



Florida Department of Environmental Protection

Water Quality Restoration Program

Orange Creek Basin Meeting November 16, 2016

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Next Step Agriculture

- DACS completed another round of follow-up with Orange Creek Basin producers.
- For producers that have not responded to offer of assistance:
 - DEP has found alternate addresses for owners. One last attempt to contact them.
 - If no response DEP will send warning letter notifying producer that they appear to have not implemented the requirements of Section 403.067(7)(b)2.g., Florida Statutes.
- Future potential for compliance enforcement action, Notice of Violation, if no response to Warning Letter.

Water Quality Review



Orange Lake Tributaries

- Focused water quality evaluation on:
 - Urban streams bacteriological quality.
 - Prairie Creek.
 - River Styx.
 - Cross Creek.

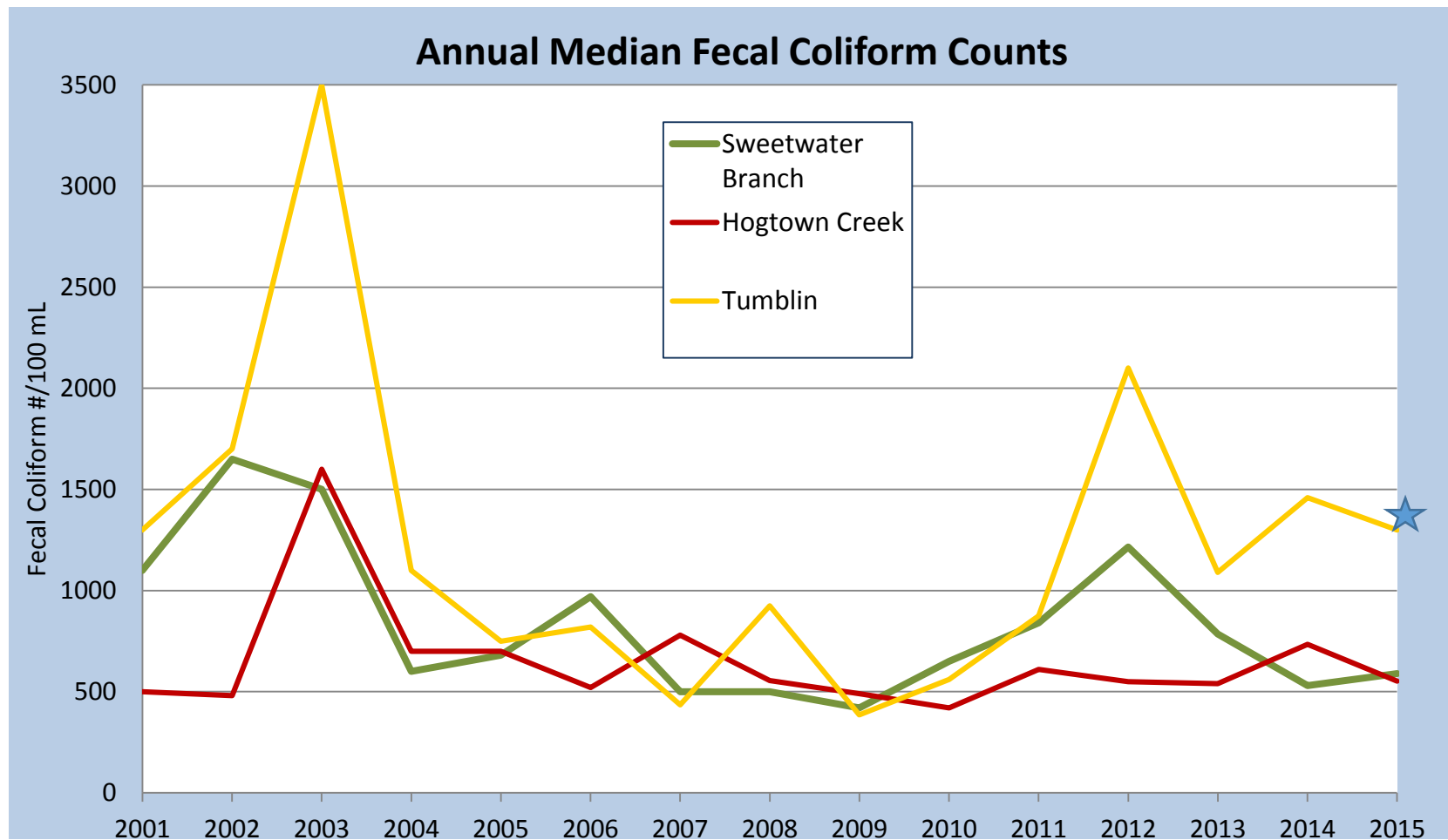


Data Comparisons

- Review of bacteriological data for urban streams; Hogtown Creek, Sweetwater Branch, and Tumblin Creek.
- Compared annual TN and TP concentrations and loading for tributaries.
- Required at least 1 sample per season.
- Lake data collected by SJRWMD and Lake Watch. Bacteriological data provided by Alachua County EPD.



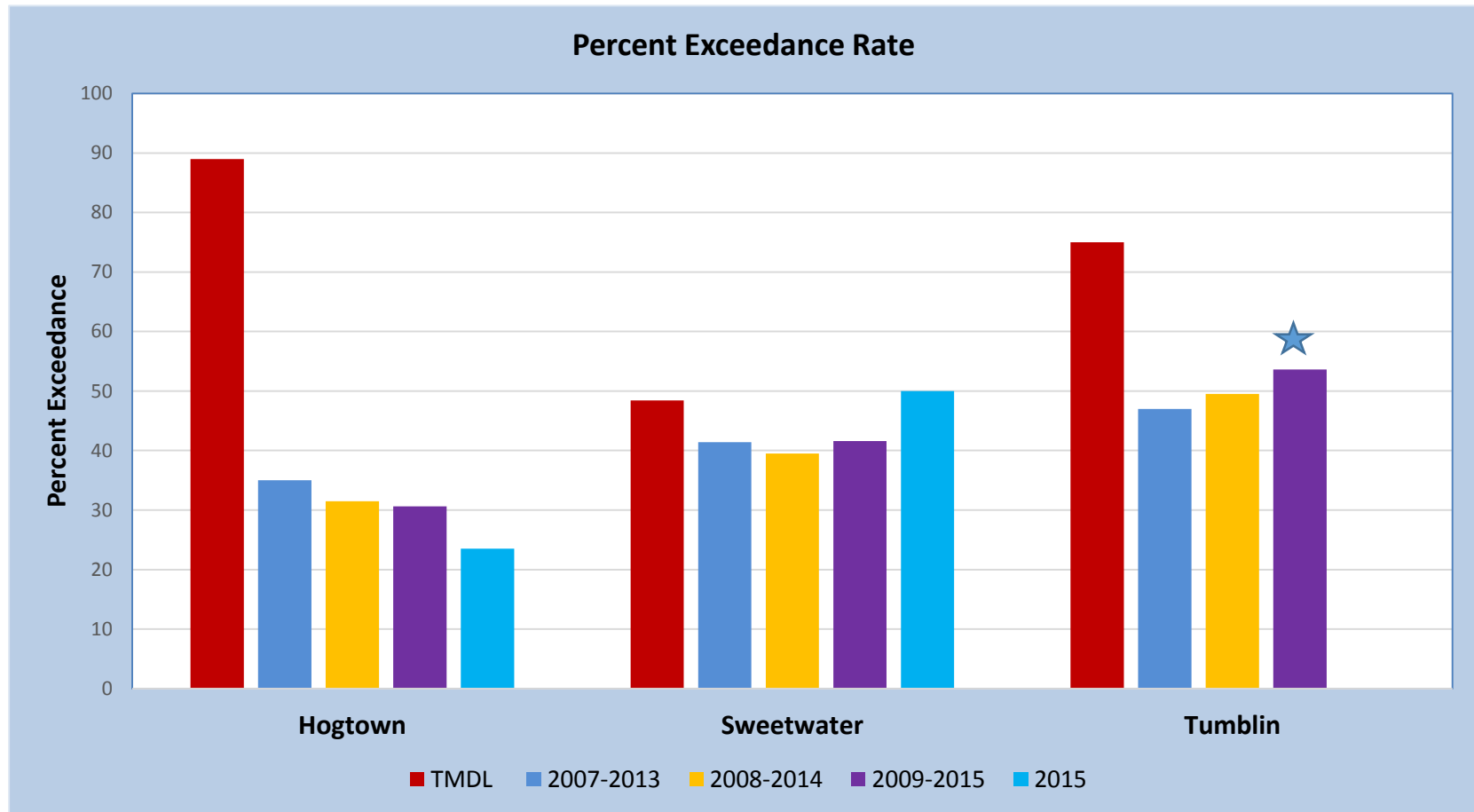
Bacteriological Quality



★ 2015 incomplete data



Exceedances



★ 2015 incomplete data



Stream Nutrient Regions

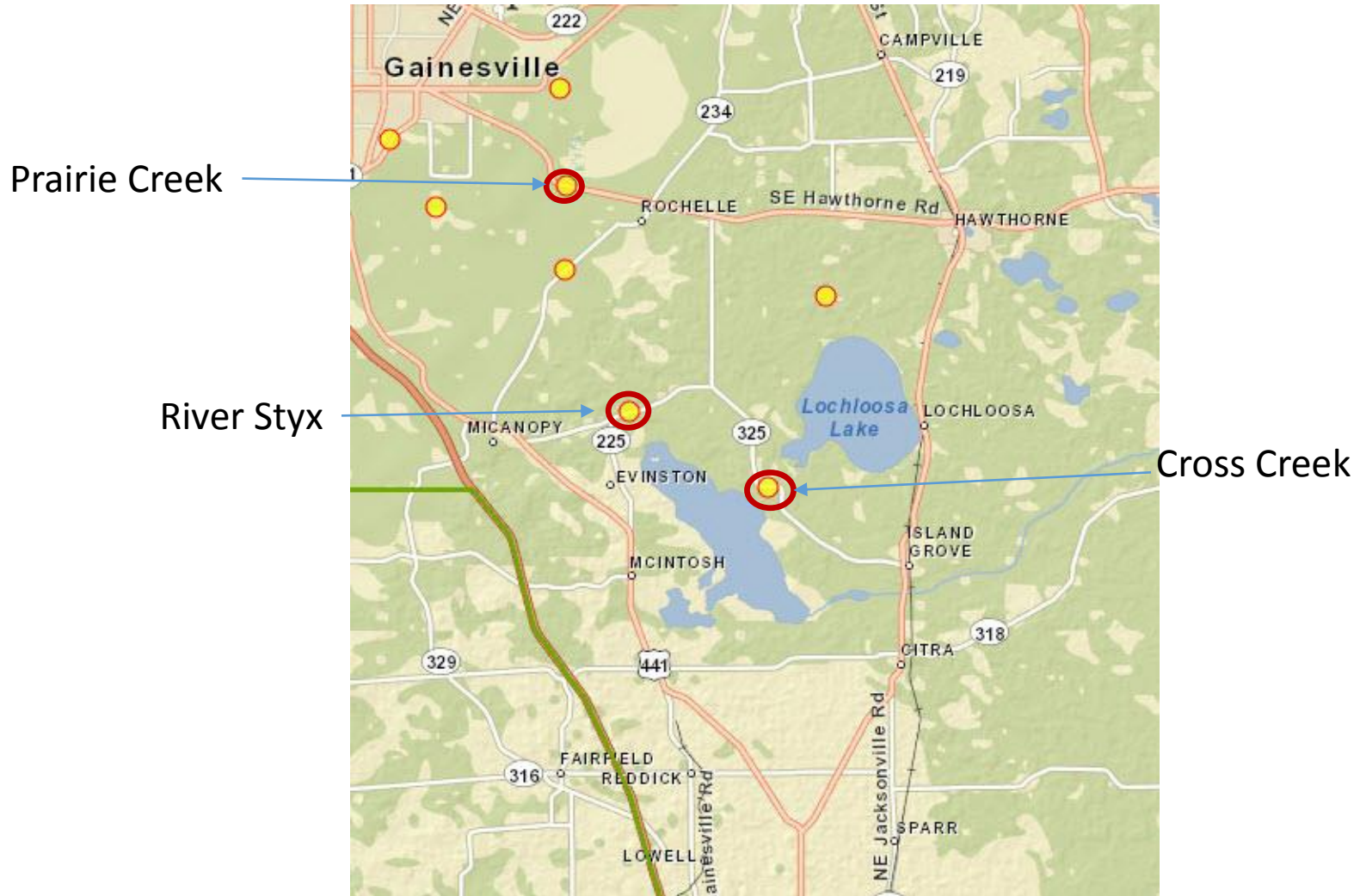
- Newnans, Lochloosa, and Orange Lakes Watershed are in Peninsular region.
- These values are annual geometric mean concentrations not to be exceeded more than once in any three calendar years

TN and TP Criteria for Florida Streams (Subparagraph 62-302.531[2][c]2, F.A.C.)

Nutrient Watershed Region	TP Threshold	TN Threshold
Panhandle West	0.06 mg/L	0.67 mg/L
Panhandle East	0.18 mg/L	1.03 mg/L
North Central	0.30 mg/L	1.87 mg/L
Peninsular	0.12 mg/L	1.54 mg/L
West Central	0.49 mg/L	1.65 mg/L
South Florida	No numeric nutrient threshold. The narrative criterion in Paragraph 62- 302.530(47)(b), F.A.C., applies. No numeric nutrient threshold. The narrative criterion in Paragraph 62-302.530(47)(b), F.A.C., applies.	



Discharge Gage Locations





Prairie Creek Chlorophyll a Summary

Year	Number of Samples	Minimum ug/L	Maximum ug/L	Arithmetic Mean ug/L	Geometric Mean ug/L
1997	12	20.359	340.425	176.915	141.054
1998	11	36.090	317.997	96.509	79.202
1999	10	26.914	361.785	135.844	100.441
2010	1	135.903	135.903	135.903	135.903
2011	5	26.700	119.705	88.929	78.878
2012	3	34.123	204.522	95.942	70.016
2013	6	30.705	58.359	39.384	38.430
2014	6	15.326	113.475	51.417	41.795
2015	6	56.604	137.772	78.293	74.625
2016	3	92.560	166.074	124.303	120.659



Prairie Creek Total Nitrogen Summary

Year	Number of Samples	Minimum mg/L	Maximum mg/L	Arithmetic Mean mg/L	Geometric Mean mg/L
1997	12	1.309	5.911	3.676	3.351
1998	11	1.096	4.238	2.338	2.214
1999	9	3.377	6.334	4.661	4.543
2003	3	2.121	2.446	2.254	2.249
2004	12	1.977	5.100	2.804	2.713
2005	12	1.652	2.507	2.157	2.140
2006	12	1.377	3.096	2.180	2.107
2007	9	2.671	7.574	4.391	4.033
2008	12	1.994	4.435	3.297	3.238
2009	12	3.032	5.956	4.180	4.110
2010	12	3.633	6.945	5.477	5.351
2011	5	2.038	6.886	4.683	4.357
2012	3	2.412	3.693	3.003	2.958
2013	6	1.898	3.818	2.512	2.437
2014	6	1.875	3.216	2.378	2.330
2015	6	1.892	3.702	2.610	2.551
2016	3	3.179	4.043	3.589	3.571

Highlighted numbers exceed numeric nutrient criteria



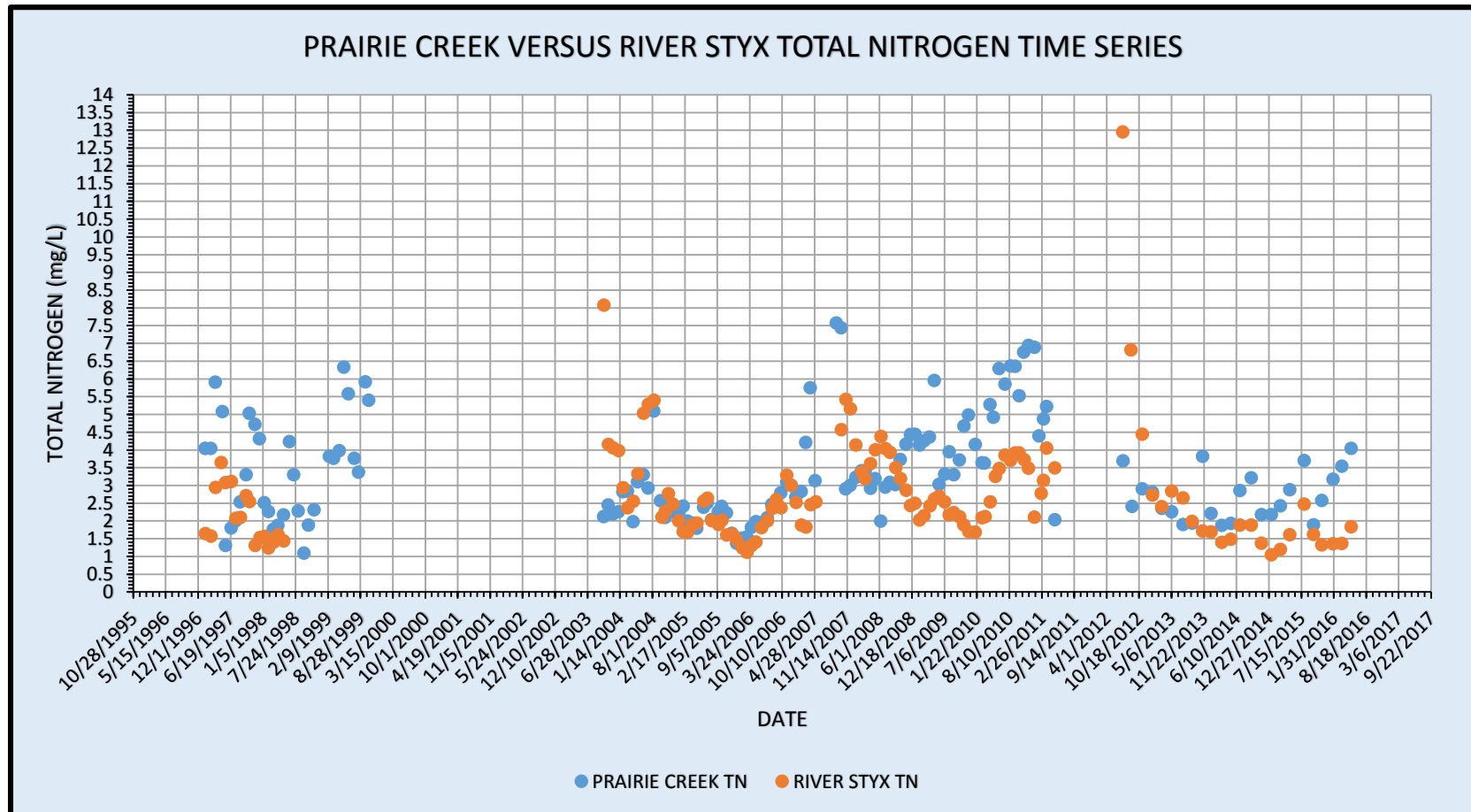
Prairie Creek Total Phosphorus Summary

Year	N of Cases	Minimum mg/L	Maximum mg/L	Arithmetic Mean mg/L	Geometric Mean mg/L
1997	12	0.016	0.222	0.142	0.124
1998	11	0.064	0.203	0.115	0.110
1999	10	0.095	0.888	0.249	0.197
2003	3	0.090	0.125	0.102	0.101
2004	12	0.107	0.325	0.159	0.151
2005	12	0.074	0.169	0.119	0.117
2006	12	0.099	0.223	0.161	0.157
2007	9	0.170	0.650	0.285	0.257
2008	12	0.117	0.254	0.196	0.192
2009	12	0.157	0.393	0.241	0.232
2010	12	0.203	0.425	0.345	0.337
2011	5	0.101	0.389	0.287	0.259
2012	3	0.157	1.116	0.482	0.311
2013	6	0.085	0.311	0.150	0.136
2014	6	0.103	0.207	0.137	0.133
2015	6	0.079	0.185	0.127	0.121
2016	3	0.112	0.291	0.203	0.189

Highlighted numbers exceed numeric nutrient criteria

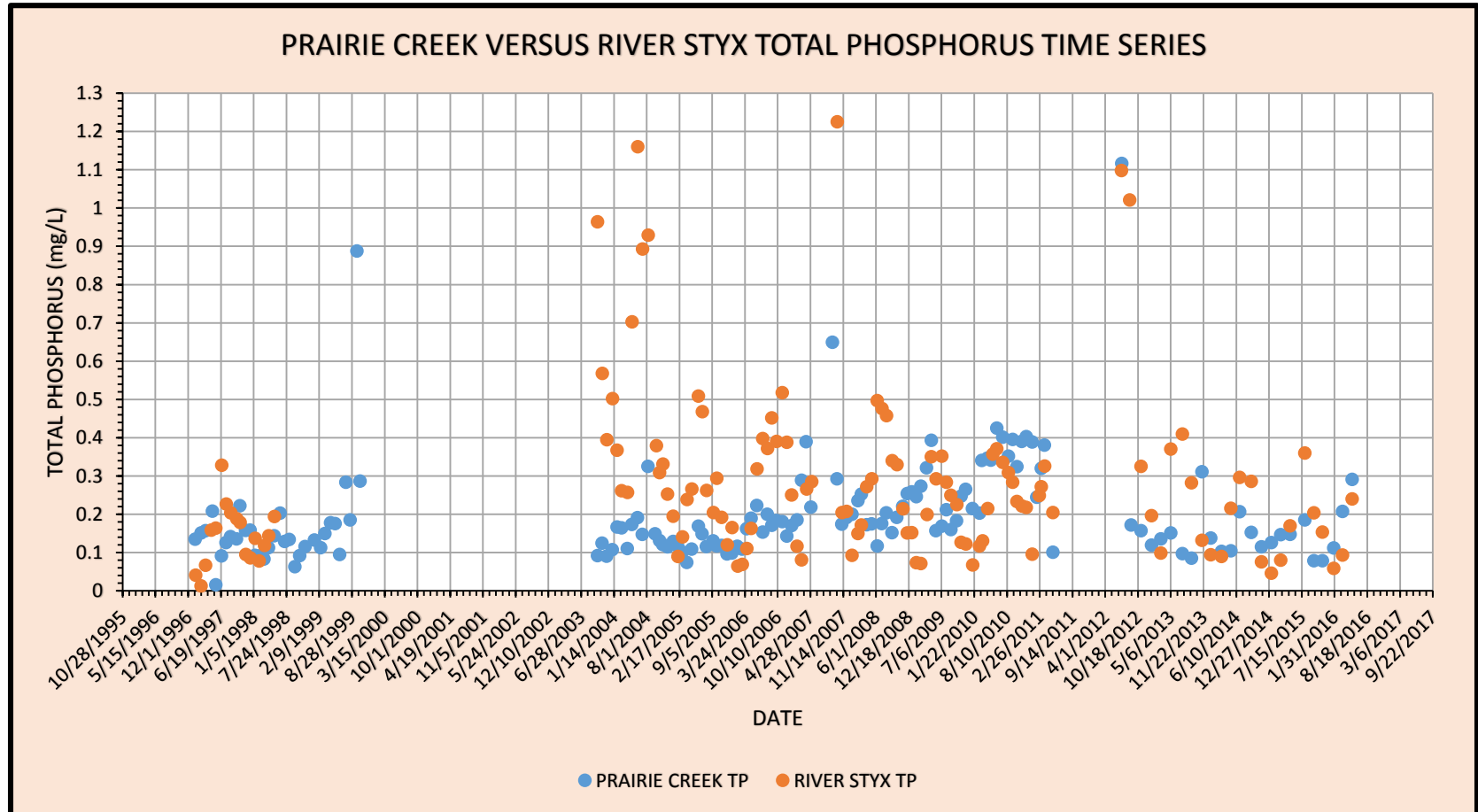


Prairie Creek Total Nitrogen





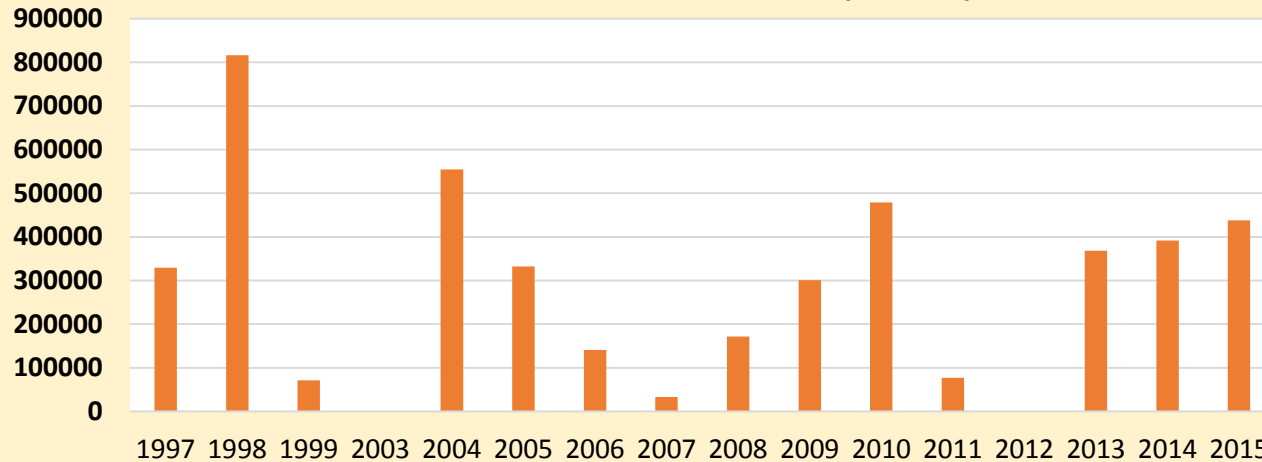
Prairie Creek Total Phosphorus



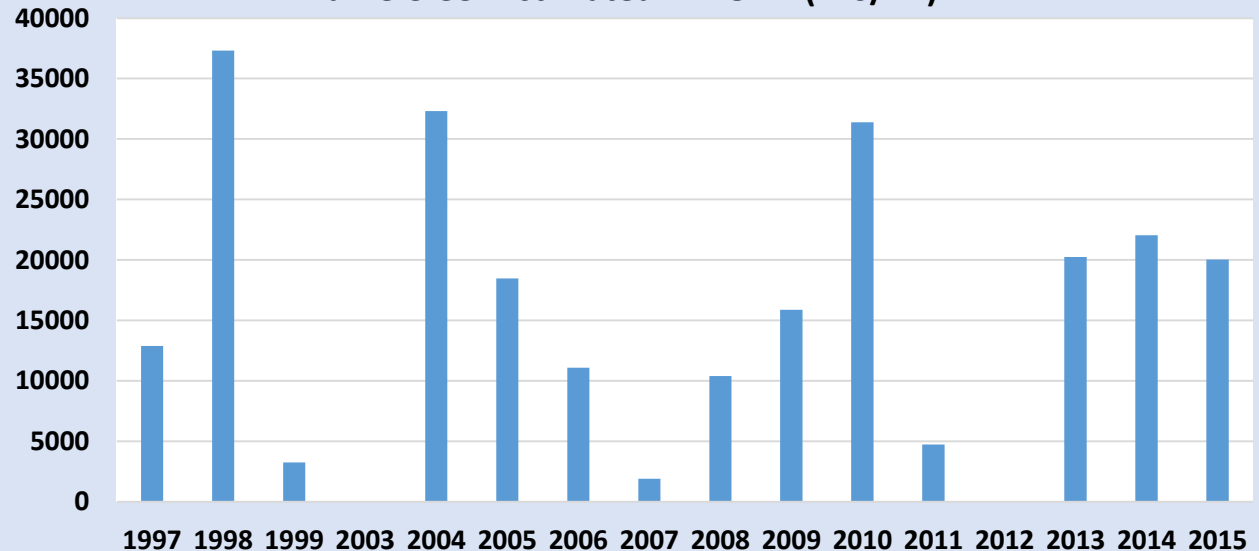


Prairie Creek Loading

Prairie Creek Estimated TN LOAD (LBS/YR)

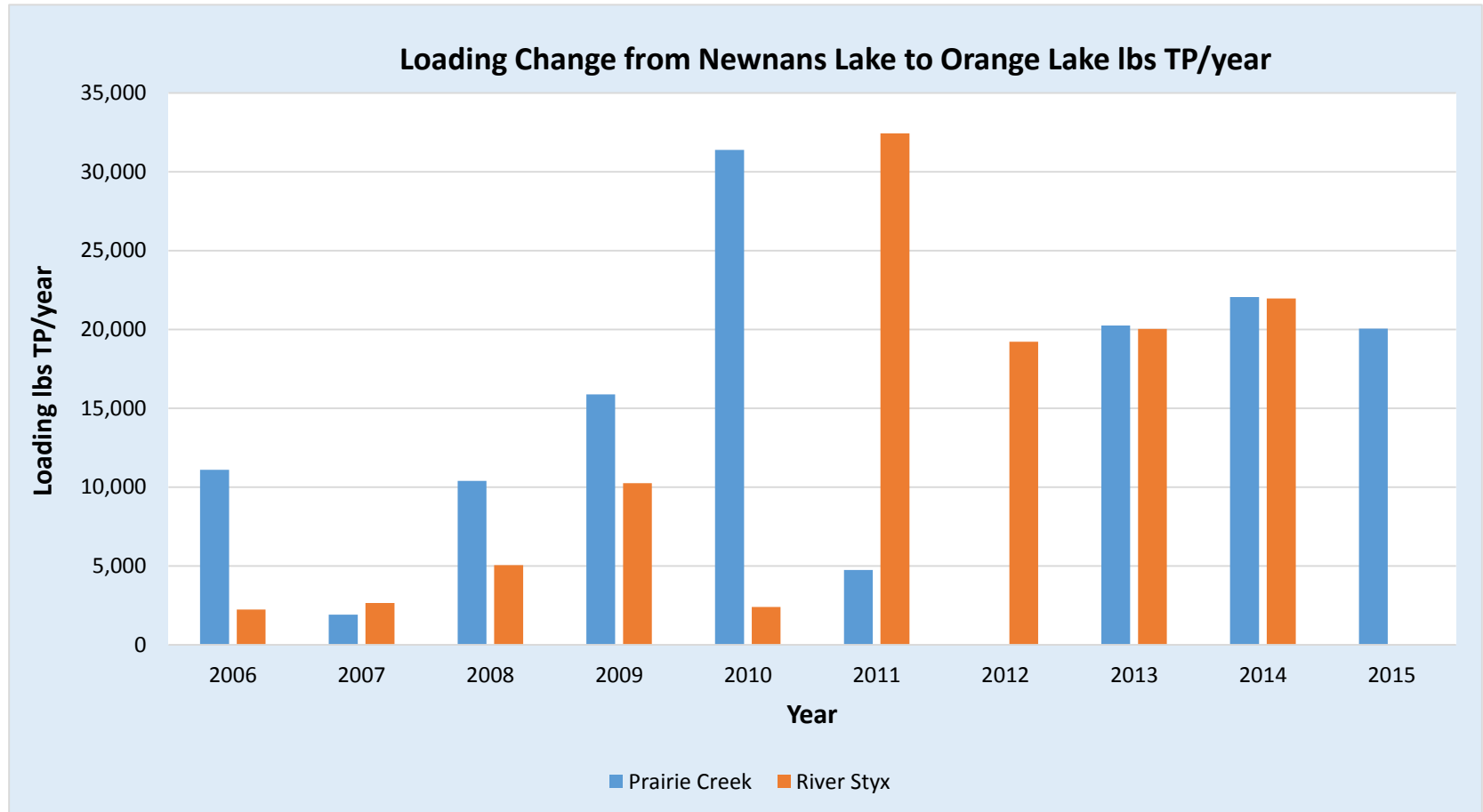


Prairie Creek Estimated TP LOAD (LBS/YR)



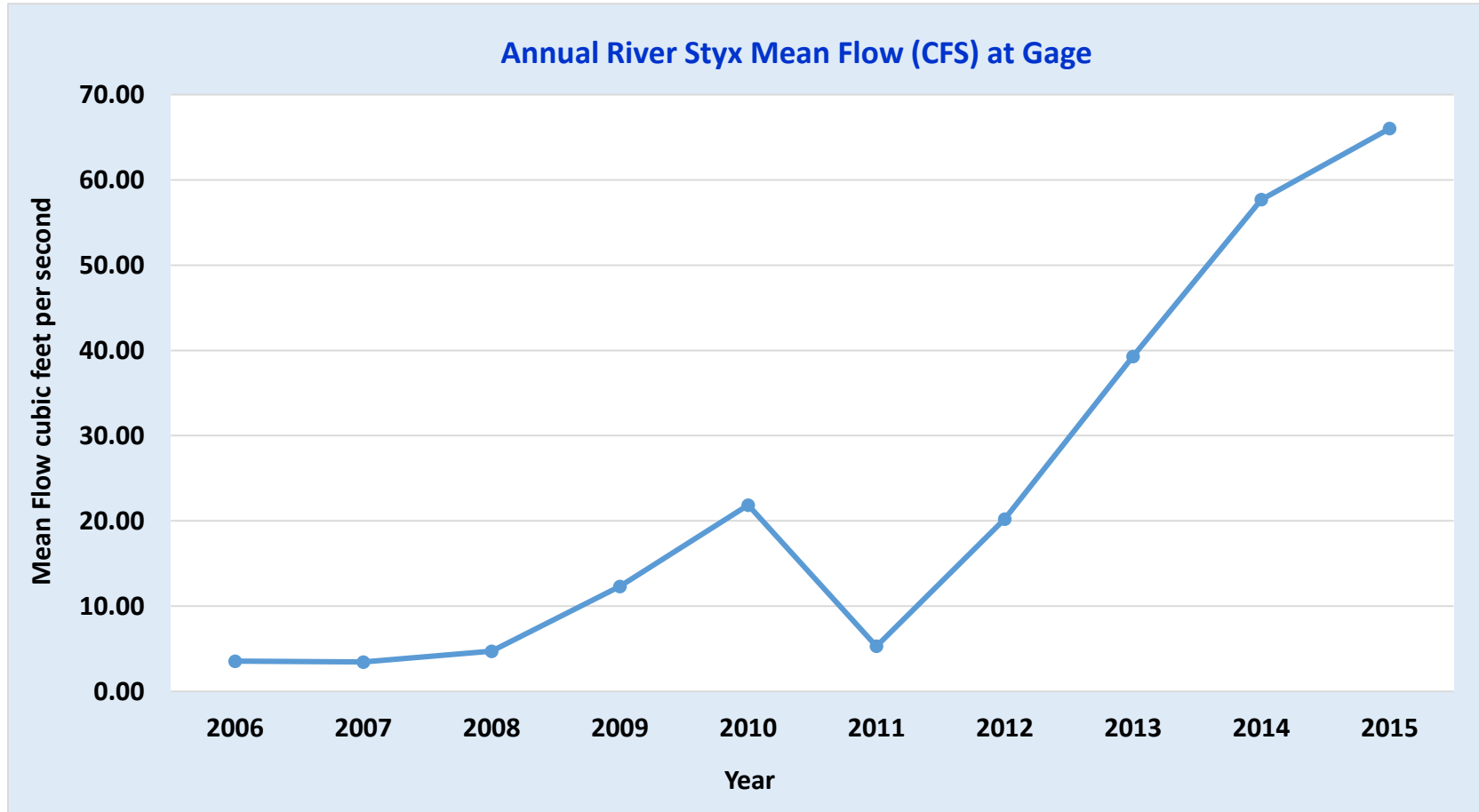


Total Phosphorus Loading Comparison





River Styx Discharge





River Styx Water Quality

YEAR	Number of Samples	RIVER STYX TP MEAN (mg/L)	RIVER STYX TP ANNUAL GEOMETRIC MEAN (mg/L)	RIVER STYX TN MEAN (mg/L)	RIVER STYX TN ANNUAL GEOMETRIC MEAN (mg/L)
1997	12	0.146	0.112	2.36	2.24
1998	5	0.134	0.129	1.45	1.45
2003	3	0.642	0.600	5.43	5.15
2004	12	0.529	0.457	3.38	3.19
2005	12	0.248	0.221	1.96	1.94
2006	12	0.284	0.230	2.00	1.88
2007	8	0.330	0.235	3.30	3.02
2008	12	0.287	0.255	3.55	3.51
2009	12	0.208	0.183	2.26	2.24
2010	12	0.238	0.215	3.15	3.03
2011	5	0.230	0.213	3.12	3.04
2012	3	0.815	0.714	8.07	7.32
2013	6	0.248	0.219	2.39	2.35
2014	6	0.176	0.151	1.62	1.61
2015	6	0.169	0.138	1.55	1.48

Highlighted numbers exceed numeric nutrient criteria



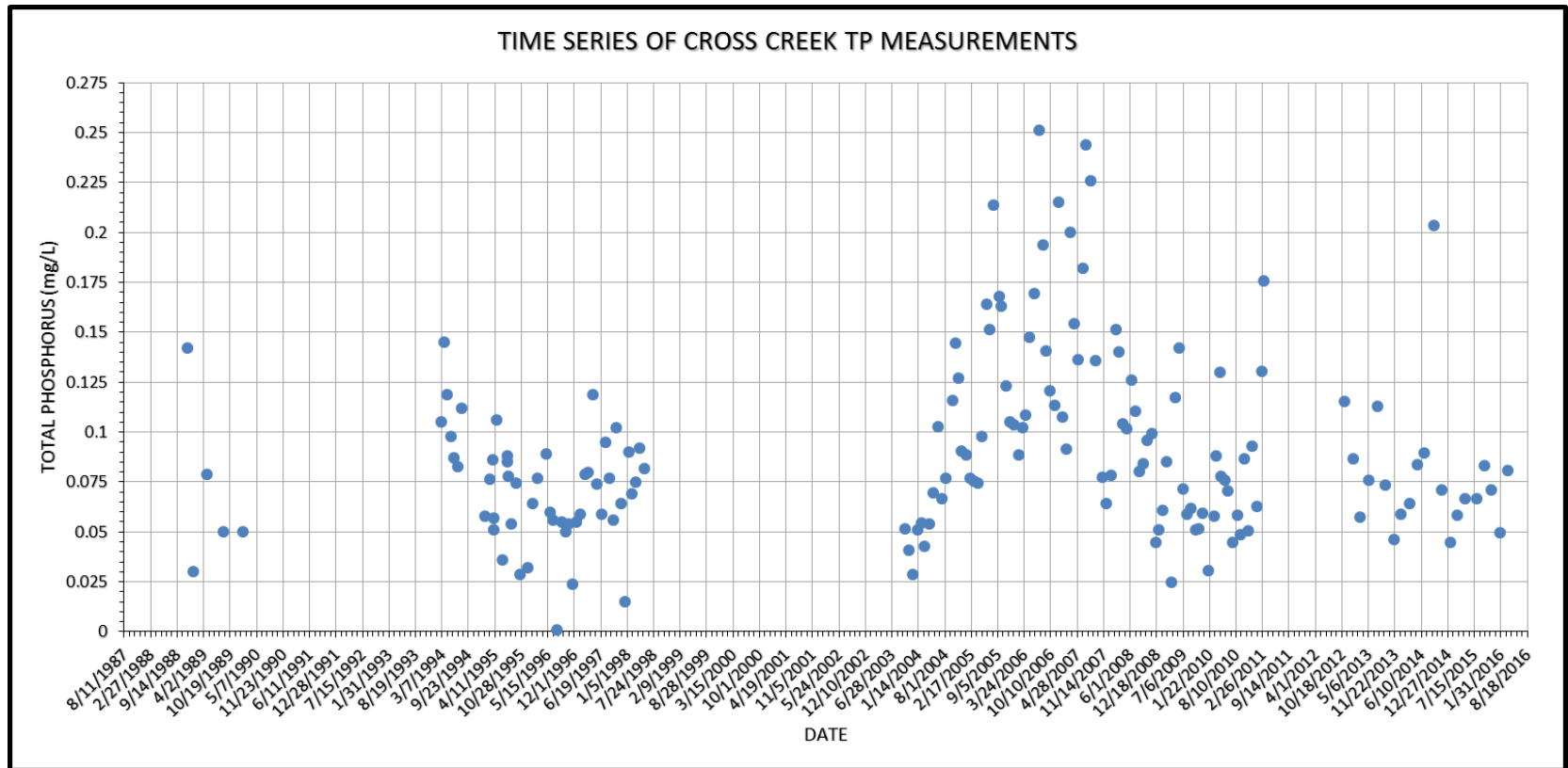
Estimated River Styx Loadings

YEAR	N	Arithmetic Mean (CFS)	RIVER STYX TN MEAN (mg/L)	RIVER STYX TP MEAN (mg/L)	ANNUAL TN LOAD (LBS/YR)	ANNUAL TP LOAD (LBS/YR)
2006	146	3.53	2.00	0.284	13,857	2,229
2007	203	3.43	3.30	0.330	22,303	2,654
2008	359	4.69	3.55	0.287	32,856	5,048
2009	364	12.31	2.26	0.208	54,672	10,255
2010	364	21.85	3.15	0.238	135,398	2,387
2011	148	5.28	3.12	0.230	32,403	32,432
2012	274	20.22	8.07	0.815	321,323	19,214
2013	365	39.30	2.39	0.248	184,741	20,032
2014	365	57.70	1.62	0.176	184,121	21,959
2015	365	66.04	1.55	0.169	201,031	0
2006-2015 Average		23.43	3.10	0.30	118,270	11,621

- TMDL estimated average TP loading of 10,344 lbs/yr.

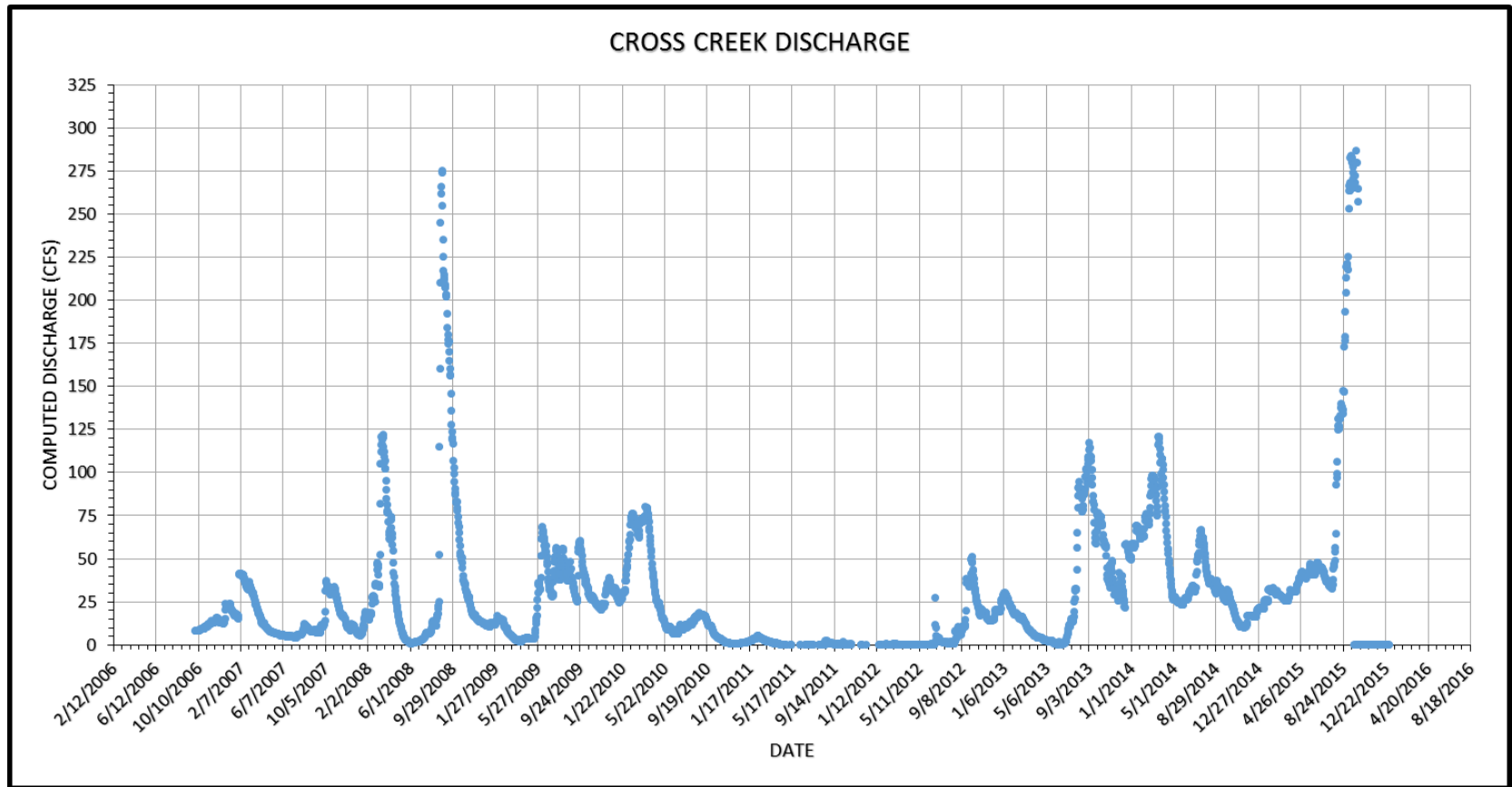


Cross Creek Total Phosphorus





Cross Creek Discharge





Cross Creek TP Summary

Year	N	MIN	MAX	Median	Arithmetic Mean	Geometric Mean	STD DEV
1988	1	0.142	0.142				
1989	3	0.030	0.079	0.050	0.053	0.049	0.0246
1990	1	0.050	0.050				
1994	7	0.083	0.145	0.105	0.107	0.105	0.0212
1995	14	0.029	0.106	0.066	0.065	0.061	0.0234
1996	11	0.001	0.089	0.055	0.053	0.039	0.0237
1997	12	0.015	0.119	0.076	0.073	0.067	0.0264
1998	5	0.069	0.092	0.082	0.082	0.081	0.0098
2003	3	0.029	0.051	0.041	0.040	0.039	0.0113
2004	12	0.043	0.144	0.073	0.083	0.077	0.0330
2005	12	0.074	0.214	0.114	0.125	0.118	0.0459
2006	12	0.089	0.251	0.131	0.146	0.139	0.0512
2007	11	0.064	0.244	0.136	0.147	0.135	0.0603
2008	12	0.045	0.152	0.101	0.101	0.097	0.0290
2009	12	0.025	0.142	0.060	0.070	0.064	0.0318
2010	13	0.031	0.130	0.071	0.070	0.066	0.0260
2011	3	0.063	0.176	0.131	0.123	0.113	0.0570
2012	1	0.115	0.115				
2013	6	0.046	0.113	0.075	0.075	0.073	0.0233
2014	6	0.059	0.204	0.077	0.095	0.086	0.0543
2015	6	0.045	0.083	0.067	0.065	0.064	0.0129



Cross Creek TMDL

- TMDLs in rule making for Cross Creek and Lochloosa Lake.
- Only covers Cross Creek located within Alachua County.
- TMDL loads identified. Total loading is sum of:
 - Cross Creek watershed loading. Smaller of the 2 sources.
 - Loading from Lochloosa Lake. Typically more than 95% of loading.
- TMDL requires reduction from Lochloosa Lake, but not Cross Creek watershed.
- TMDL requires 40% TP loading reduction and 46% TN loading reduction.
- TMDL will not be allocated.



Estimated Cross Creek TP Loading

Year	Current Cross Creek Watershed TP Load (lbs/yr)	Current from Lochloosa TP Load (lbs/yr)	Total Current TP Load (lbs/yr)	TMDL from Lochloosa TP Load (lbs/yr)	Total Cross Creek TMDL TP Load (lbs/yr)	% Reduction
2004	245	4,718	4,963	3,578	3,823	23%
2005	302	8,788	9,090	4,224	4,526	50%
2006	119	7,500	7,619	3,479	3,598	53%
2007	159	4,059	4,217	2,597	2,756	35%
2008	209	7,932	8,142	4,037	4,246	48%
2009	159	2,504	2,663	2,288	2,447	8%
2010	130	1,724	1,854	1,671	1,801	3%
2004–10 Average	189	5,318	5,507	3,125	3,314	40%

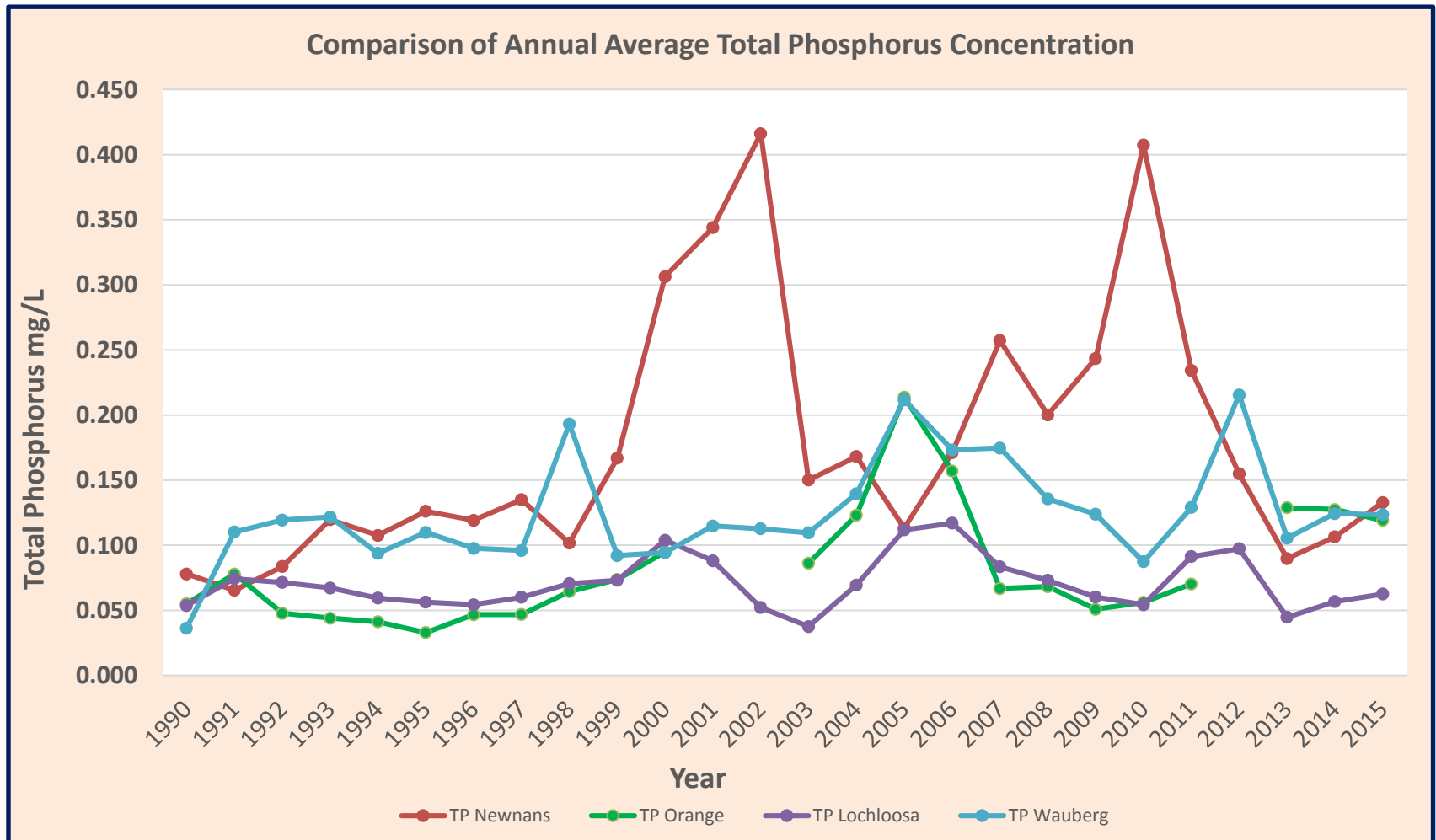


Estimated Cross Creek TN Loading

YEAR	CURRENT CROSS CREEK WATERSHED TN LOAD (KG/YR)	CURRENT FROM LOCHLOOSA TN LOAD (KG/YR)	TOTAL CURRENT TN LOAD (KG/YR)	TMDL FROM LOCHLOOSA TN LOAD (KG/YR)	TOTAL CROSS CREEK TMDL TN LOAD (KG/YR)	% REDUCTION
2004	1,093	53,020	54,113	34,316	35,409	35%
2005	1,402	58,543	59,945	40,171	41,573	31%
2006	508	41,670	42,178	33,124	33,632	20%
2007	723	47,492	48,215	25,224	25,947	46%
2008	956	118,575	119,531	37,953	38,909	67%
2009	649	41,873	42,522	22,169	22,818	45%
2010	495	33,594	34,089	16,355	16,850	51%
2004–10 Average	832	56,395	57,228	29,902	30,734	46%



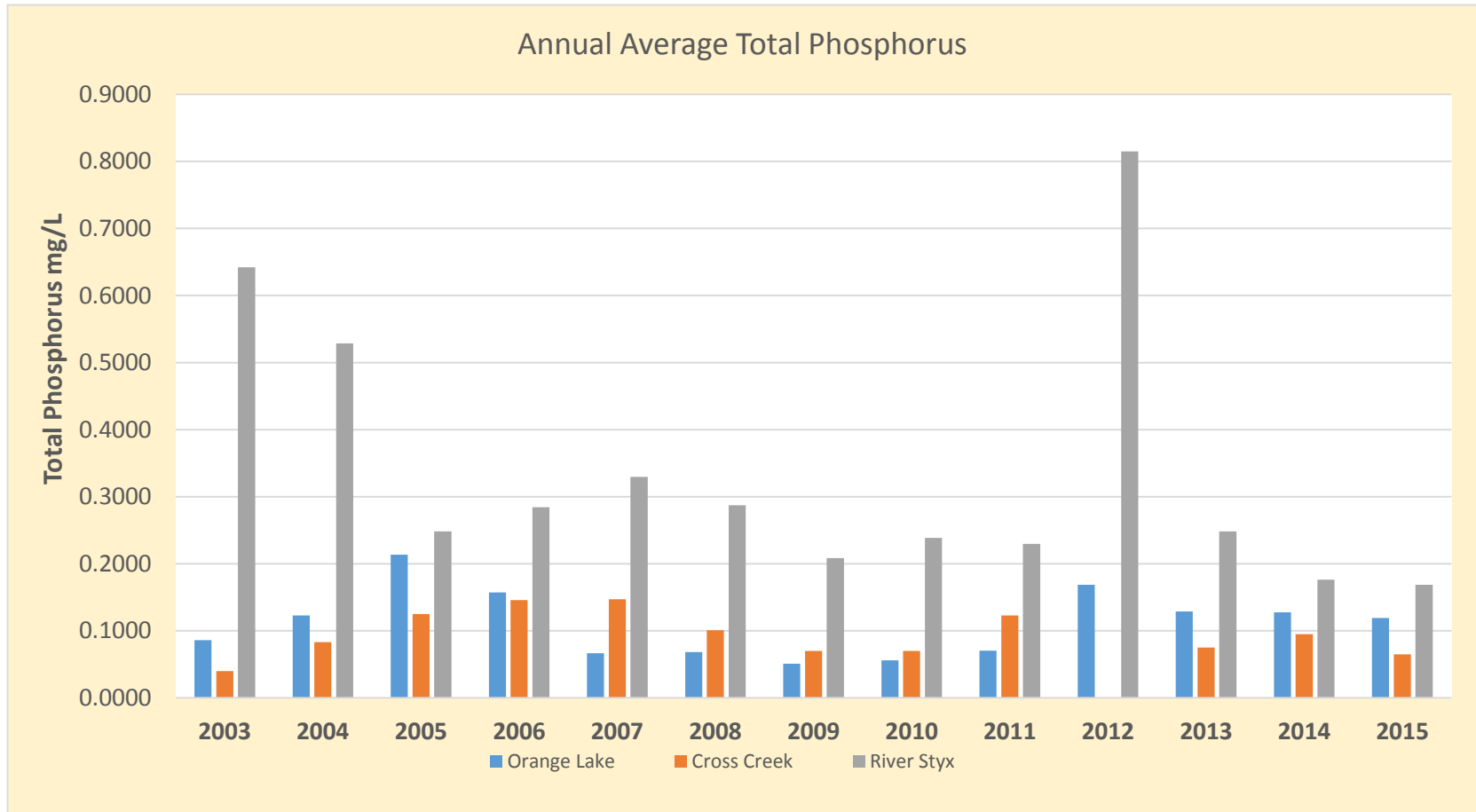
Annual Average Total Phosphorus



- For comparison purposes Lochloosa values are arithmetic means.



Total Phosphorus Comparison





Lochloosa TMDL

- Watershed includes 3 jurisdictions.
 - Alachua County
 - FDOT, District 2
 - Hawthorne
- OSTDS included in watershed loading, not a separate source of loading.
- Model separate:
 - Watershed loading.
 - Internal recycling.
 - Atmospheric deposition.



Land Use Categories

Anthropogenic

URBAN

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Industrial/Commercial
- Open Land
- Pasture
- Agriculture Trees
- Agriculture Crops

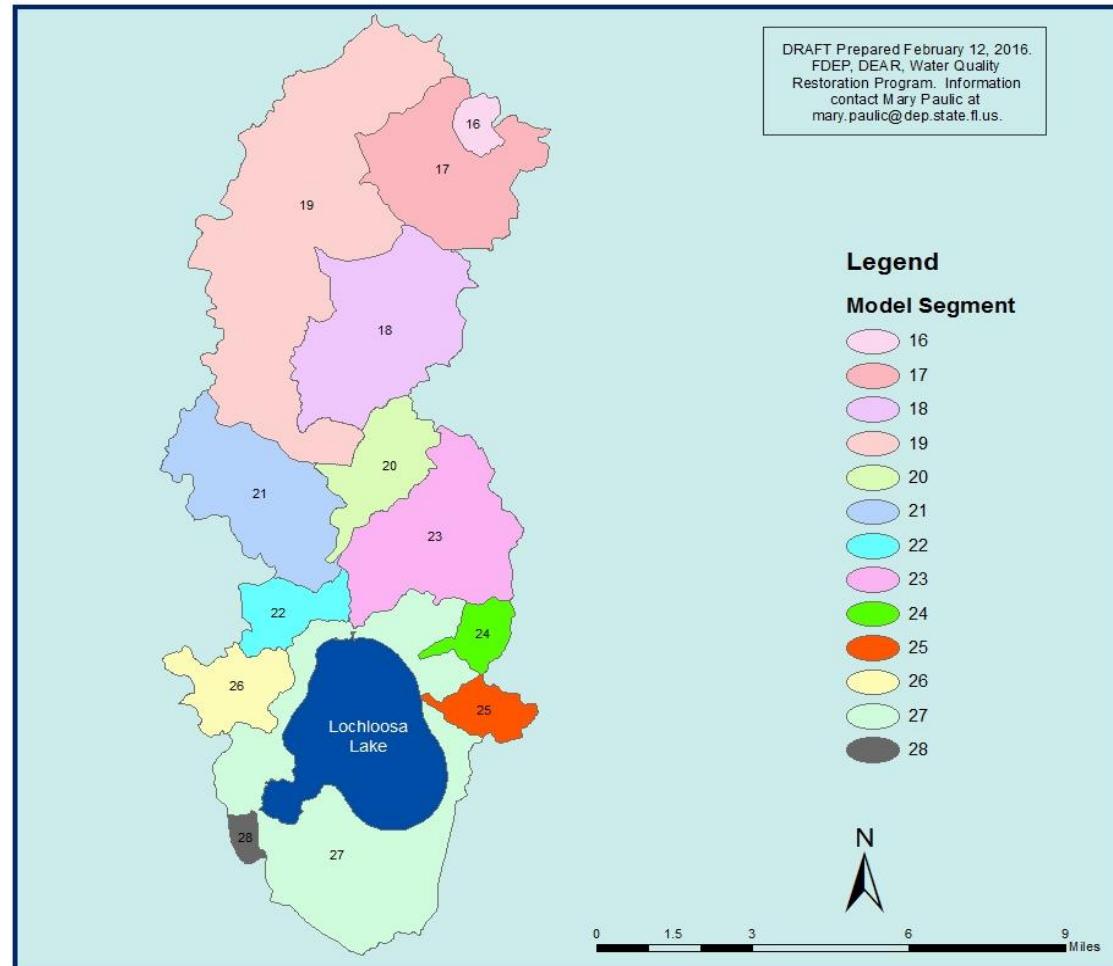
Natural Lands

- Forest
- Forest Regeneration
- Rangeland
- Water
- Wetlands



Characteristics

- TMDL identifies:
 - Watershed Loading.
 - HSPF modeled.
 - Build up and wash off.
 - Estimates moisture condition in soil.
 - Atmospheric Deposition.
 - Internal Loading.





Lochloosa Lake TMDL

YEAR	CURRENT WATERSHED TP LOAD (KG/YR)	CURRENT INTERNAL TP LOAD (KG/YR)	ATMOSPHERIC DEPOSITION (KG/YR)	TOTAL CURRENT TP LOAD (KG/YR)	TMDL WATERSHED TP LOAD (KG/YR)	TMDL INTERNAL TP LOAD (KG/YR)	TOTAL TMDL TP LOAD (KG/YR)	% REDUCTION	TOTAL TP REDUCTION (KG/YR)
2004	10,424	734	2,246	13,404	6,369	440	9,055	32%	
2005	6,235	7,865	2,442	16,542	1,730	1,966	6,138	63%	
2006	2,626	5,740	1,893	10,259	373	574	2,840	72%	
2007	4,121	1,723	1,793	7,637	1,533	603	3,929	49%	
2008	9,300	671	1,833	11,804	2,417	335	4,585	61%	
2009	3,171	422	1,767	5,360	2,575	338	4,680	13%	
2010	2,119	74	1,515	3,708	1,927	74	3,516	5%	
2011	245	-	1,182	-	-	-	-	-	
2004–10 Average	5,428	2,461	1,927	9,816	2,418	619	4,963	49%	4,853

YEAR	CURRENT WATERSHED TN LOAD (KG/YR)	CURRENT INTERNAL TN LOAD (KG/YR)	ATMOSPHERIC DEPOSITION (KG/YR)	TOTAL CURRENT TN LOAD (KG/YR)	TMDL WATERSHED TN LOAD (KG/YR)	TMDL INTERNAL TN LOAD (KG/YR)	TOTAL TMDL TN LOAD (KG/YR)	% REDUCTION	TOTAL TN REDUCTION (KG/YR)
2004	103,048	77,698	41,246	221,992	43,335	38,054	122,635	45%	
2005	67,788	109,261	43,425	220,474	33,862	49,153	126,440	43%	
2006	22,892	47,574	30,073	100,539	11,321	21,428	62,822	38%	
2007	40,568	92,848	31,003	164,419	10,603	18,526	60,132	63%	
2008	44,091	335,299	31,376	410,766	8,736	33,530	73,642	82%	
2009	32,132	93,028	30,663	155,823	9,115	18,584	58,362	63%	
2010	20,340	90,970	23,442	134,752	3,701	4,533	31,676	76%	
2011	806	-	17,862	-	-	-	-	-	
2004–10 Average	47,266	120,954	33,033	201,252	17,239	26,258	76,530	62%	124,722



How to Allocate Lochloosa?

- Possible load/acre approach.

	Kg TN/acre	Kg TP/acre
TMDL	0.306	0.043
Current	0.84	0.096

- Load / acre can be applied over total acres for each category of land use.
- Applied over entire Lochloosa Lake watershed, rather than by individual sub-watershed.
- Developing refinements.



Septic Systems

- Only used systems located 200 meters or closer to lakes and their conveyances.
- Removed somewhat likely septic category from total count.
 - 629 somewhat likely category.
 - 7,267 known and likely category.
- Identified jurisdiction where septic system is located.
- Updated loading allocation to individual jurisdiction.



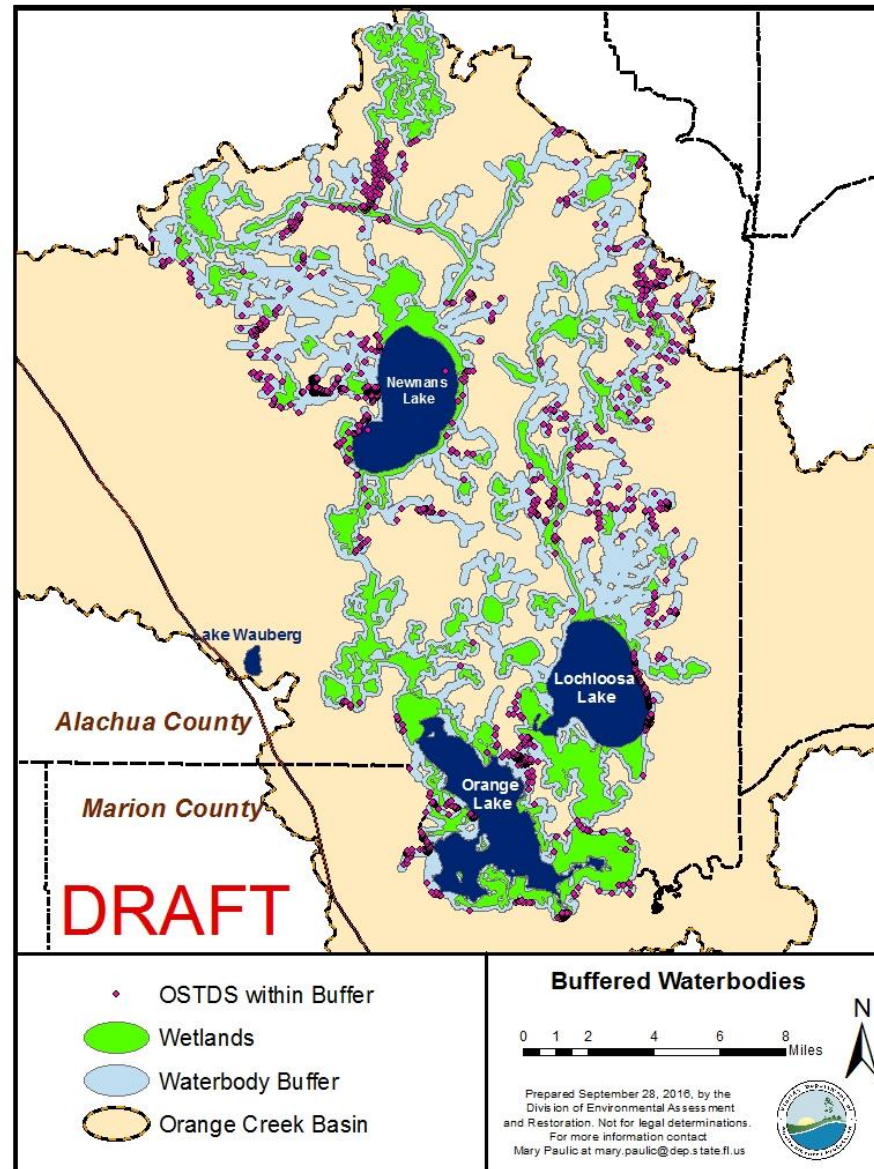
Number of Septic Systems Within 200 Meter Buffer

Entity	Basin	Number of Septic Systems	Percent of Septic within Entity	Change
Alachua County	CCRS	9	100.0%	higher
Alachua County	Hatchett Creek	137	93.8%	lower
Alachua County	Little Hatchett Creek	7	14.0%	lower
Alachua County	Lochloosa Lake	403	95.3%	higher
Alachua County	Newnans Lake	288	92.3%	lower
Alachua County	Orange Lake	54	25.8%	higher
City of Gainesville	Hatchett Creek	9	6.2%	higher
City of Gainesville	Little Hatchett Creek	43	86.0%	higher
City of Gainesville	Newnans Lake	24	7.7%	higher
Hawthorne	Lochloosa Lake	20	4.7%	lower
Marion County	Orange Lake	114	54.5%	lower
McIntosh	Orange Lake	41	19.6%	higher

- CCRS=Camps Canal River Styx.



Septic Systems Within Buffer





Education Crediting

- Education credits were added. Same crediting scheme used in all BMAPs.

Activity	Credit	Activity Details
Florida Yards and Neighborhoods program	3%	Support IFAS program or alternative
Landscaping local code/ordinance	0.50%	
Irrigation local code/ordinance	0.50%	
Fertilizer local code/ordinance	0.50%	
Pet waste management local code/ordinance	0.50%	
Public Service Announcements (PSAs)	0.25%	MS4 Program
Informational pamphlets	0.25%	MS4 Program
Website	0.25%	MS4 Program
Inspection program and call-in number for illicit discharges	0.25%	MS4 Program
Total Achievable Credit for Education Activities	6.00%	



Education Calculation

- Calculated as portion of stormwater loading for an entity.
 - Used same percent area based proportioning to assign stormwater loading to an individual entity.
 - Alachua County Orange Lake Low Density Residential = percent of land use x loading.
 - $8.5\% \times 418 \text{ lbs/yr TP} = 36$.
- Maximum of 6% of stormwater loading as credit.
 - Credit as lbs/yr = stormwater loading x percent credit.



Draft Project Credits Summary

	Hogtown Creek		Lochloosa Lake		Newnans Lake		Orange Lake		Paynes Prairie		Lake Wauberg	
	TN lbs/yr	TP lbs/yr	TN lbs/yr	TP lbs/yr	TN lbs/yr	TP lbs/yr	TN lbs/yr	TP lbs/yr	TN lbs/yr	TP lbs/yr	TN lbs/yr	TP lbs/yr
Alachua County Public Works Department	112.0	72.0			67.0	43.0			48.0	31.0		
City of Gainesville	276.9	141.3			360.1	131.6			1029.0	361.9		
FDOT, District 2	798.9	309.7	5824.2	1032.8	3414.0	524.7	257.1	54.01	75.8	48.4	163.6	34.4
FDOT, District 5							4398	2934				
Gainesville Regional Utilities	84.0	37.0							125106. 0	3359.0		
Total	1271.8	560.0	5824.2	1032.8	3841.1	699.3	4655.1	2988.0	126258. 8	3800.3	163.6	34.4



Time Frame

- Allocation of reductions. Only address watershed loading for urban sources and agriculture.
 - Break into 2 loading reduction periods.
 - First 7 years 2016 to 2023. Completes 2nd phase and 3rd phase of BMAP.
 - Propose 50 percent loading reduction.
 - Second reduction period 2023 to 2028. Second 50% reduction.
- Question to Stakeholders. Will a 12 year period to address lake impairment be adequate?
- Review of Spreadsheets.

A photograph of an empty lecture hall with rows of blue plastic seats. The seats are arranged in a tiered fashion, facing towards the front of the room. The background is a plain, light-colored wall.

• Any comments or questions???