

Ionia County

Carp

Jordan Lake

Ionia and Barry Counties

Hg Analysis:

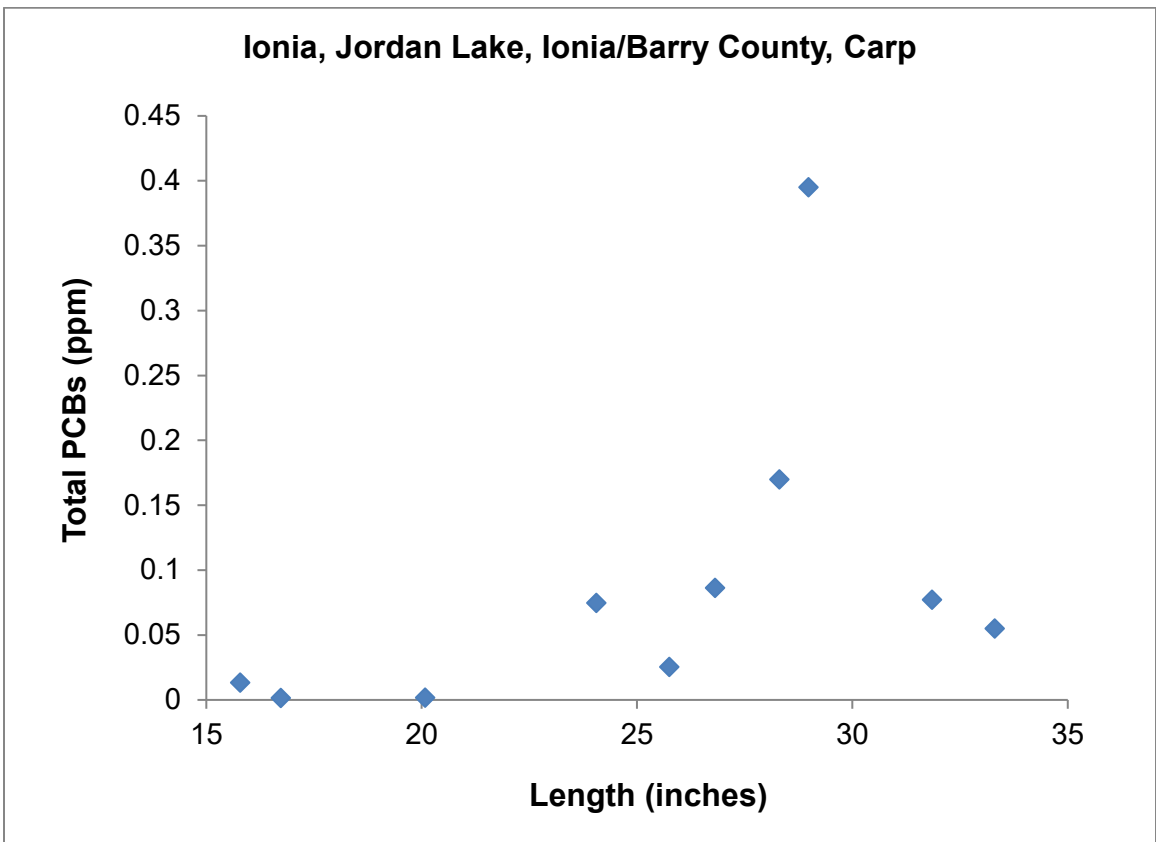
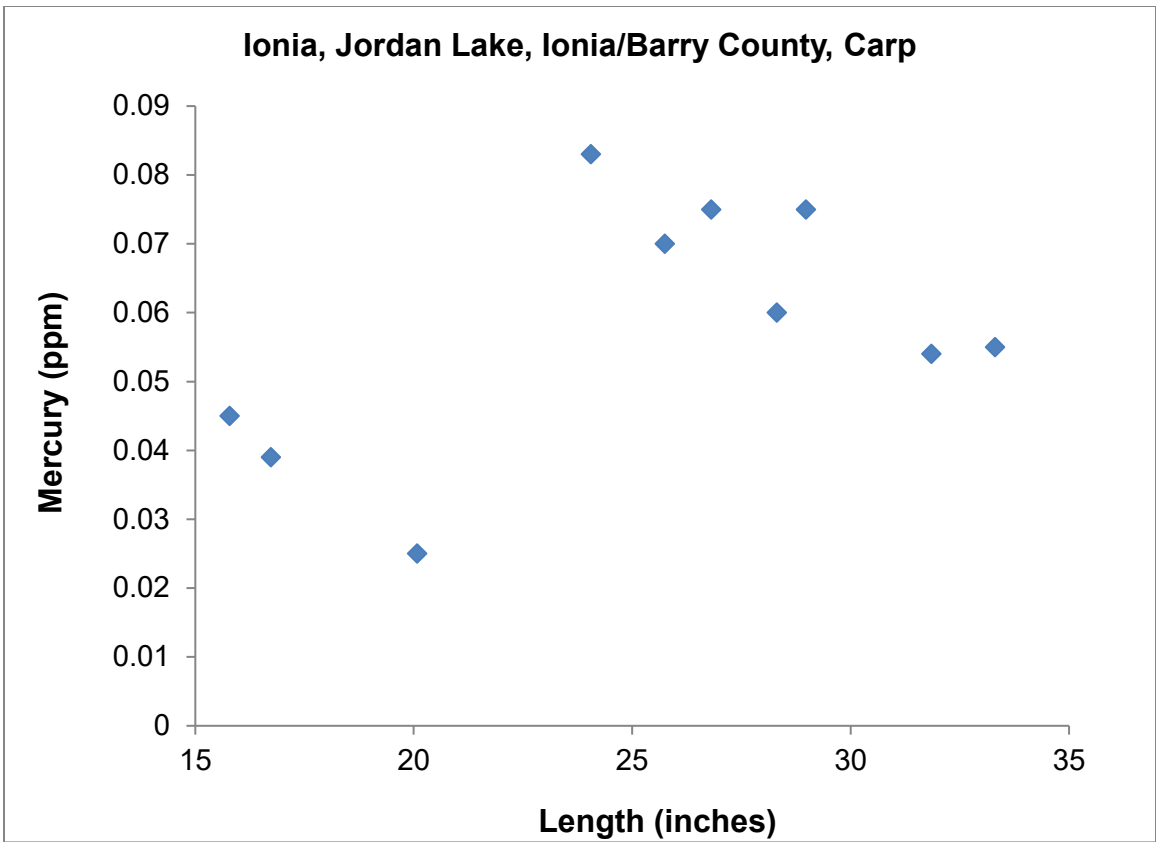
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent					
2018	2018	10	15.8	NA	15.8	33.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.058	0.025	0.083	0.071	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.234	0.272				

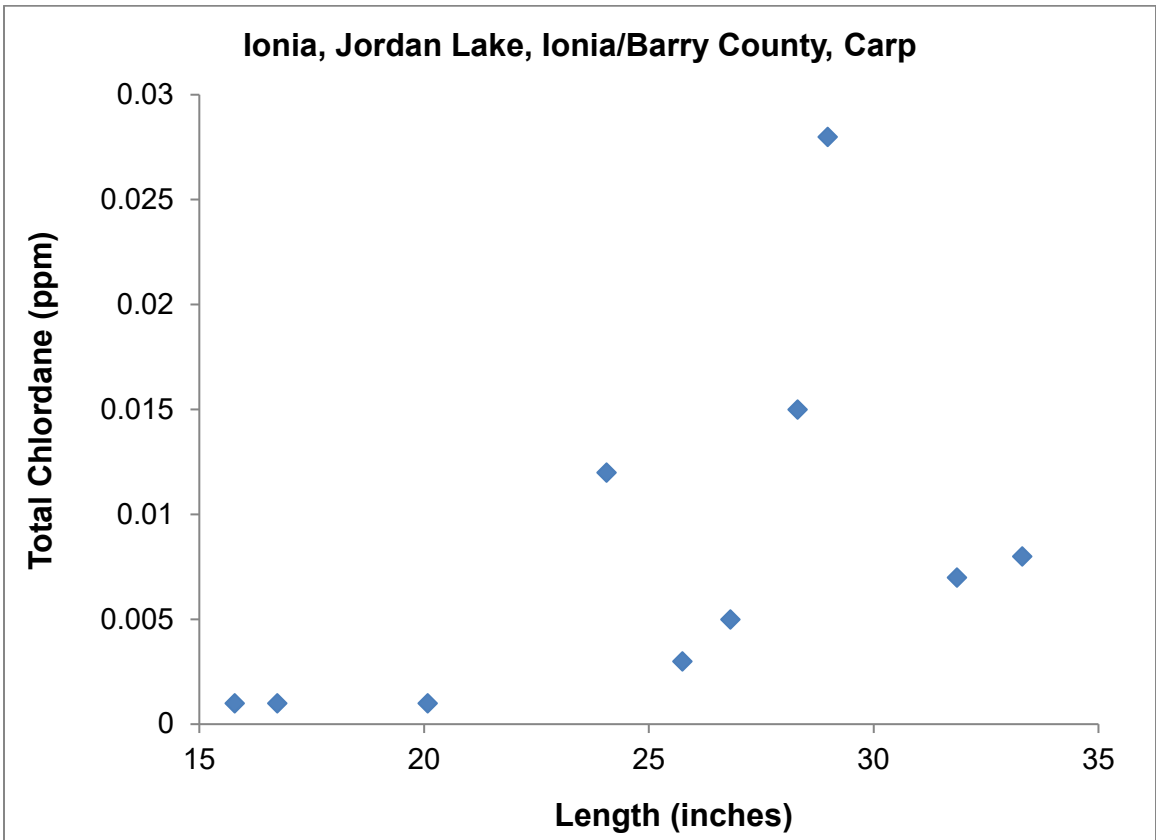
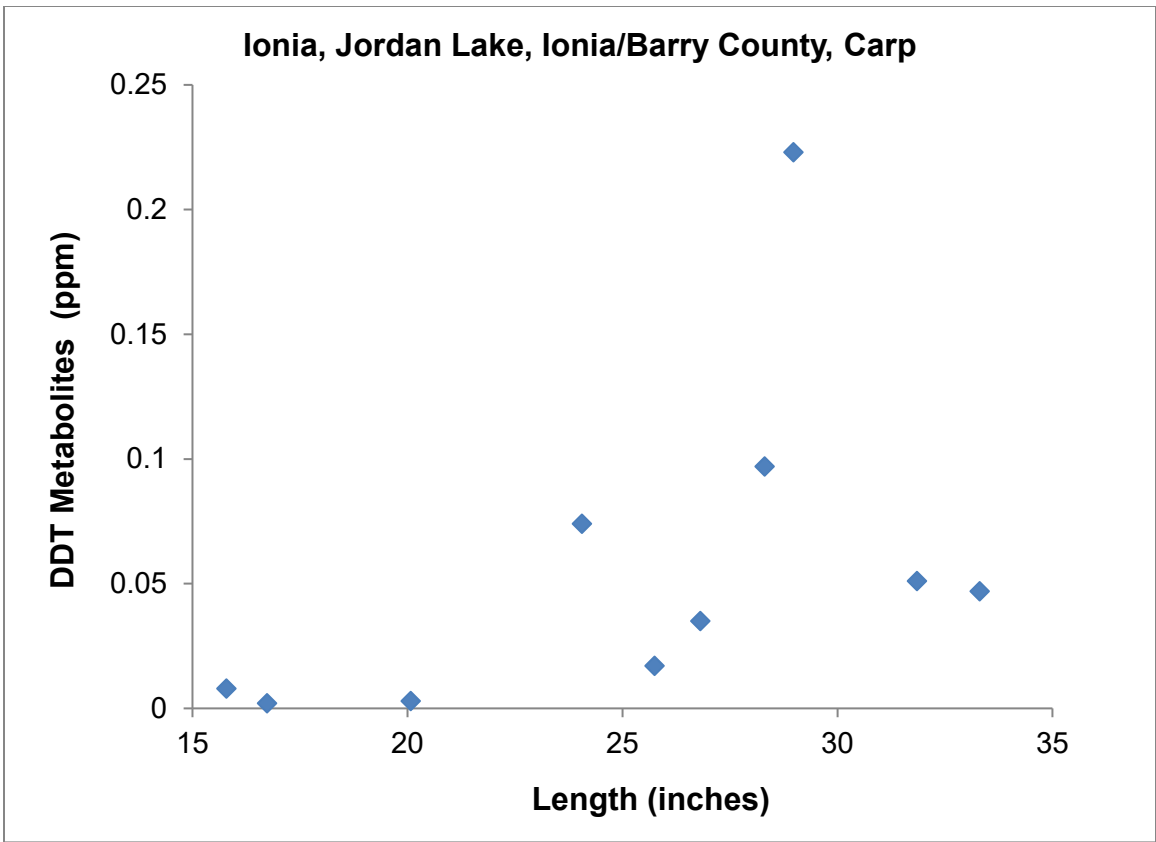
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent					
2018	2018	10	15.8	NA	15.8	33.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.090	0.002	0.395	0.175	1
DDT	10	0.056	0.002	0.223	0.103	16
Chlordane	10	0.008	0.001	0.028	0.014	16
Toxaphene	10	ND	--	--	--	--
PFOS	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.209	0.046				
DDT	0.238	0.083				
Chlordane	0.273	0.131				
Toxaphene	--	--				
PFOS	--	--				
Final meal category based on UCL:						1

Existing MDHHS Advisory: Carp from Jordan Lake are currently covered under the statewide guidance for PCBs. No one should eat more than two meals per month of carp due to PCBs.

Recommendation: No one should eat more than one meal per month of carp from Jordan Lake in Ionia and Barry Counties due to PCBs. Mercury causes a less-restrictive advisory.





Largemouth Bass

Jordan Lake

Ionia and Barry Counties

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples			
Earliest	Most Recent							
1989	2018	20	12.8	14.0	13.5	19.4		
Datasets available: 1989, 2018								
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category		
Mercury	17	0.412	0.220	0.950	0.507	2		
Chemical	Linear Regression	Exponential Regression						
	R ²	R ²						
Mercury	0.337	0.351						

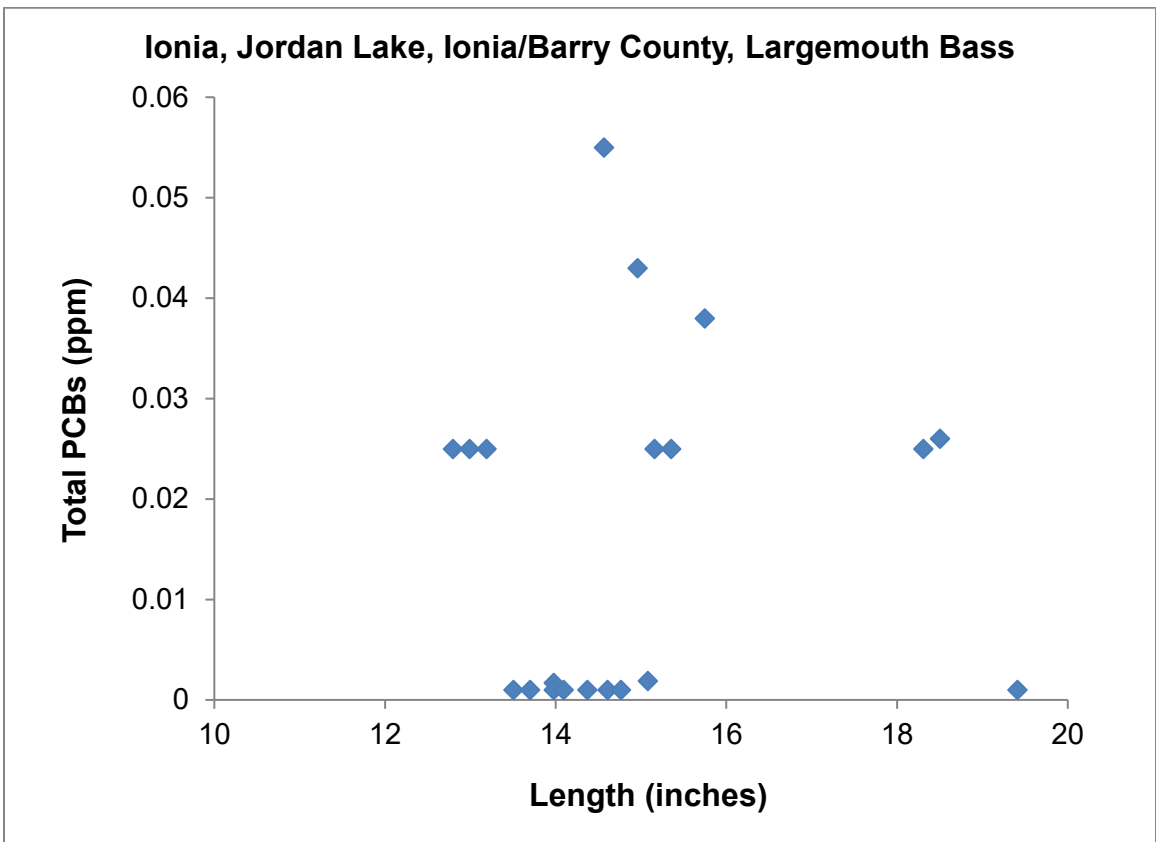
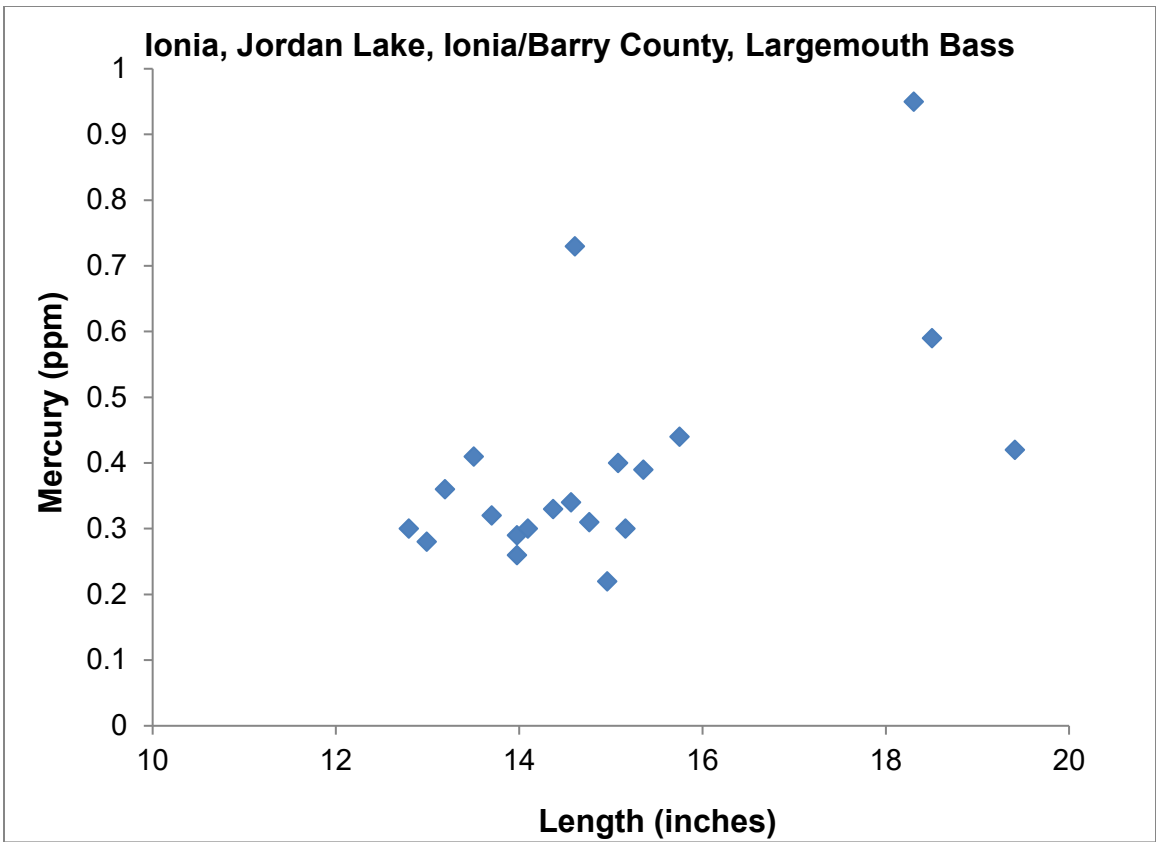
Organics Analysis:

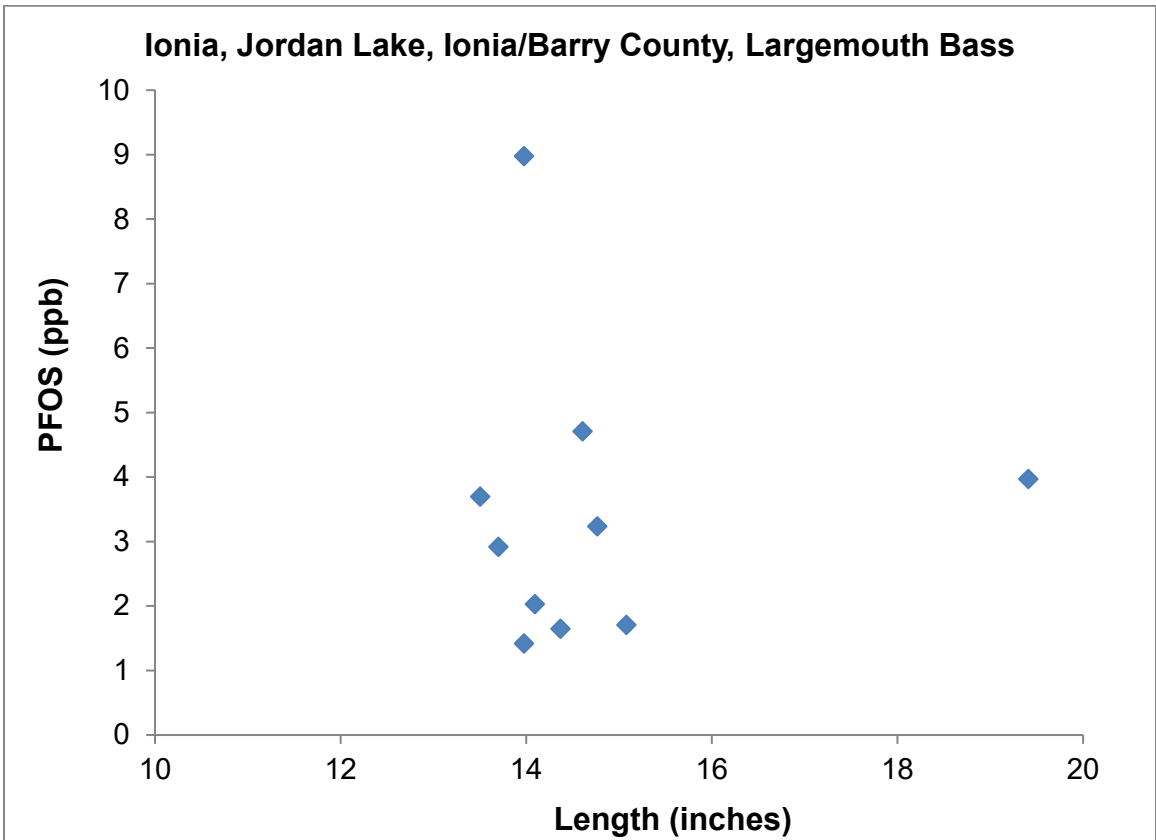
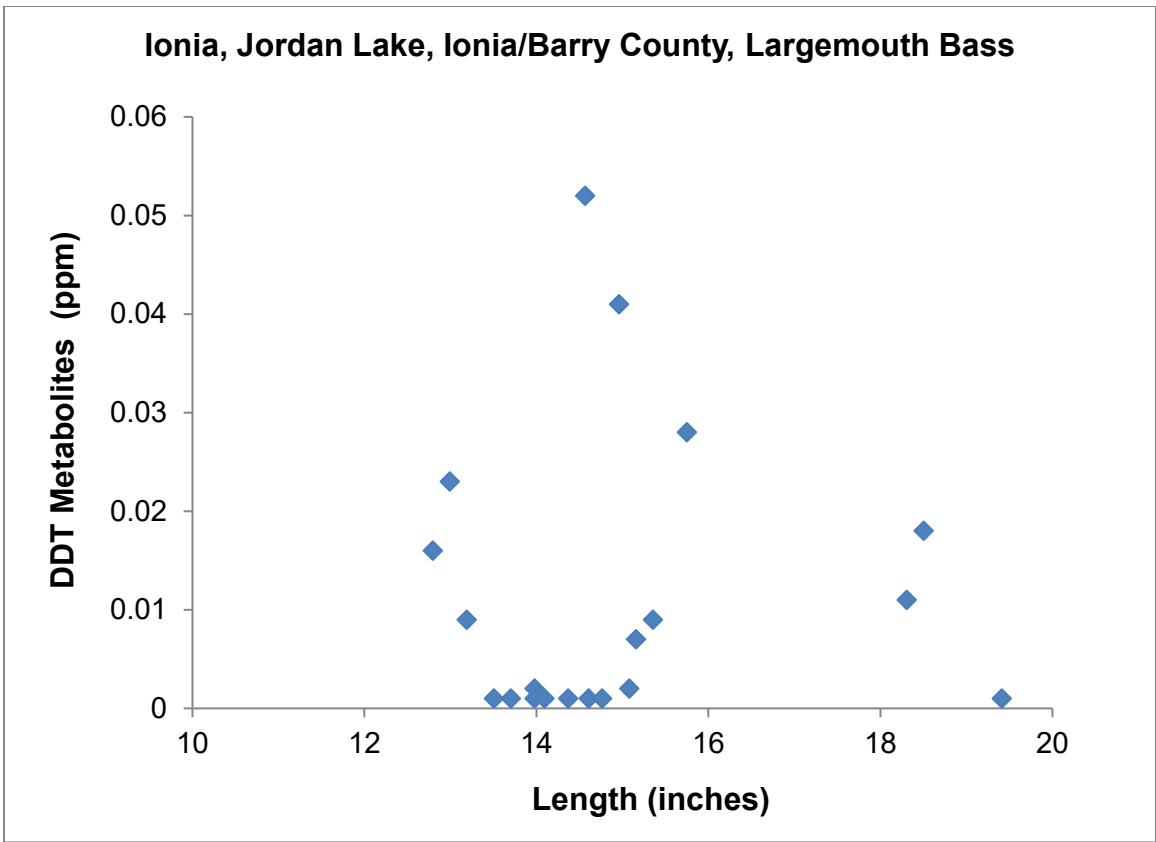
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples			
Earliest	Most Recent							
1989	2018	20	12.8	14.0	13.5	19.4		
Datasets available: 1989, 2018								
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category		
PCB	17	0.015	<0.001	0.055	0.024	8		
DDT	17	0.010	<0.001	0.052	0.018	16		
Chlordane	17	0.002	<0.001	0.004	0.002	16		
Toxaphene	17	ND	--	--	--	--		
PFOS	10	3.4 ppb	1.4 ppb	9.0 ppb	5.0 ppb	16		
Chemical	Linear Regression	Exponential Regression						
	R ²	R ²						
PCB	0.007	0.011						
DDT	0.000	0.007						
Chlordane	0.009	0.011						
Toxaphene	--	--						
PFOS	0.001	0.014						
						Final meal category based on UCL:		2

Existing MDHHS Advisory: No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 16 inches in length or no more than 1 meal per month of bass larger than 16 inches in length from Jordan Lake in Ionia and Barry Counties due to mercury.

Recommendation: No one should eat more than two meals per month of largemouth or smallmouth bass of any size from Jordan Lake in Ionia and Barry Counties due to mercury. PCBs causes a less-restrictive advisory.

Note: The 2018 sample included only one individual larger than 16 inches. The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.





Largemouth Bass

Long Lake

Ionia County

Hg Analysis:

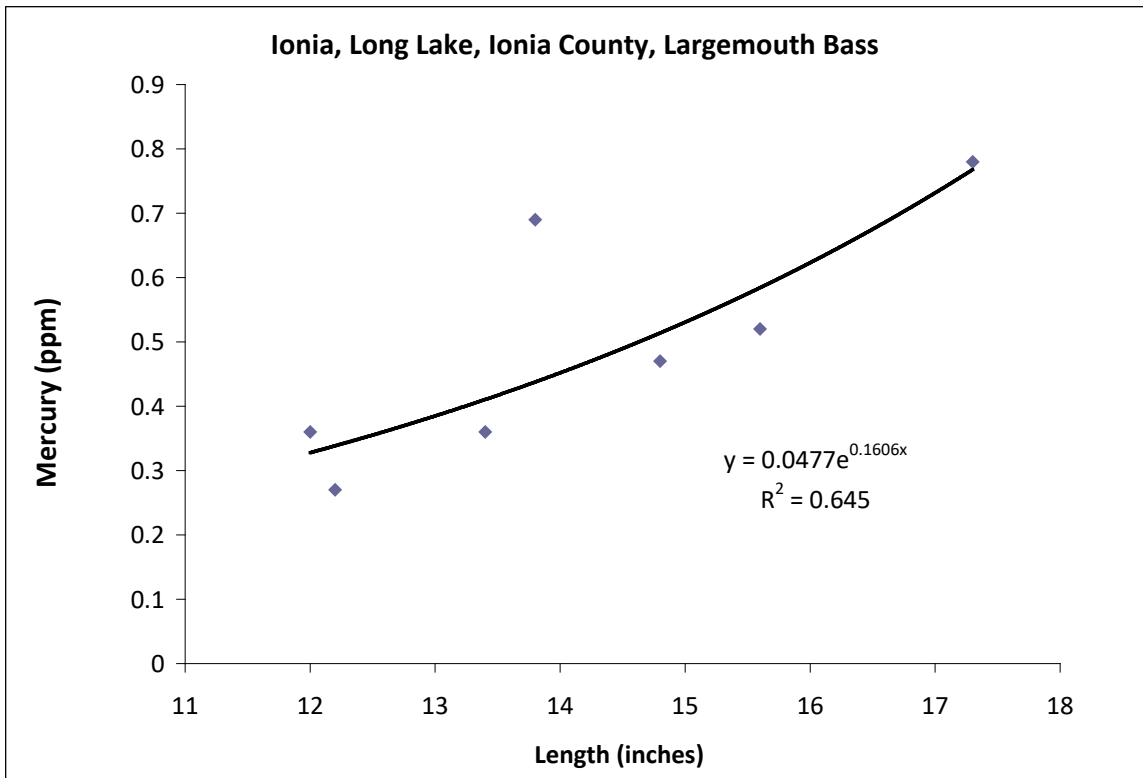
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	7	12	14	13.8	17.3
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.615	0.470	0.780	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.631	0.645				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Long Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data available to develop specific advice for Long Lake largemouth bass. The statewide consumption guidelines recommend that no one eat more than 2 meals per month of legal size smallmouth or largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.



Carp

Morrison Lake

Ionia County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	2003	14	11.1	NA	11.1	30.3
Datasets available: 1988, 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.06	0.02	0.10	0.07	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.630	0.776				

Organics Analysis:

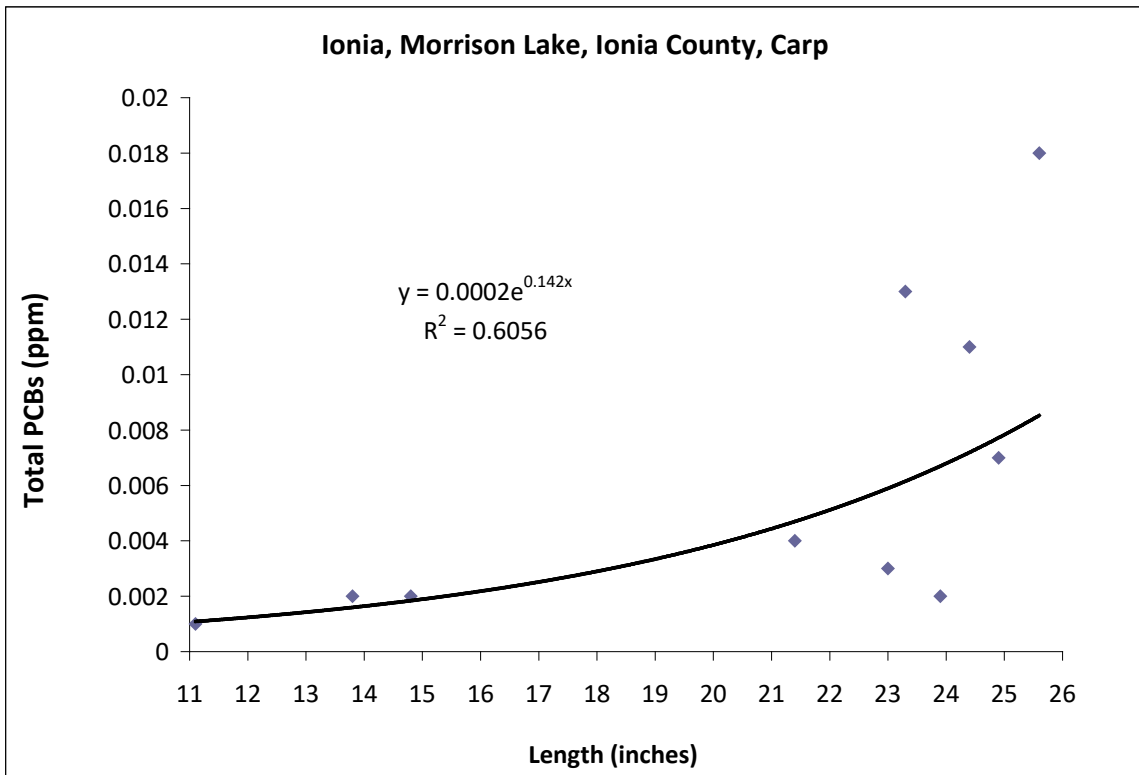
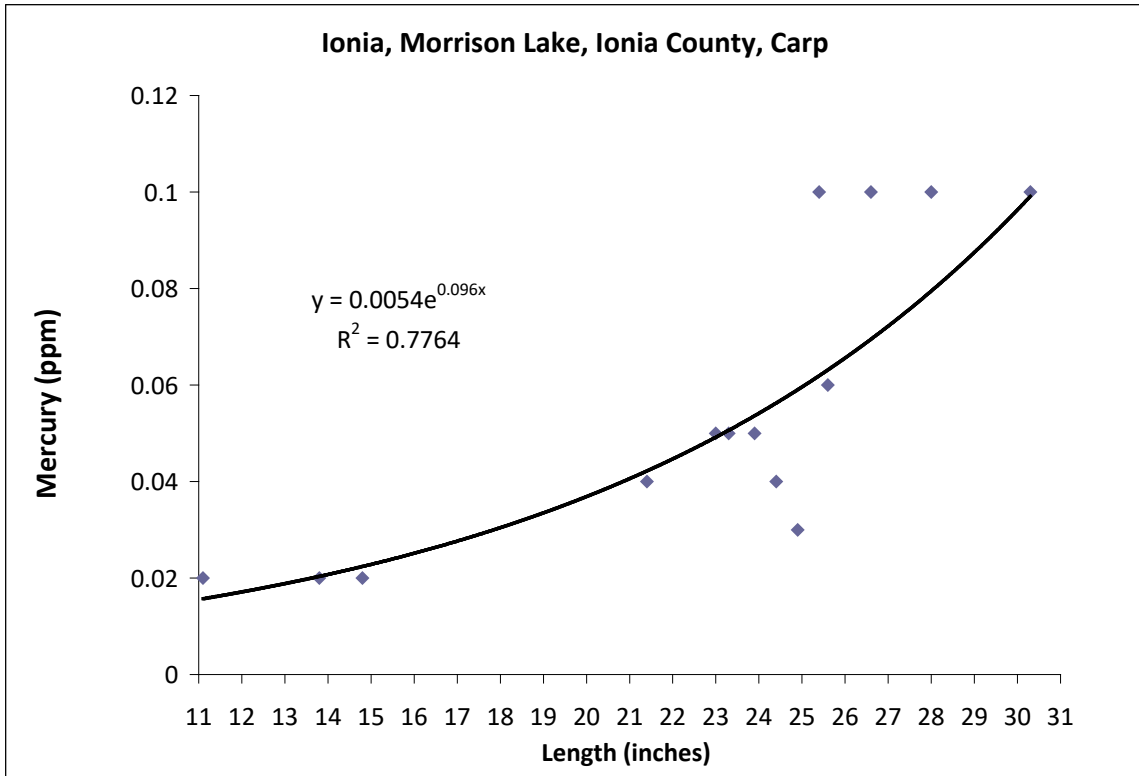
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	11.1	NA	11.1	25.6
Datasets available: 1988, 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.006	0.001	0.018	0.01	16
DDT	10	0.056	0.015	0.097	0.08	16
Chlordane	10	0.004	0.001	0.017	0.01	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.413	0.606				
DDT	0.580	0.703				
Chlordane	0.198	0.249				
Toxaphene	--	--				
Final meal category based on UCL:						16

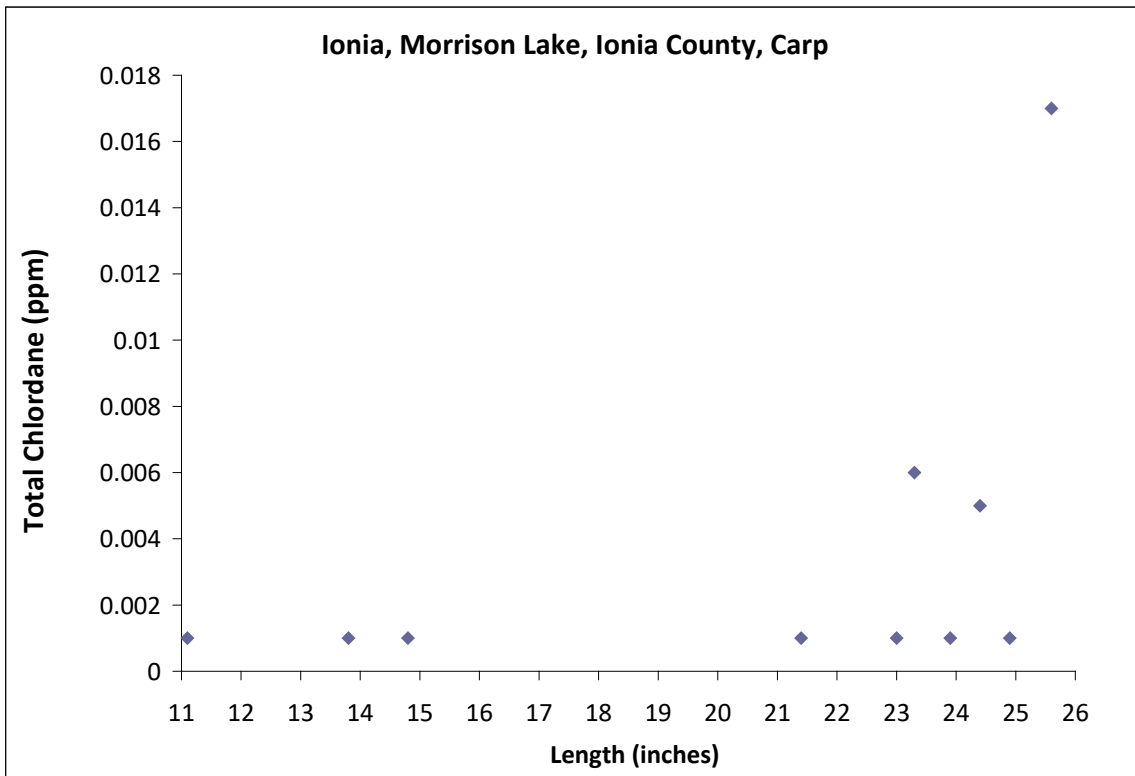
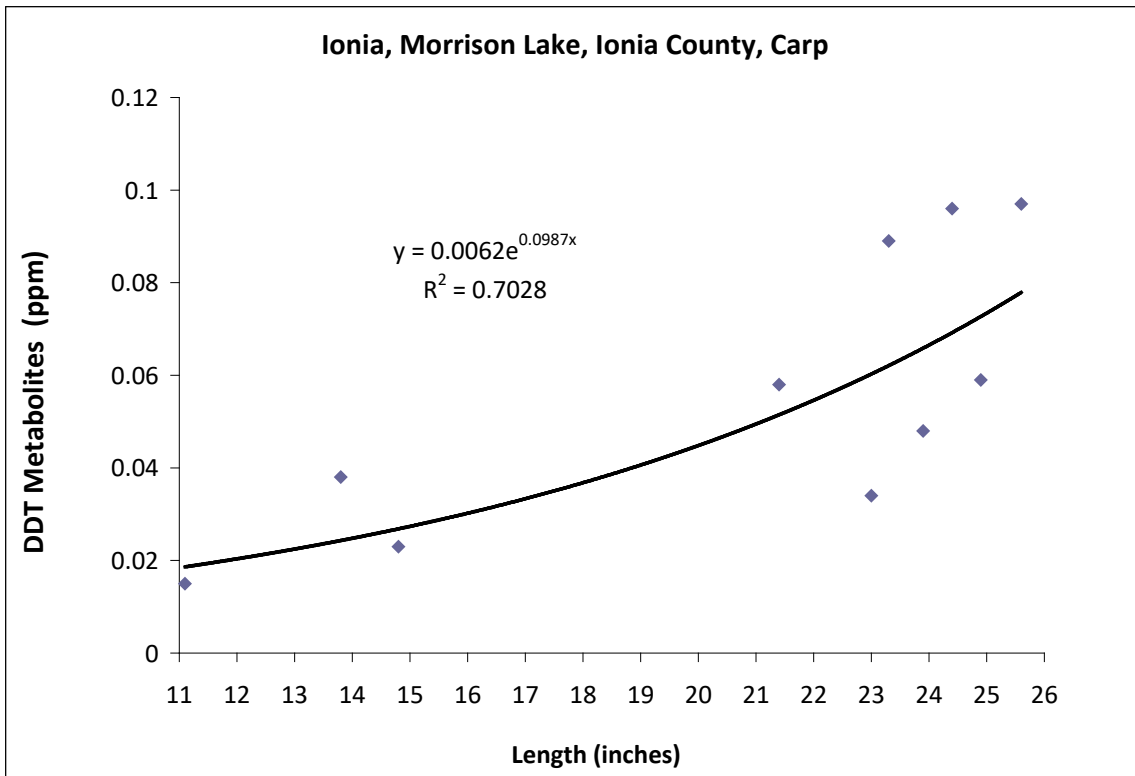
Existing Advisory: Women and children should eat no more than one meal per week of Morrison Lake carp between 26 and 30 inches in length and no more than one meal per month of Morrison Lake carp greater than 30 inches in length due to PCBs.

Recommendation: No consumption advisory is necessary for Morrison Lake carp. Carp will be listed at 16 meals per month as the upper limit of the assessment.

Length (Inches)	DDT Regression Equation Estimate (ppm)	Meal Category
12	0.020	16
14	0.025	16
16	0.030	16
18	0.037	16
20	0.045	16
22	0.054	16
24	0.066	16
26	0.081	16
28	0.098	16

Shaded area denotes extrapolated estimates





Largemouth Bass

Morrison Lake

Ionia County

Hg Analysis:

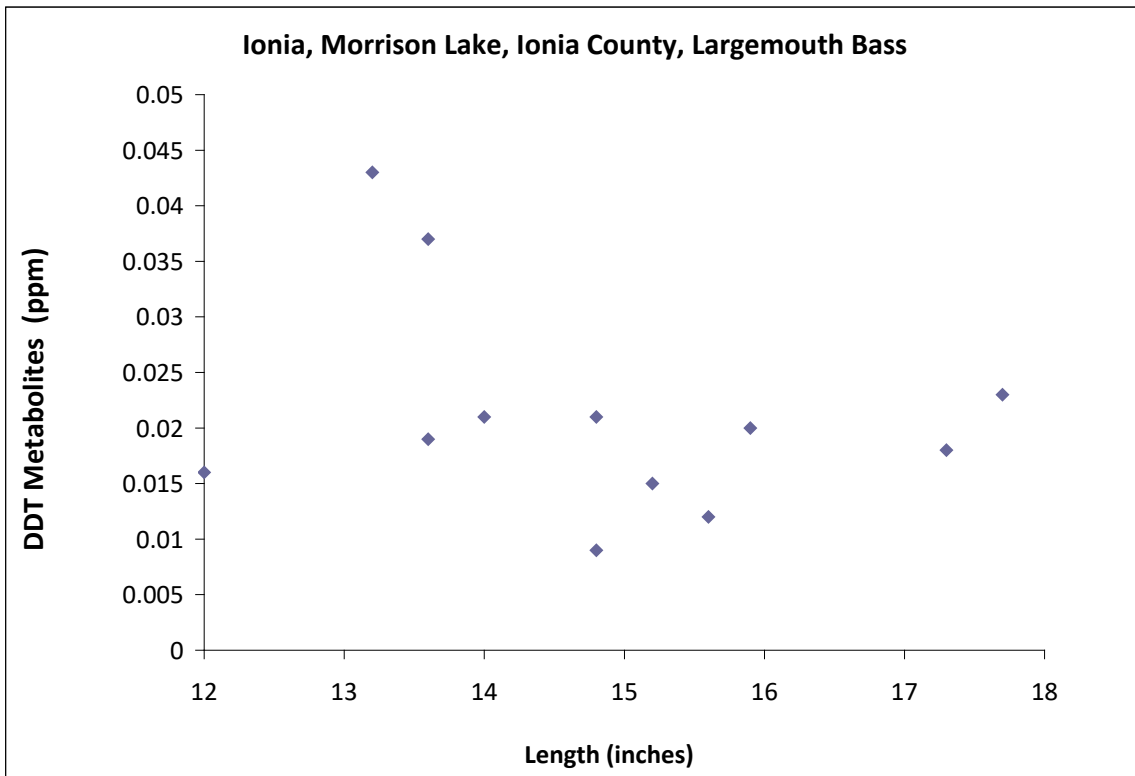
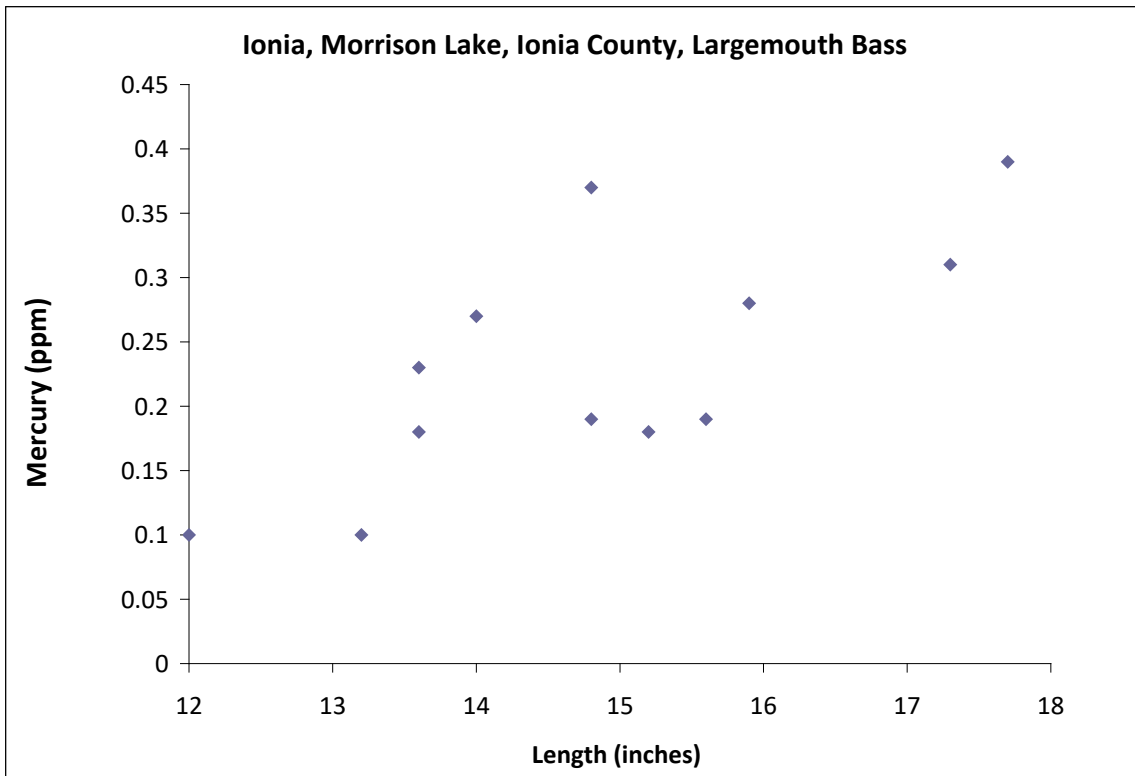
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1998	12	12	14	13.6	17.7
Datasets available: 1988, 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.26	0.18	0.39	0.32	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.537	0.556				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1998	12	12	14	13.6	17.7
Datasets available: 1988, 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	0.020	0.012	0.037	0.020	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.080	0.046				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Morrison Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of legal size largemouth or smallmouth bass under 18 inches or more than 1 meal per month of largemouth or smallmouth bass over 18 inches. Statewide length break applied.



Walleye

Morrison Lake

Ionia County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	16.7	15	16.7	22
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.20	0.15	0.25	0.22	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.016	0.019				

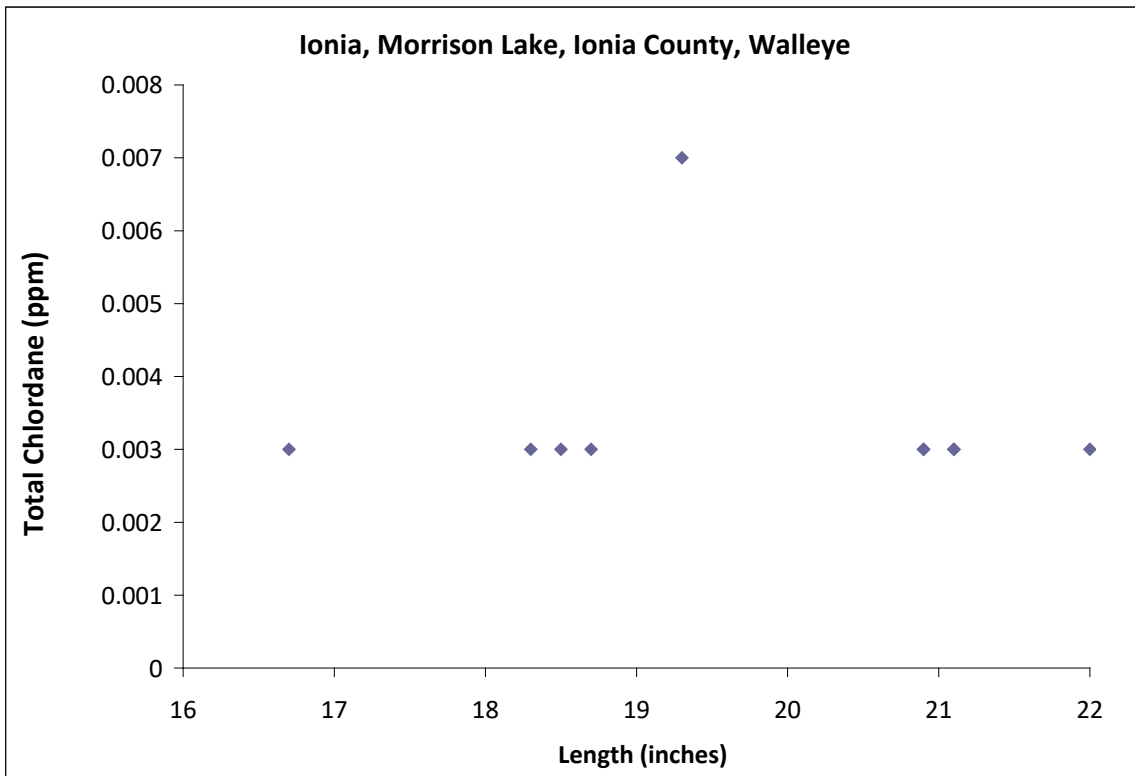
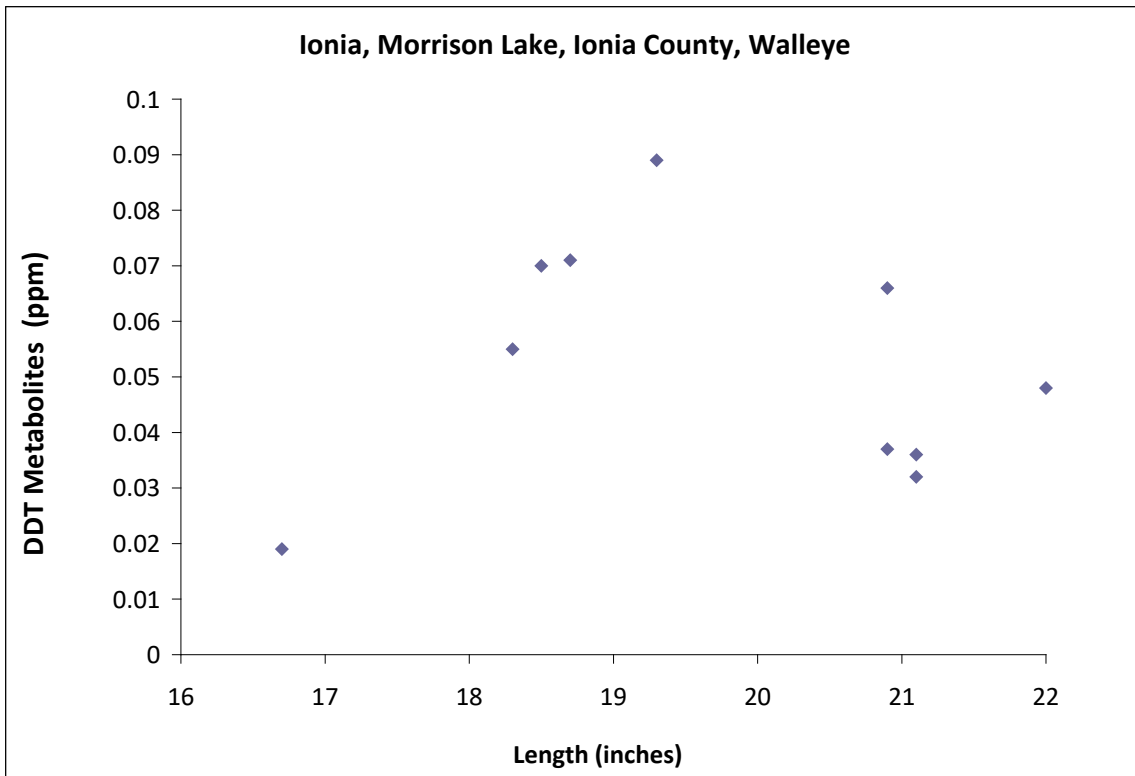
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	16.7	15	16.7	22
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.025	0.025	0.025	0.03	8
DDT	10	0.052	0.019	0.089	0.07	16
Chlordane	10	0.003	0.003	0.007	0.004	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.000	0.000				
DDT	0.004	0.007				
Chlordane	0.009	0.009				
Toxaphene	--	--				
Final meal category based on UCL:						4

Existing Advisory: Morrison Lake walleye are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Lake Morrison walleye due to mercury. Dataset is limited due to age for PCBs. PCB concentrations ≥15 years old are expected to have declined to a concentration that allows a less restrictive meal category than determined by the standard evaluation method and would not cause an advisory.





White Sucker

Morrison Lake

Ionia County

Hg Analysis:

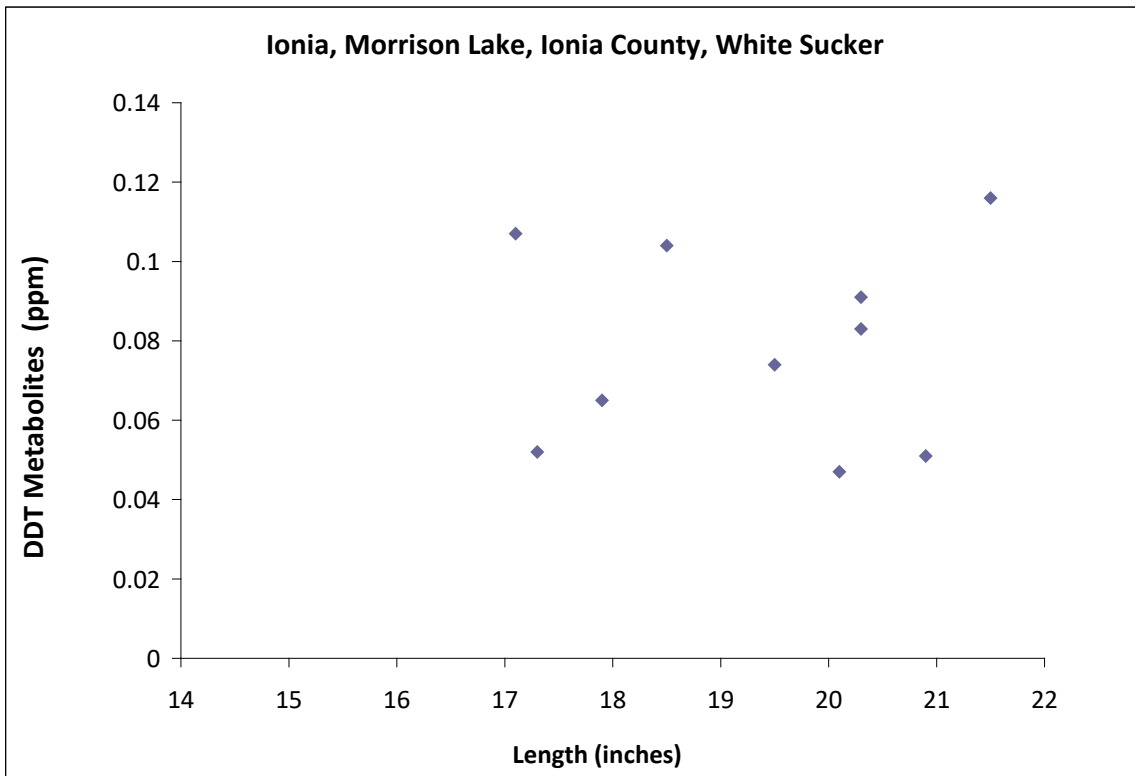
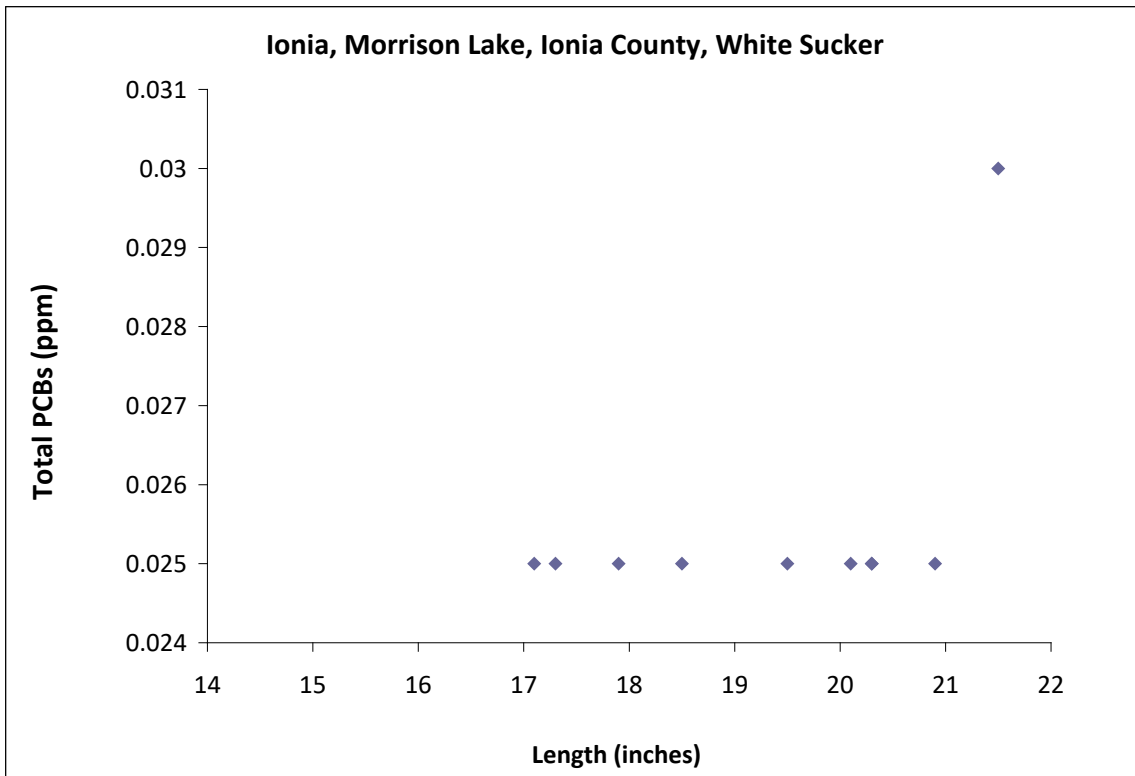
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	17.1	NA	17.1	21.5
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

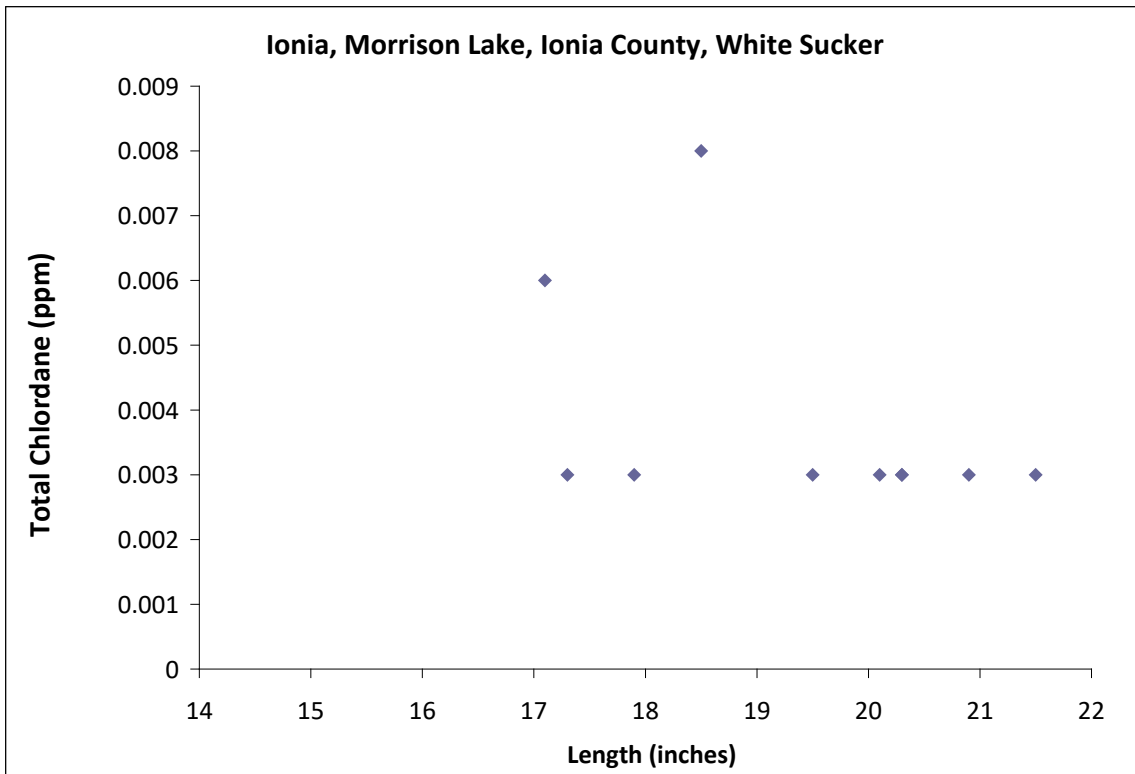
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	17.1	NA	17.1	21.5
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.03	0.025	0.03	0.03	8
DDT	10	0.08	0.05	0.12	0.10	16
Chlordane	10	0.004	0.003	0.008	0.01	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.241	0.241				
DDT	0.003	0.001				
Chlordane	0.201	0.226				
Toxaphene	--	--				
Final meal category based on UCL:						8*

Existing Advisory: There are no current consumption advisories for Morrison Lake white sucker.

Recommendation: No one should eat more than 12 meals per month of Morrison Lake sucker due to PCBs. The quality of this dataset is limited due to the age of the data. *Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are expected to have declined to a concentration that allows a less restrictive meal category than determined by the standard evaluation method.





Isabella County

Largemouth Bass

Coldwater Lake

Isabella County

Hg Analysis:

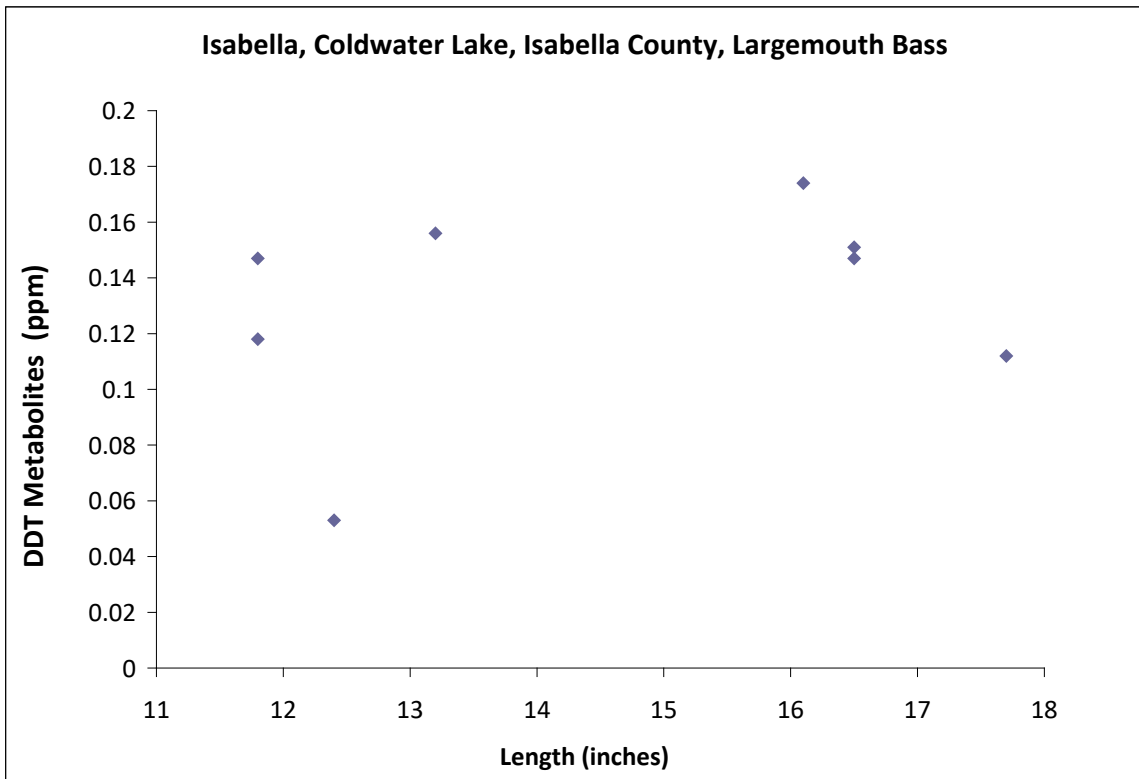
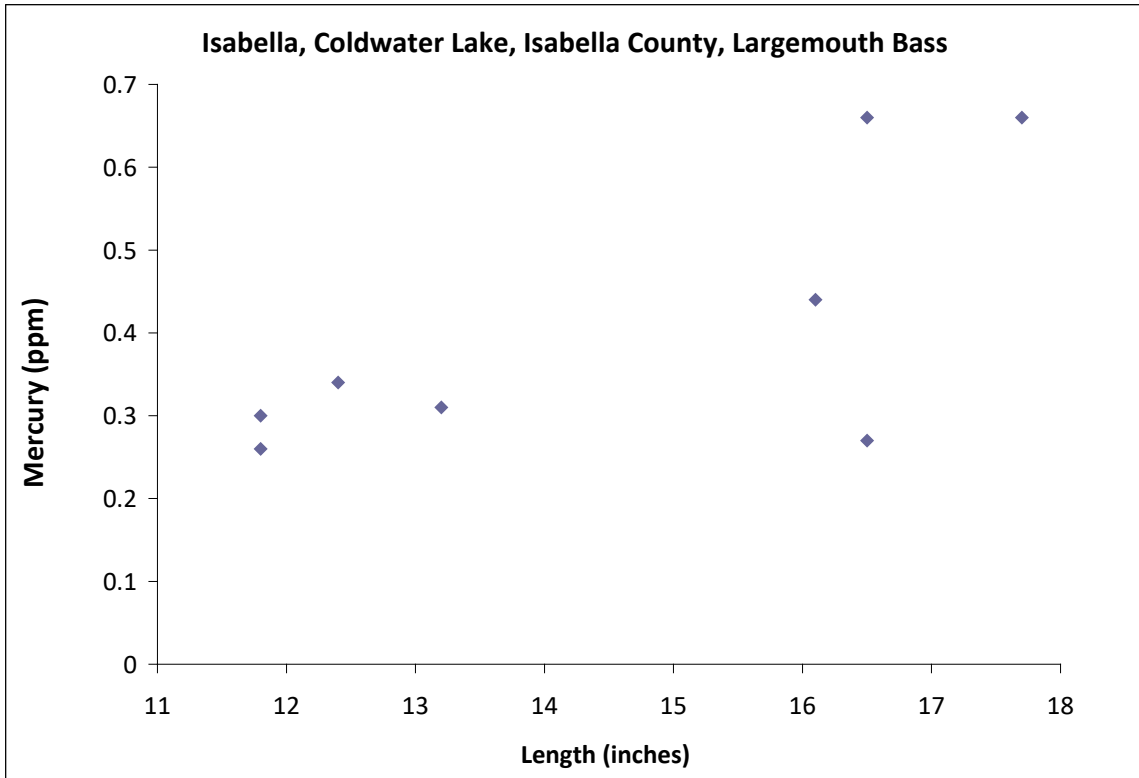
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	8	11.8	14	16.1	17.7
Datasets available:		1989				
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.51	0.27	0.66	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

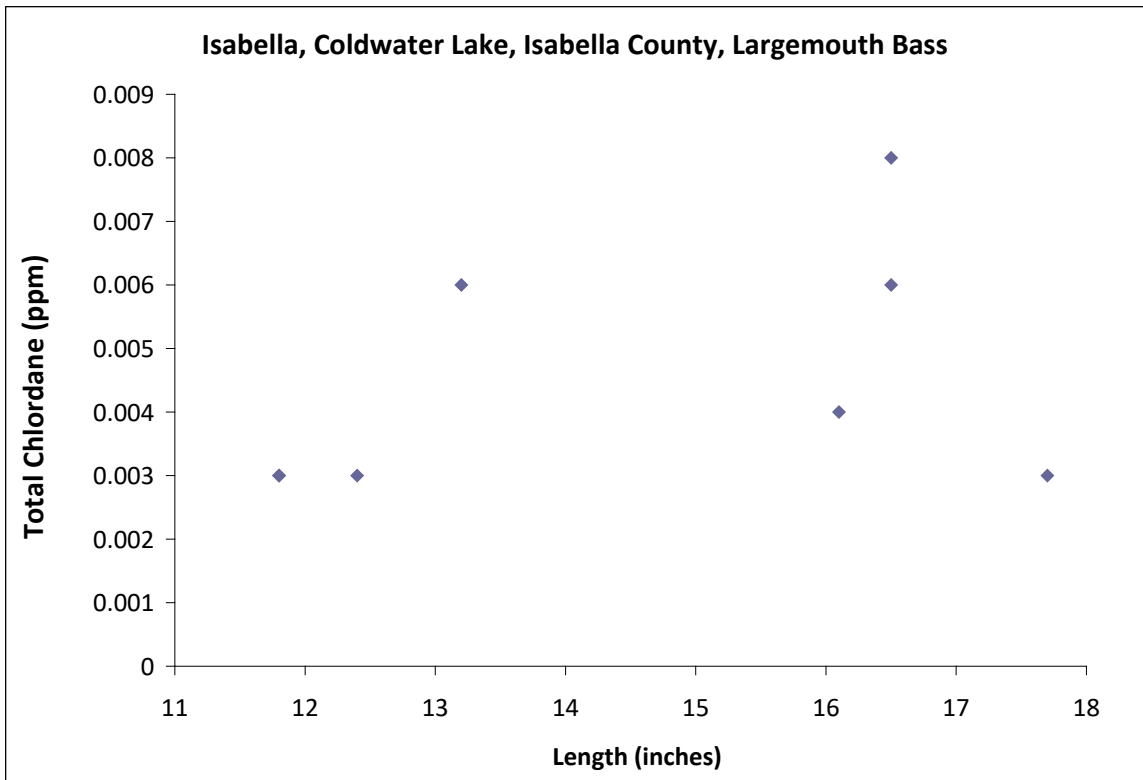
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	8	11.8	14	16.1	17.7
Datasets available:		1989				
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	ND	--	--	--	--
DDT	4	0.146	0.112	0.174	--	--
Chlordane	4	0.005	0.003	0.008	--	--
Toxaphene	4	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Coldwater Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data of legal lengths to develop specific advice for Coldwater Lake largemouth bass. Dataset is limited due to the age of the data. The statewide consumption guidelines recommend that no one eat more than 2 meals per month of legal size largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.





Walleye

Coldwater Lake

Isabella County

Hg Analysis:

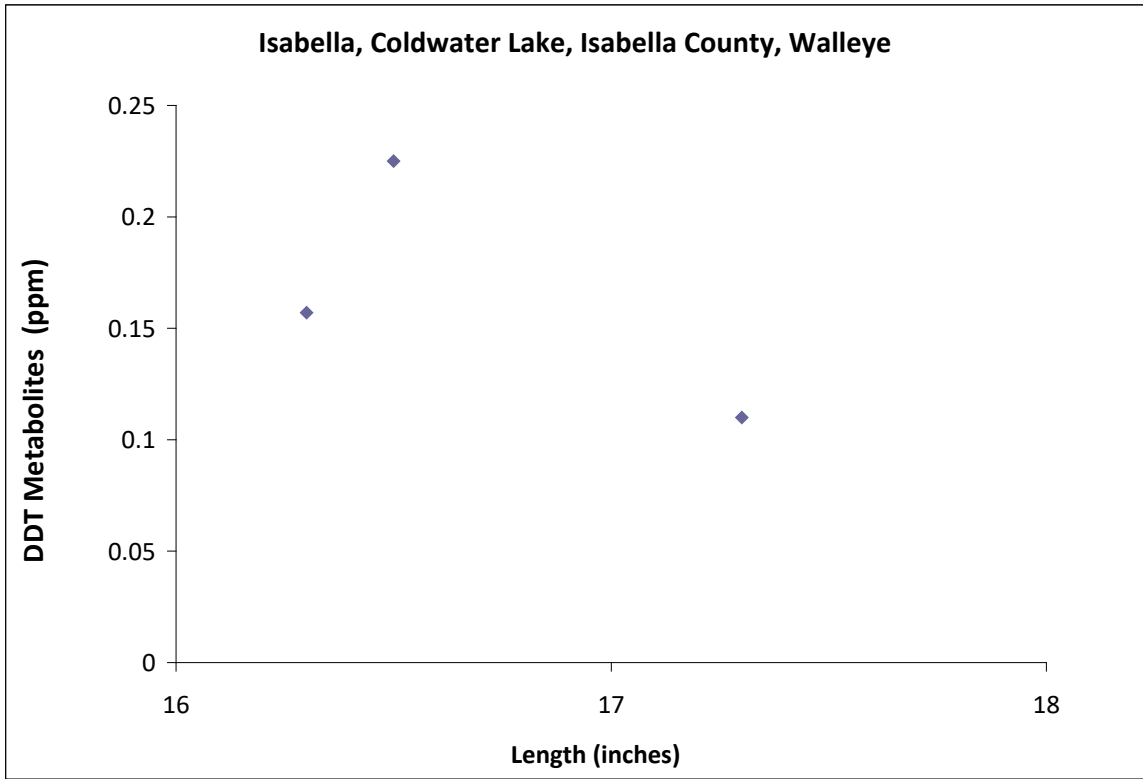
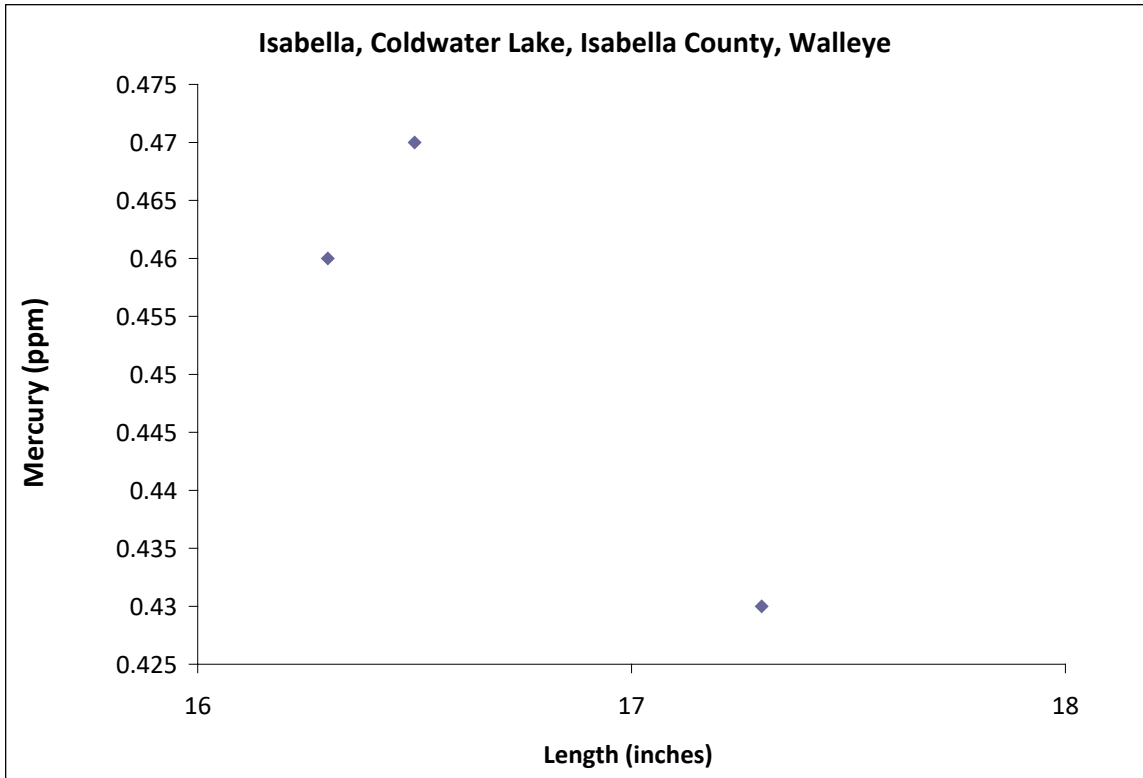
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	3	16.3	15	16.3	17.3
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.45	0.43	0.47	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	3	16.3	15	16.3	17.3
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	ND	--	--	--	--
DDT	3	0.164	0.110	0.225	--	--
Chlordane	3	ND	--	--	--	--
Toxaphene	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Coldwater Lake walleye are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data available to develop specific advice for Coldwater Lake walleye. The statewide consumption guidelines recommend that no one eat more than 1 meal per month of walleye over 20 inches in length or more than 2 meals per month of legal size walleye under 20 inches in length.



Bluegill

Littlefield Lake

Isabella County

Hg Analysis:

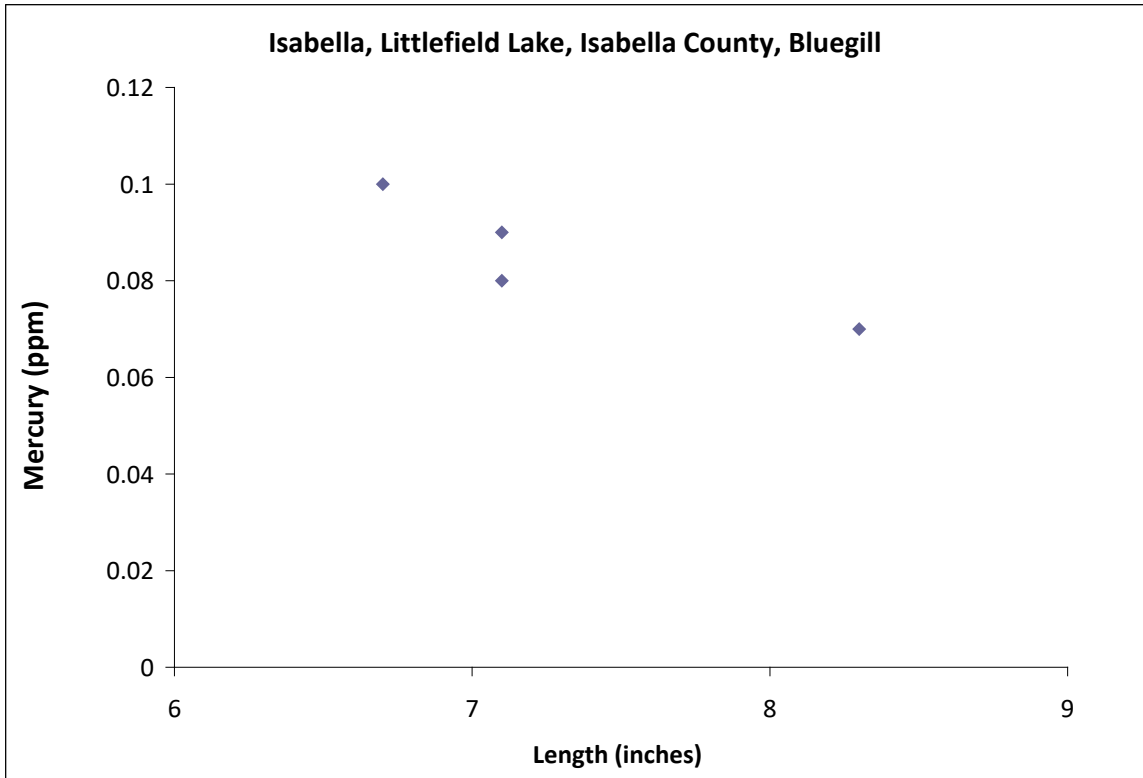
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1995	1995	4	6.7	NA	6.7	8.3
Datasets available: 1995						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.08	0.07	0.10	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	-	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: There are no current consumption advisories for Littlefield Lake bluegill.

Recommendation: There are insufficient data available to develop specific advice for Littlefield Lake bluegill. The statewide consumption guidelines recommend that no one eat more than 8 meals per month of bluegill from inland waters.



Largemouth Bass

Littlefield Lake

Isabella County

Hg Analysis:

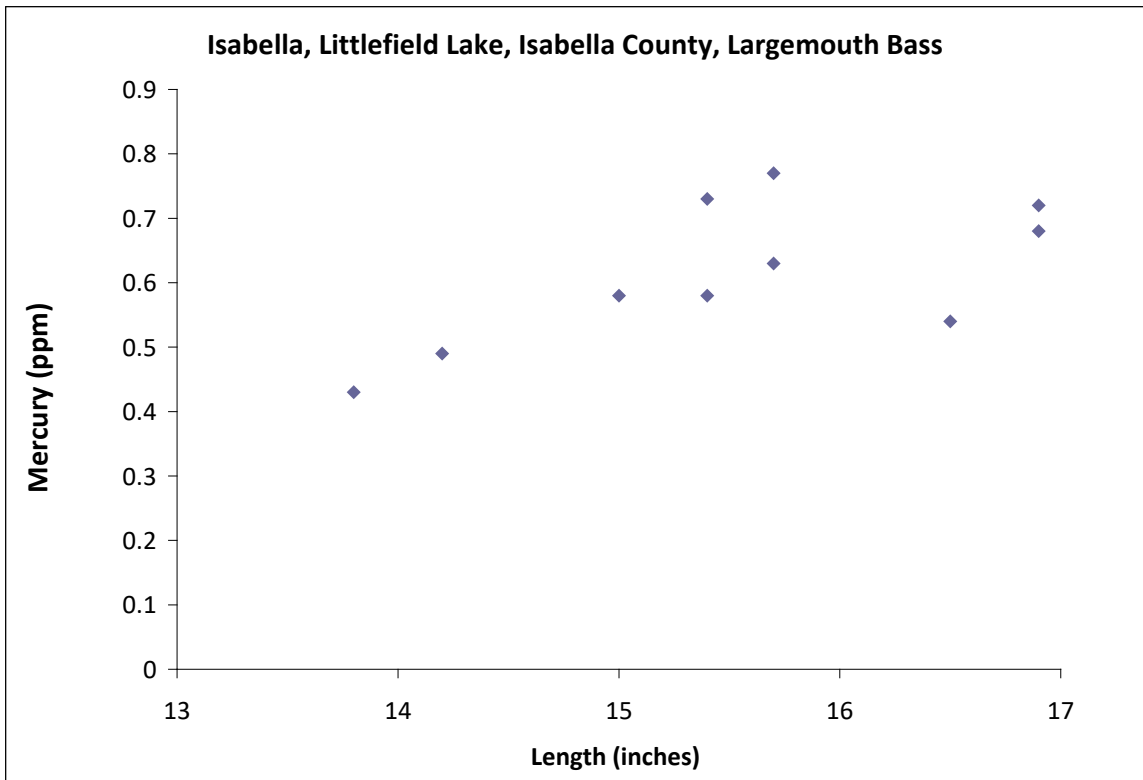
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1995	1995	10	13.8	14	13.8	16.9
Datasets available: 1995						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.615	0.430	0.770	0.690	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.430	0.471				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Littlefield Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Littlefield Lake smallmouth or largemouth bass less than 18 inches, or 6 meals per year greater than 18 inches due to mercury. Statewide length break applied.



**Brown Bullhead
Yellow Bullhead**

Stevenson Lake

Isabella County

Hg Analysis:

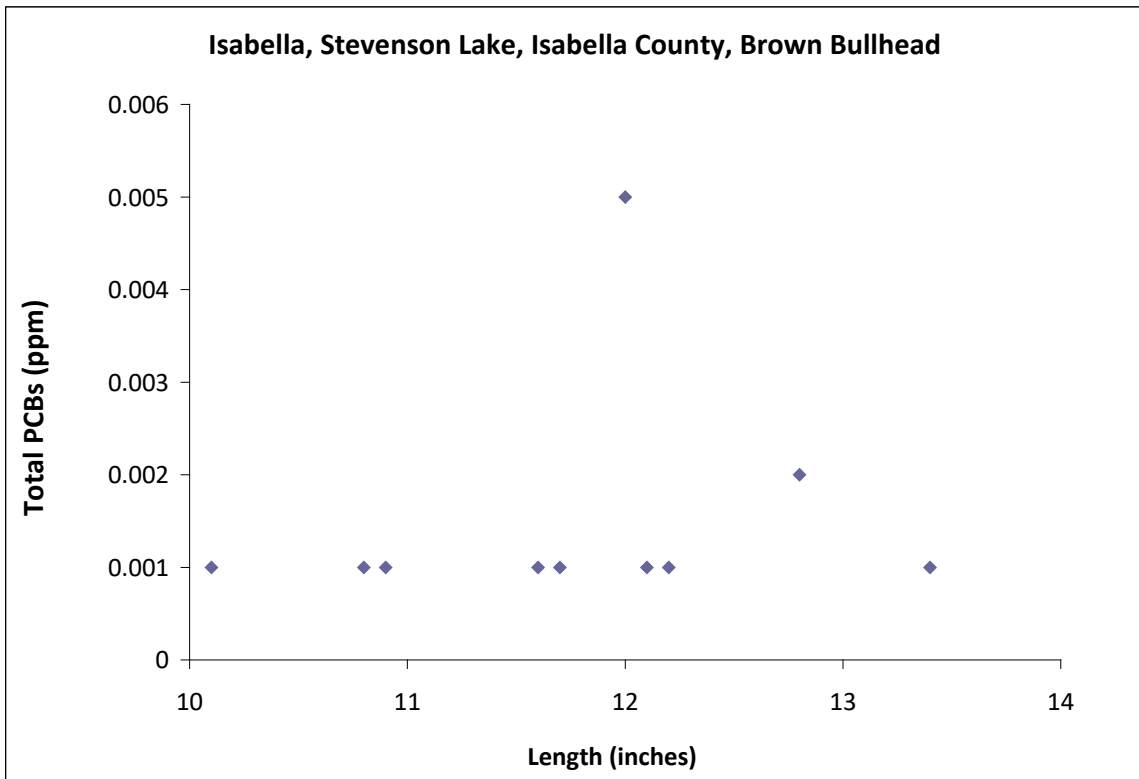
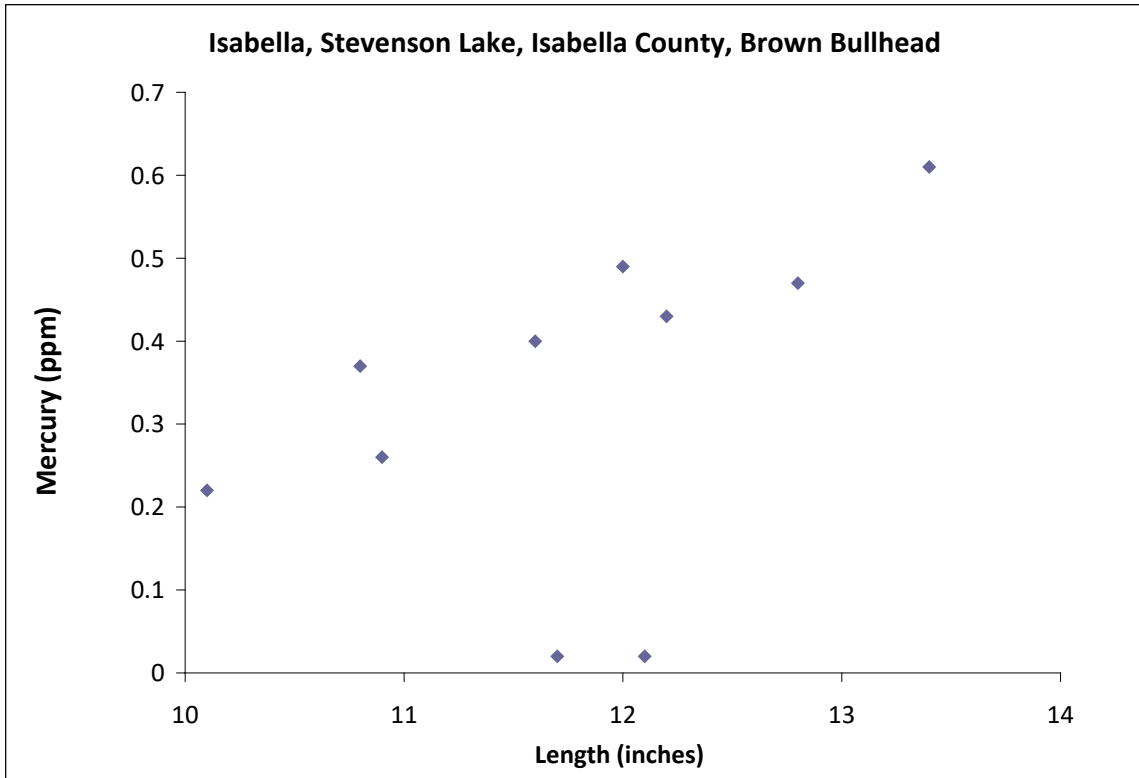
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	10.1	NA	10.1	13.4
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.329	0.020	0.610	0.470	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.210	0.019				

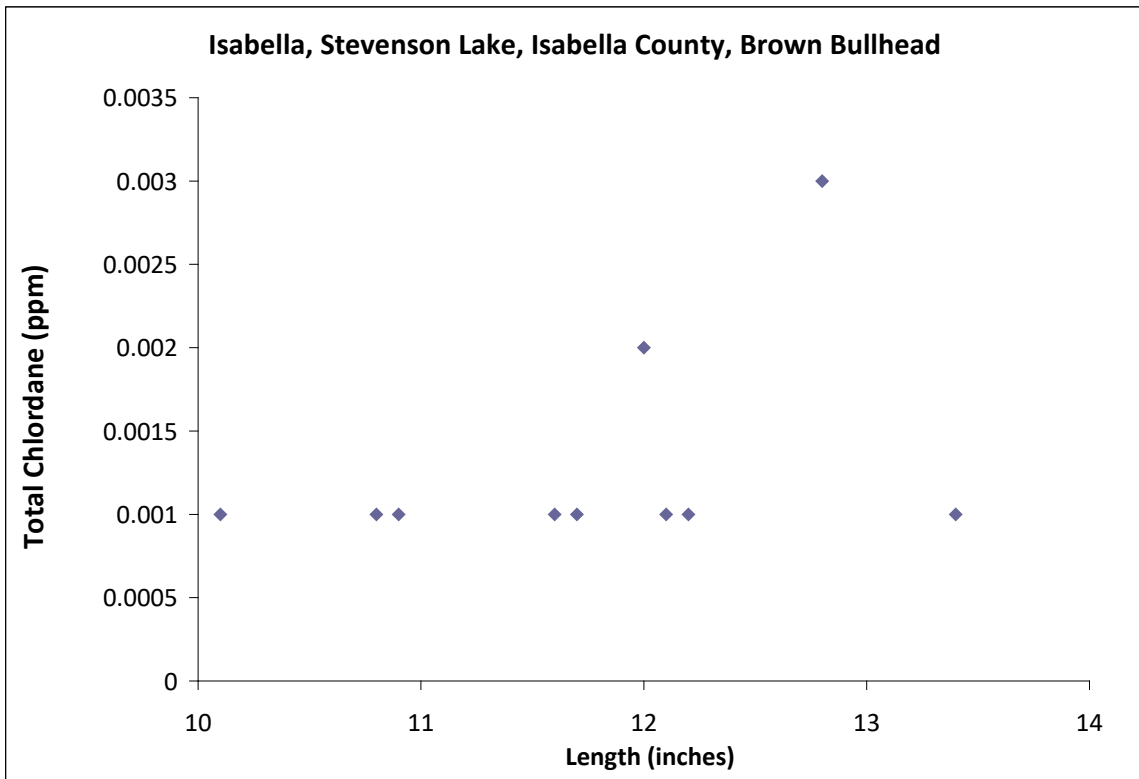
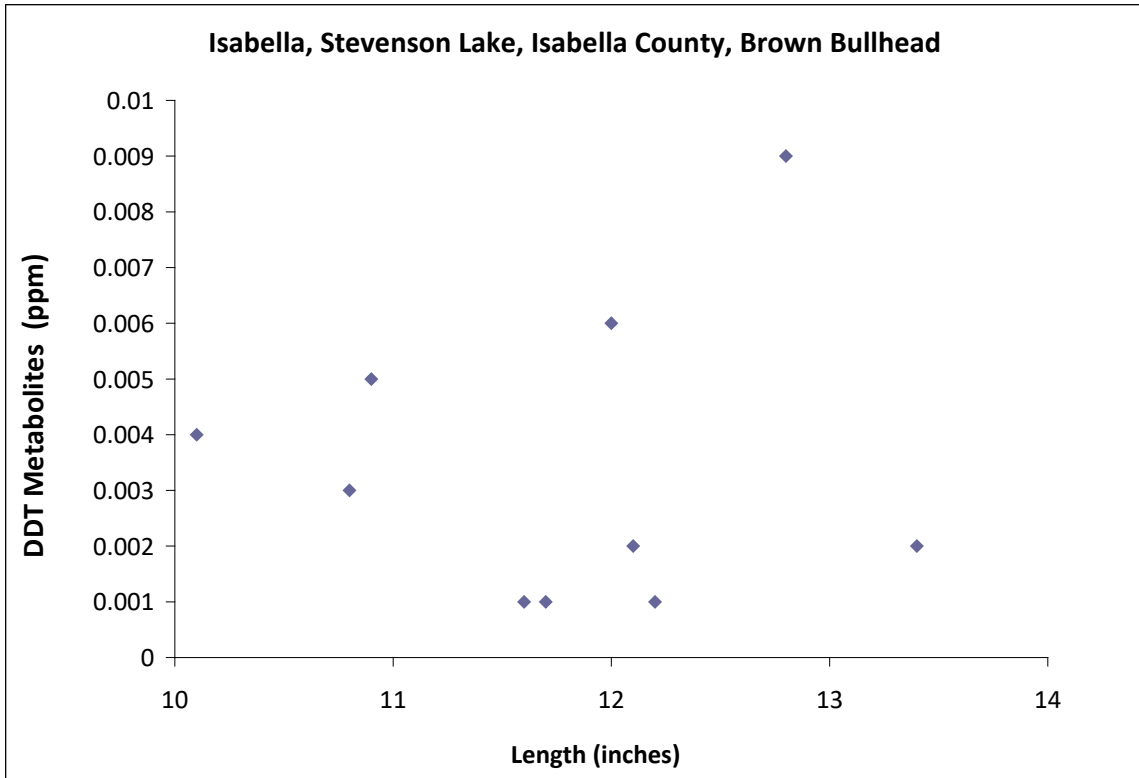
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	10.1	NA	10.1	13.4
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.002	0.001	0.005	0.003	16
DDT	10	0.003	0.001	0.009	0.01	16
Chlordane	10	0.001	0.001	0.003	0.002	16
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.032	0.056				
DDT	0.003	0.009				
Chlordane	0.153	0.146				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: There are no current consumption advisories for Stevenson Lake bullhead.

Recommendation: No one should eat more than 2 meals per month of Stevenson Lake bullhead due to mercury.





Largemouth Bass

Stevenson Lake

Isabella County

Hg Analysis:

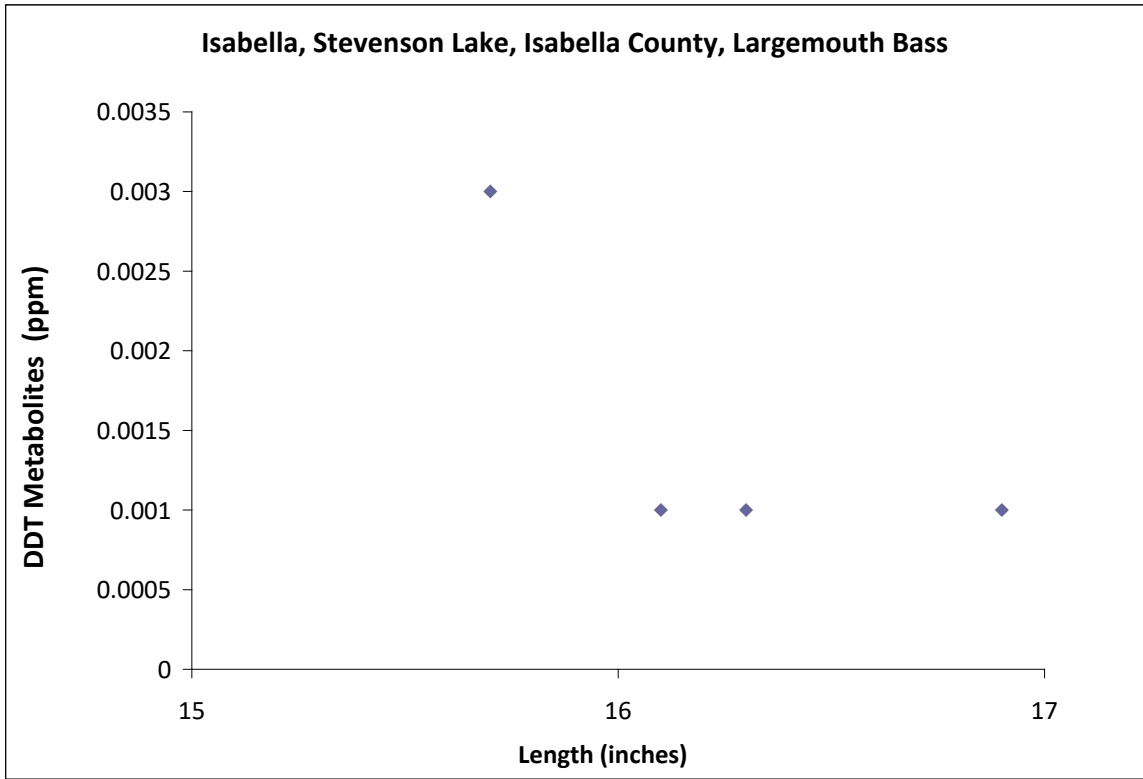
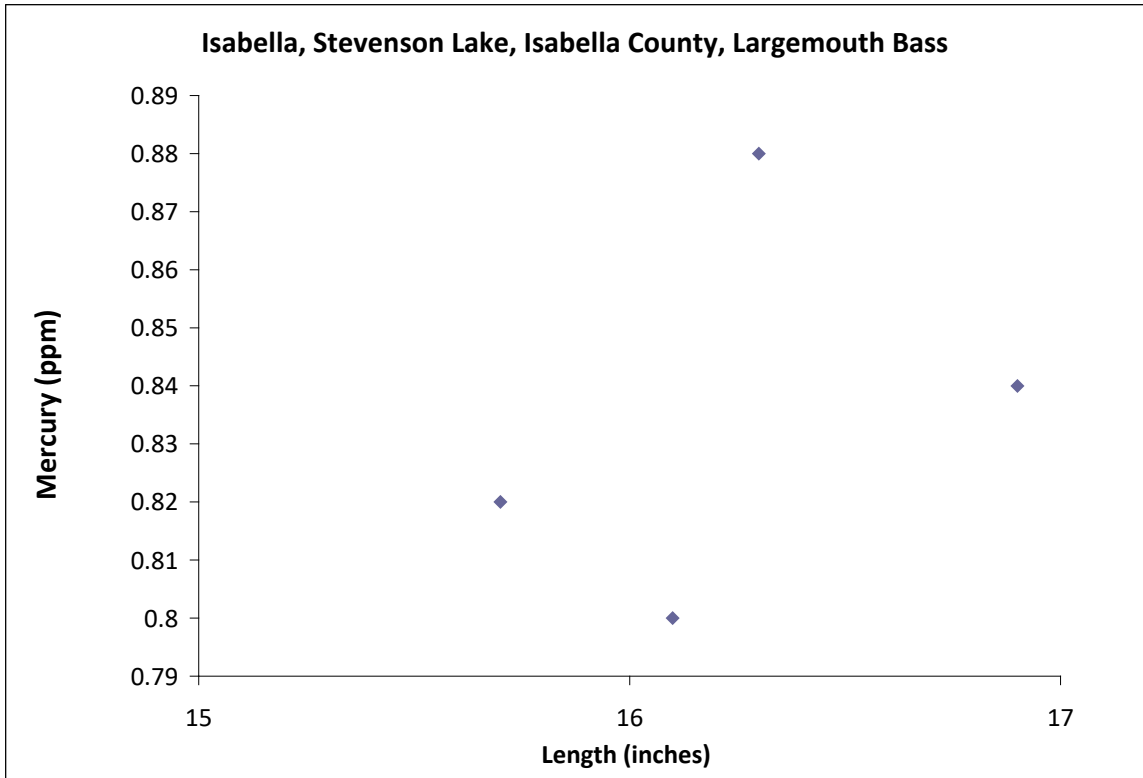
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	4	15.7	14	15.7	16.9
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.835	0.800	0.880	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	4	15.7	14	15.7	16.9
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	ND	--	--	--	--
DDT	4	0.002	0.001	0.003	--	--
Chlordane	4	ND	--	--	--	--
Toxaphene	4	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Stevenson Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data available to develop specific advice for Stevenson Lake largemouth bass. No one should eat more than 1 meal per month of legal size largemouth bass under 18 inches or more than 6 meals per year of those fish larger than 18 inches. Guideline is one meal category more restrictive than the statewide guidelines based on the available data and supported by a similar guideline for northern pike.



Northern Pike

Stevenson Lake

Isabella County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	17.8	24	24.8	28
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.60	0.43	0.71	0.73	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.607	0.614				

Organics Analysis:

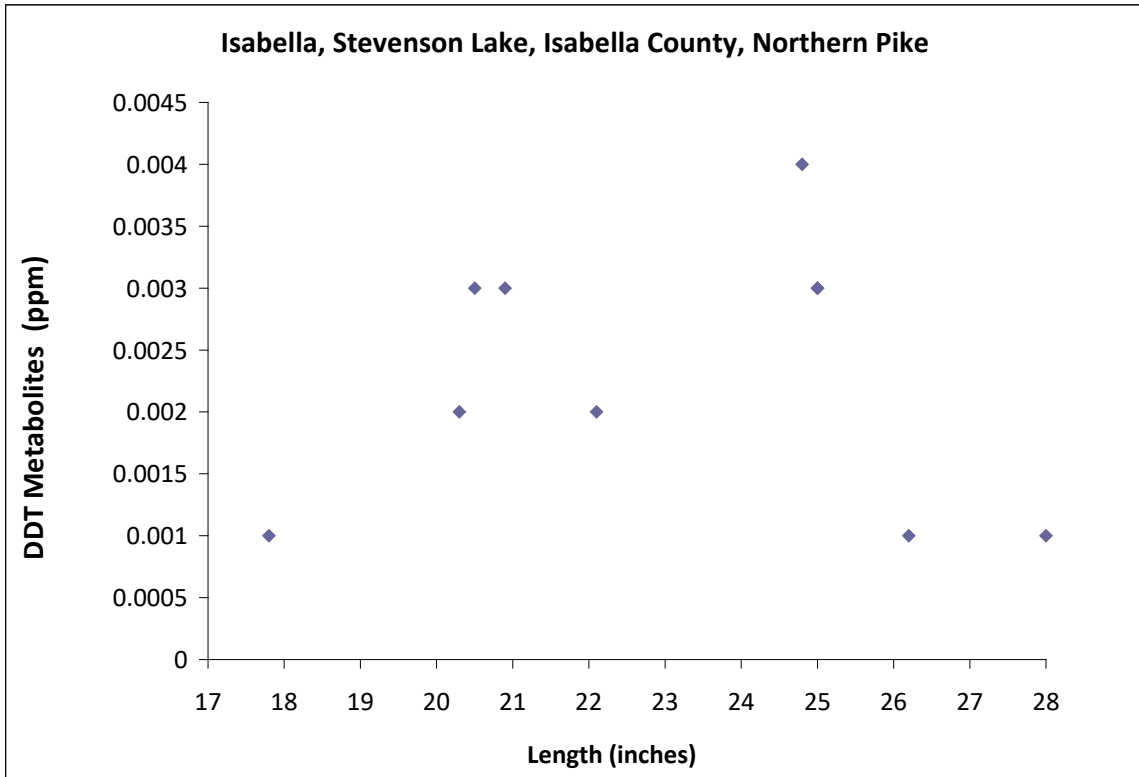
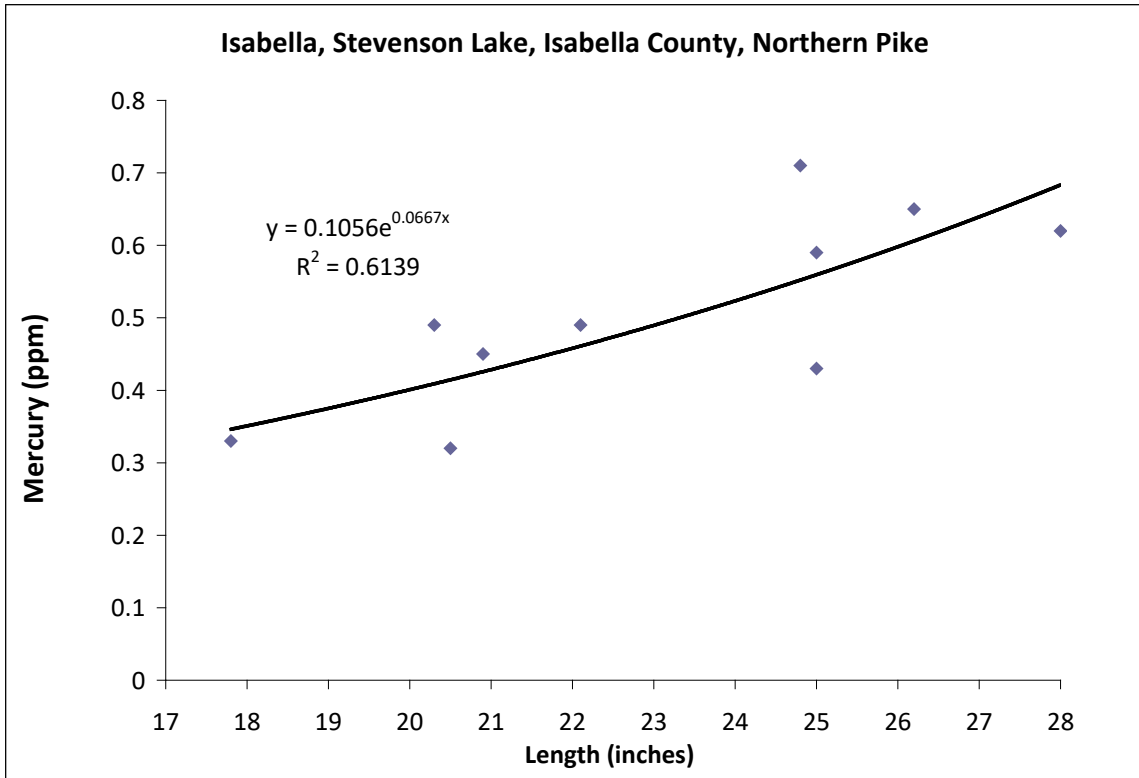
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	17.8	24	24.8	28
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.002	0.001	0.004	0.003	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.000	0.005				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Stevenson Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Stevenson Lake northern pike under 30 inches and no more than 6 meals per year of northern pike over 30 inches due to mercury. The Statewide Guidelines length break was added.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.523	2
25	0.560	1
26	0.598	1
27	0.639	1
28	0.684	1
29	0.731	1
30	0.781	1
31	0.835	1
32	0.893	1

Shaded area denotes extrapolated estimates



Jackson County

Northern Pike

Center Lake

Jackson County

Hg Analysis:

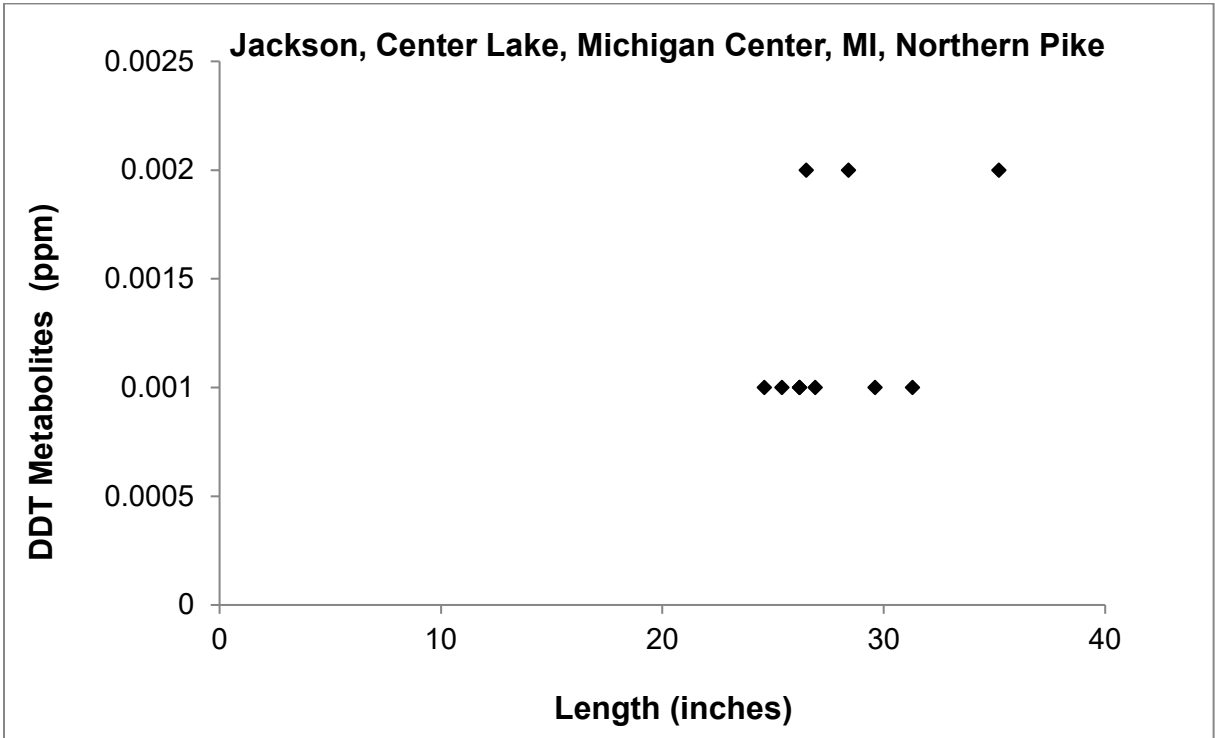
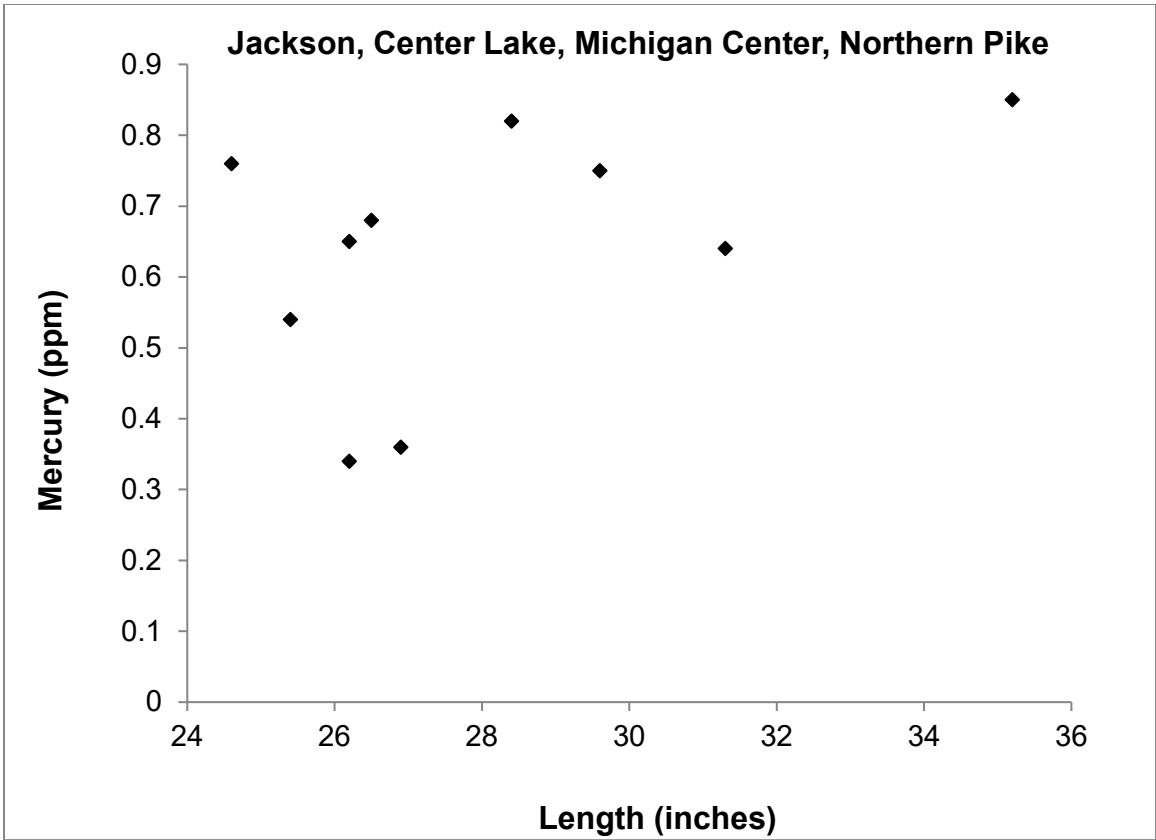
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2014	2014	10	24.6	24	24.6	35.2	
Datasets available: 2014							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.64		0.34	0.85	0.77	1
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.214	0.174					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2014	2014	10	24.6	24	24.6	35.2	
Datasets available: 2014							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND					
DDT	10						
Chlordane	10	ND		--	--	--	--
Toxaphene	10	ND		--	--	--	--
TEQ	0	--		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	0.184	0.184					
Chlordane	--	--					
Toxaphene	--	--					
TEQ	--	--					
Final meal category based on UCL:							1

Existing Advisory: Center Lake northern pike are covered under the statewide mercury consumption advisory: No one should eat more than 2 meals per month of northern pike smaller than 30 inches or more than 1 meal per month of those fish larger than 30 inches due to mercury.

Recommendation: No one should eat more than 1 meal per month of Center Lake northern pike due to mercury.



Black Crappie

Clark Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	5	10.4	na	10.4	12.2
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.194	0.160	0.260	0.240	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.707	0.757				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						4

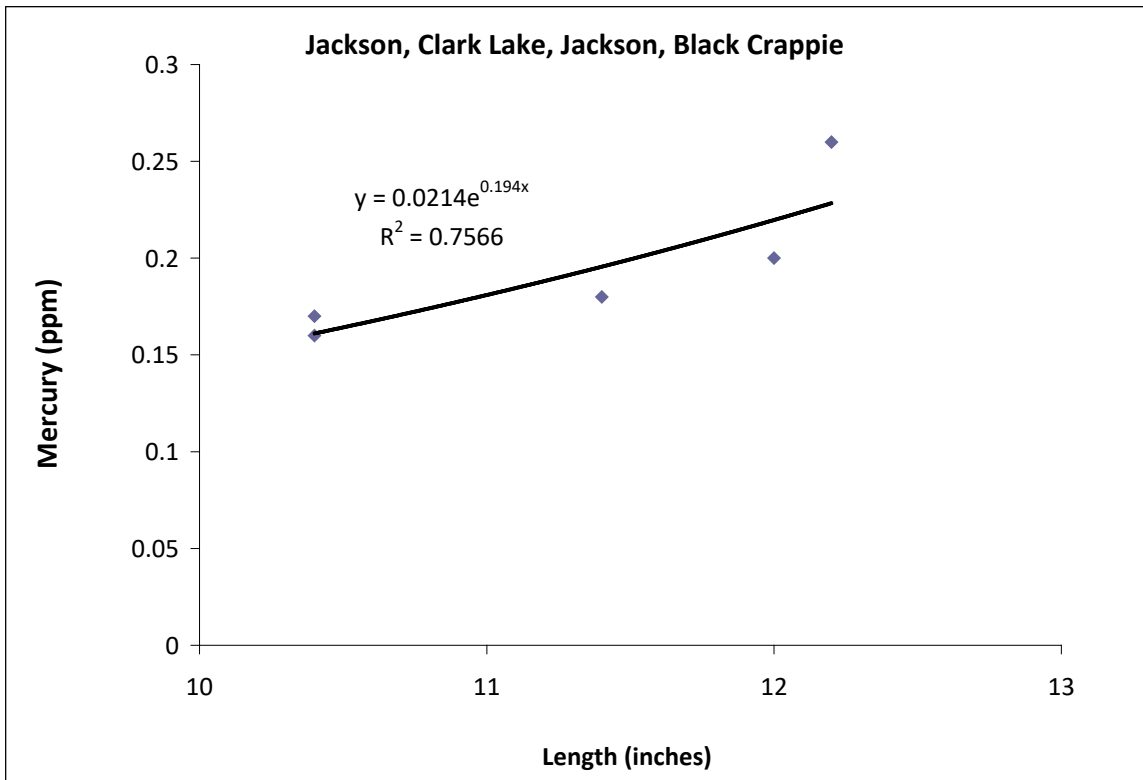
Existing Advisory: Clark Lake black crappie are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Clark Lake crappie due to mercury.

Note: Sample includes only a limited range of fish sizes; the recommendation matches the statewide advice for crappie.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	0.069	16
7	0.083	12
8	0.101	8
9	0.123	8
10	0.149	4
11	0.181	4
12	0.220	4
13	0.267	4
14	0.324	2

Shaded area denotes extrapolated estimates



Largemouth Bass

Clark Lake

Jackson County

Hg Analysis:

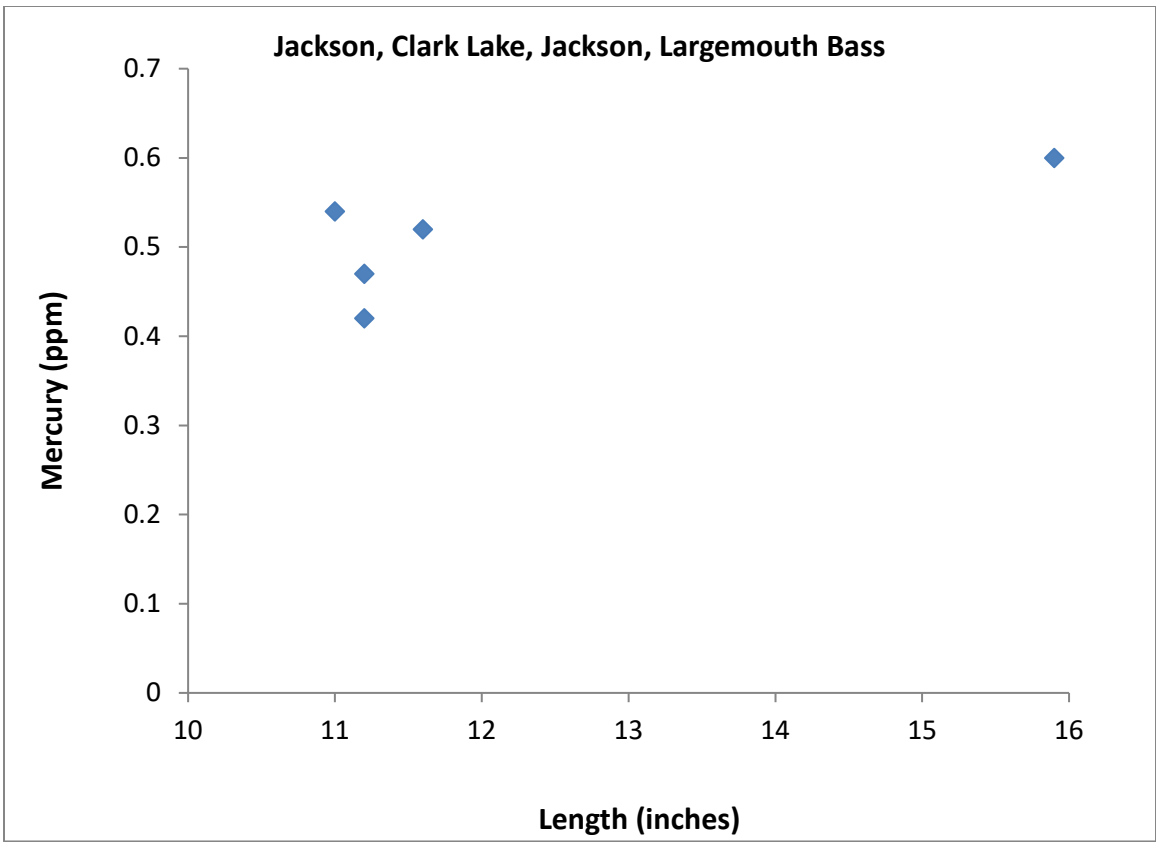
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	5	11	14	15.9	15.9
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.60	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.539	0.489				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Clark Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data available to develop specific advice for Clark Lake largemouth bass. The statewide consumption guidelines recommend that no one eat more than 2 meals per month of legal size largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.



Rock Bass

Clark Lake

Jackson County

Hg Analysis:

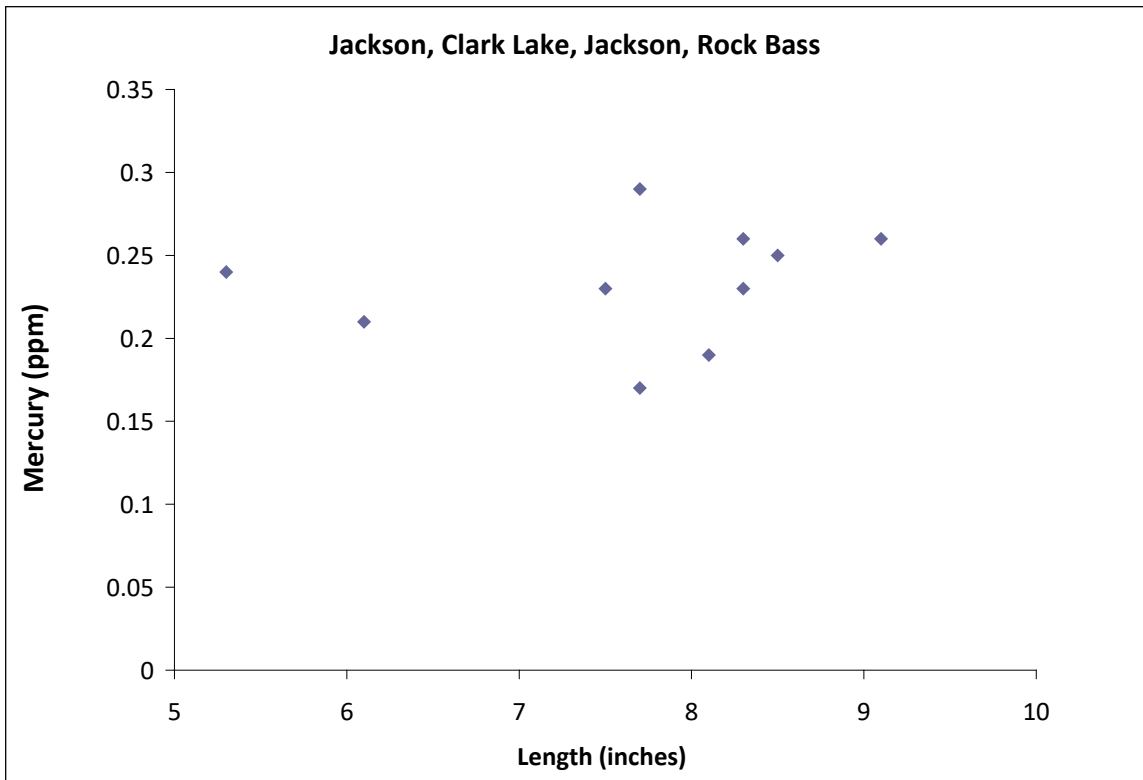
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	5.3	NA	5.3	9.1
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.23	0.17	0.29	0.26	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.035	0.029				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						4

Existing Advisory: Clark Lake rock bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Clark Lake rock bass due to mercury.



Bluegill

Grass Lake

Jackson County

Hg Analysis:

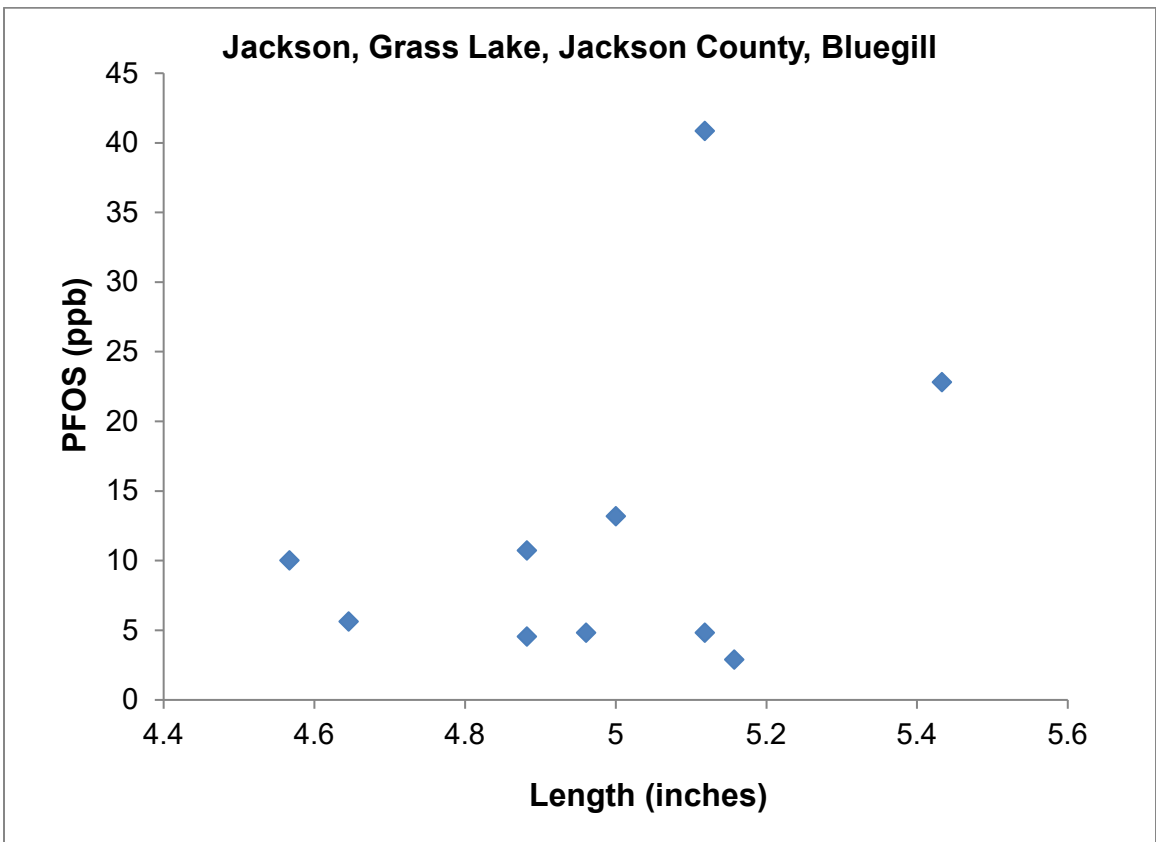
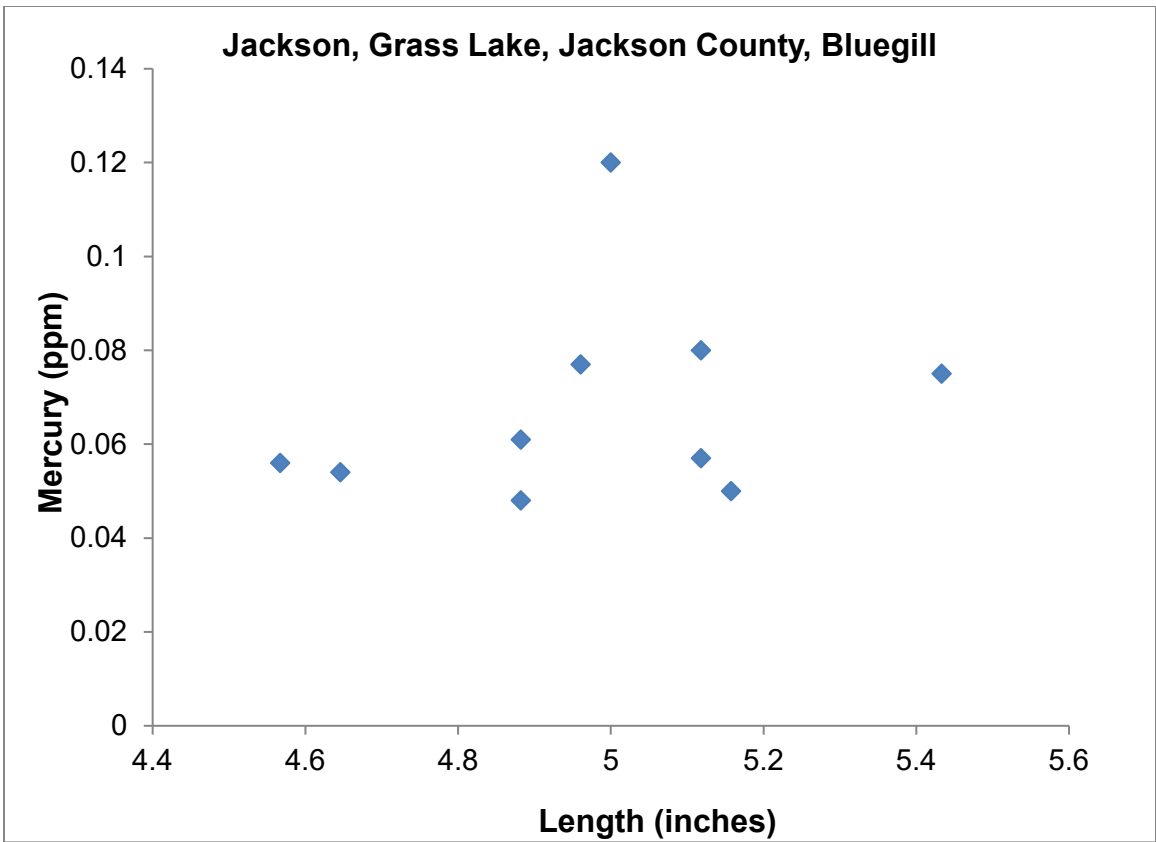
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent								
2020	2020	10	4.6	NA	4.6	5.4			
Datasets available:		2020							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category			
Mercury	10	0.068	0.048	0.120	0.083	12			
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
Mercury	0.072	0.096							

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent								
2020	2020	10	4.6	NA	4.6	5.4			
Datasets available:		2020							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category			
PCB	0	--	--	--	--	--			
DDT	0	--	--	--	--	--			
Chlordane	0	--	--	--	--	--			
Toxaphene	0	--	--	--	--	--			
PFOS	10	12.0 ppb	2.9 ppb	40.9 ppb	20.4 ppb	4			
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
PCB	--	--							
DDT	--	--							
Chlordane	--	--							
Toxaphene	--	--							
PFOS	0.147	0.078					Final meal category based on UCL:	4	

Existing MDHHS Advisory: Bluegill and sunfish from Grass Lake in Jackson County are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 4 meals per month of bluegill or sunfish from Grass Lake of any size due to PFOS. Mercury causes less restrictive advice.



Rock Bass

Grass Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent								
2020	2020	10	5.9	NA	5.9	7.6			
Datasets available:		2020							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category			
Mercury	10	0.177	0.110	0.360	0.231	4			
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
Mercury	0.718	0.698							

Organics Analysis:

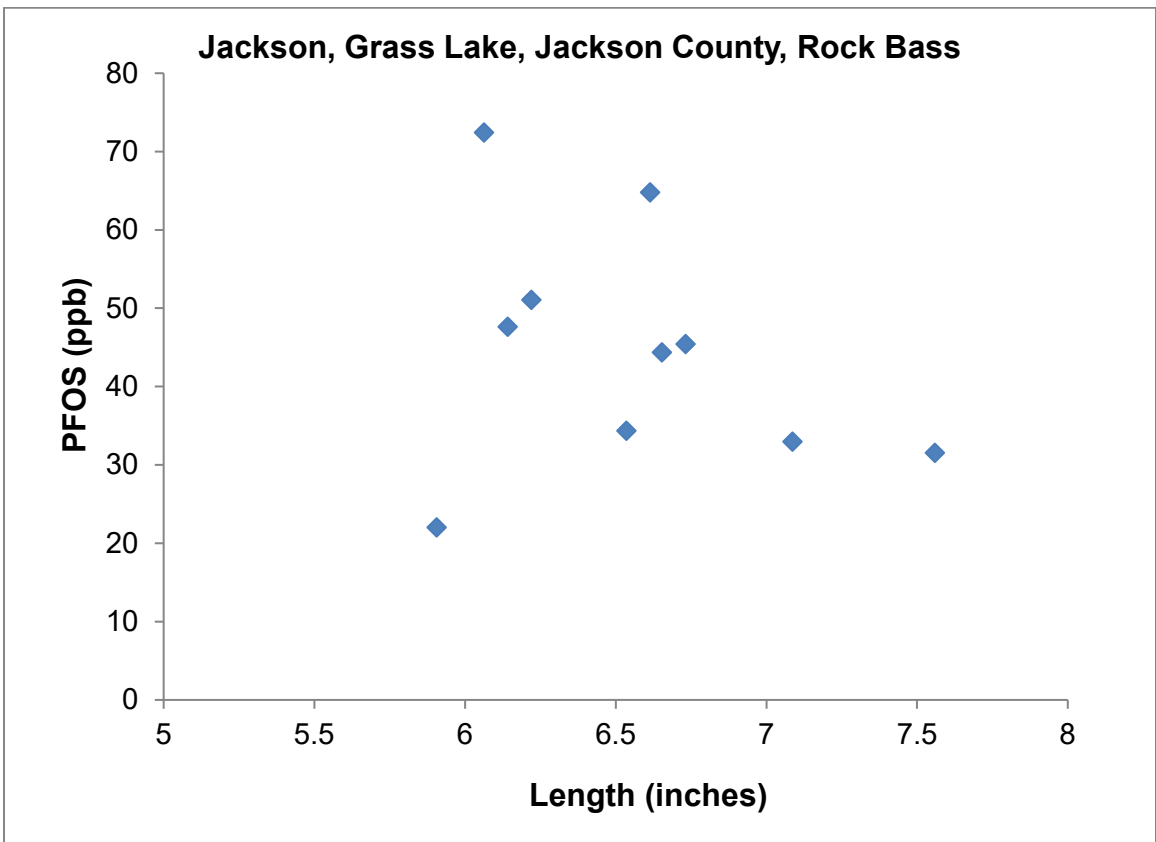
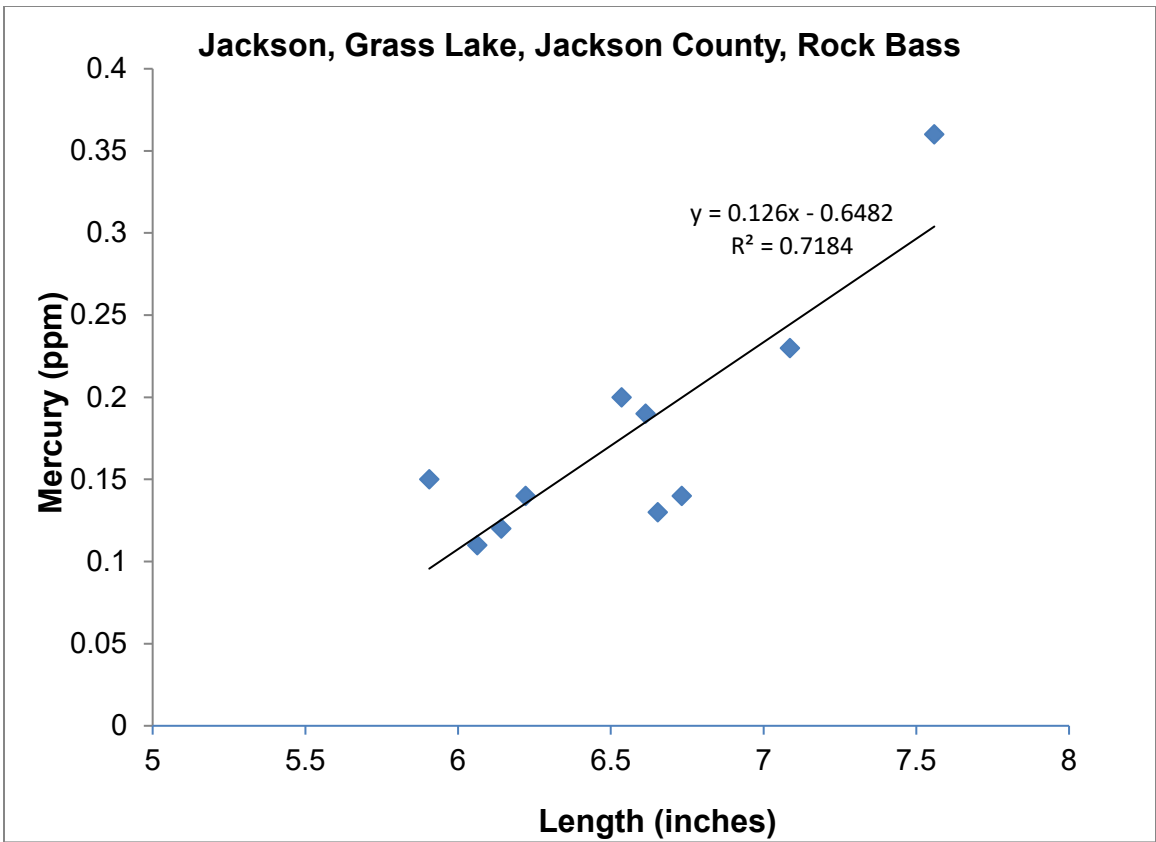
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent								
2020	2020	10	5.9	NA	5.9	7.6			
Datasets available:		2020							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category			
PCB	0	--	--	--	--	--			
DDT	0	--	--	--	--	--			
Chlordane	0	--	--	--	--	--			
Toxaphene	0	--	--	--	--	--			
PFOS	10	44.7 ppb	22.1 ppb	72.4 ppb	55.7 ppb	2			
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
PCB	--	--							
DDT	--	--							
Chlordane	--	--							
Toxaphene	--	--							
PFOS	0.083	0.043							
Final meal category based on UCL:						2			

Existing MDHHS Advisory: Rock bass from Grass Lake in Jackson County are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of rock bass of any size.

Recommendation: No one should eat more than 2 meals per month of rock bass from Grass Lake less than 7 inches due to PFOS or more than 2 meals per month of those fish larger than 7 inches due to PFOS and mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
5.5	0.045	16
6.0	0.108	8
6.5	0.171	4
7.0	0.234	4
7.5	0.297	2
8.0	0.359	2
8.5	0.422	2
9.0	0.485	2

Shaded area denotes extrapolated estimates



Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	18.7	NA	18.7	25.7
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.109	0.090	0.210	0.150	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.336	0.204				

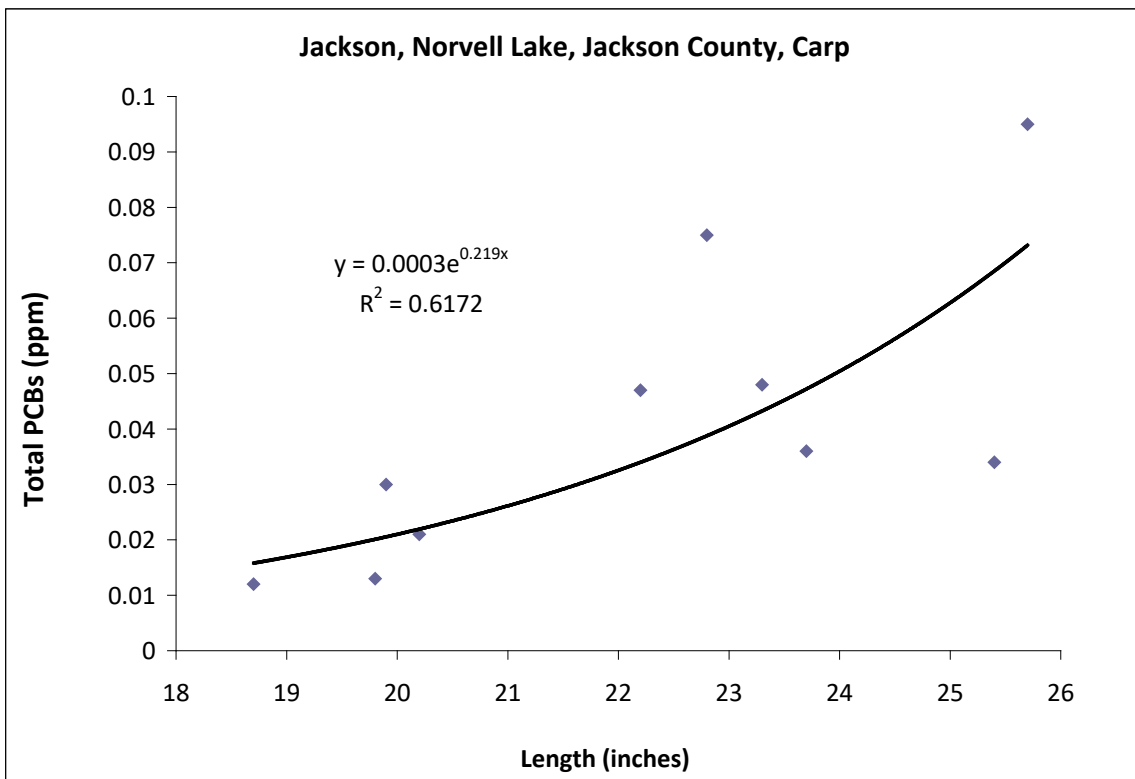
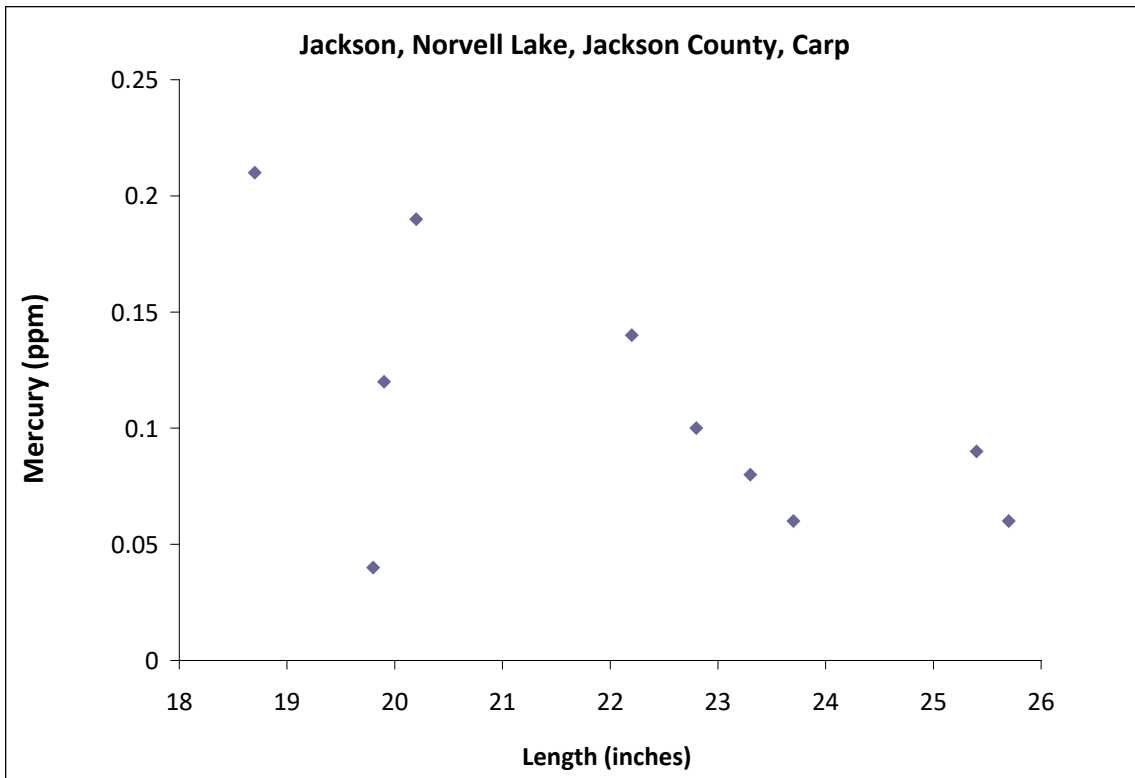
Organics Analysis:

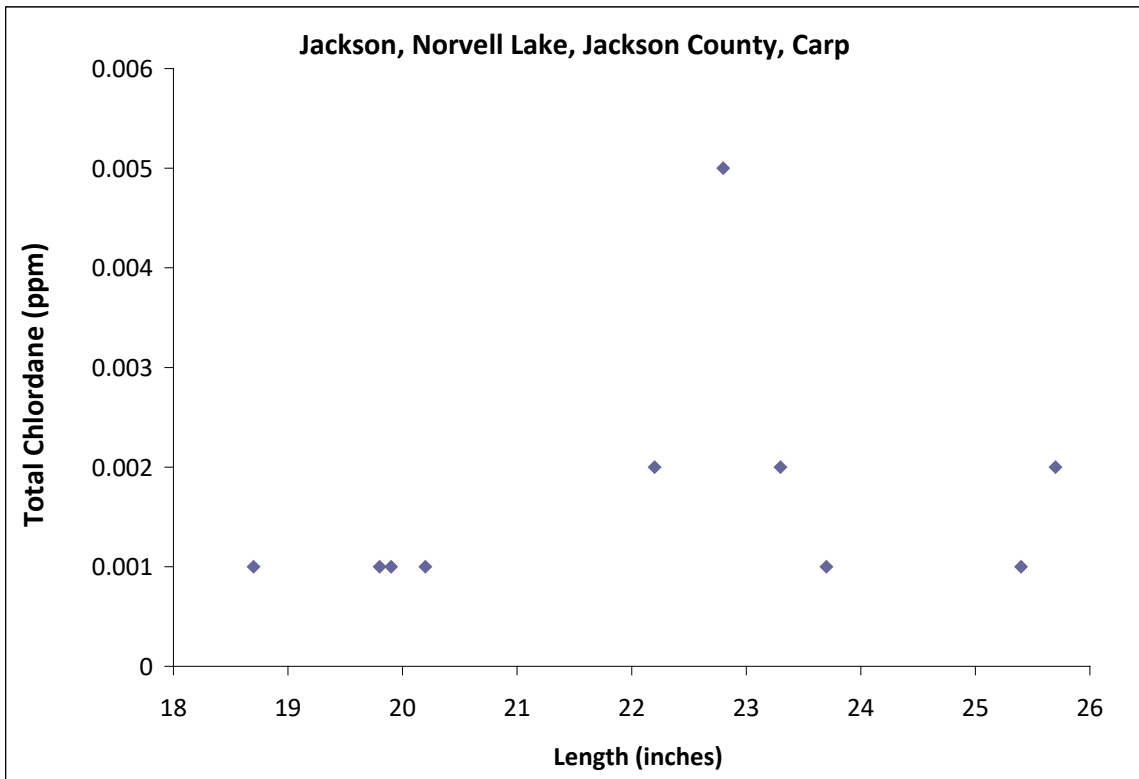
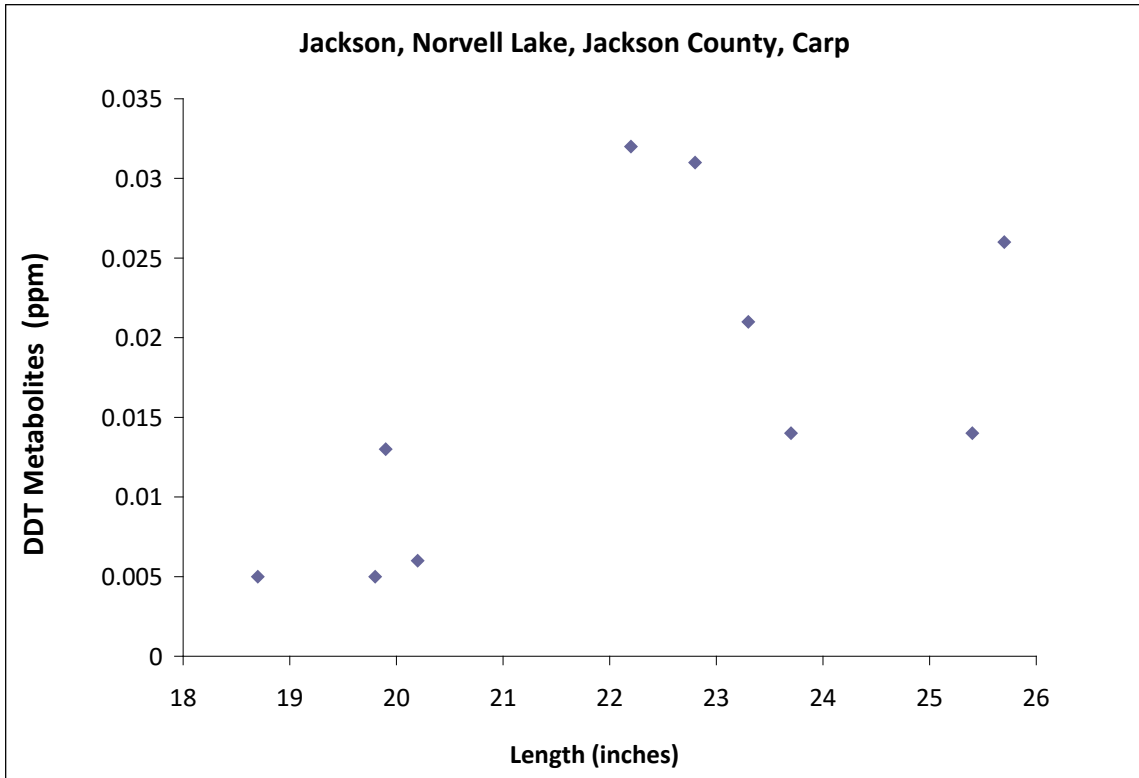
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	18.7	NA	18.7	25.7
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.041	0.01	0.10	0.06	2
DDT	10	0.017	0.005	0.03	0.02	16
Chlordane	10	0.002	0.001	0.005	0.003	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.519	0.617				
DDT	0.339	0.482				
Chlordane	0.069	0.127				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: There are no current consumption advisories for Norvell Lake carp.

Recommendation: No one should eat more than 4 meals per month of Norvell Lake carp smaller than 22 inches due to mercury and PCBs or more than 2 meals per month of those fish larger than 22 inches due to PCBs.

Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
12	0.004	16
14	0.006	16
16	0.010	16
18	0.015	12
20	0.024	8
22	0.037	4
24	0.058	2
26	0.089	2
28	0.138	1
<i>Shaded area denotes extrapolated estimates</i>		





Largemouth Bass

Norvell Lake

Jackson County

Hg Analysis:

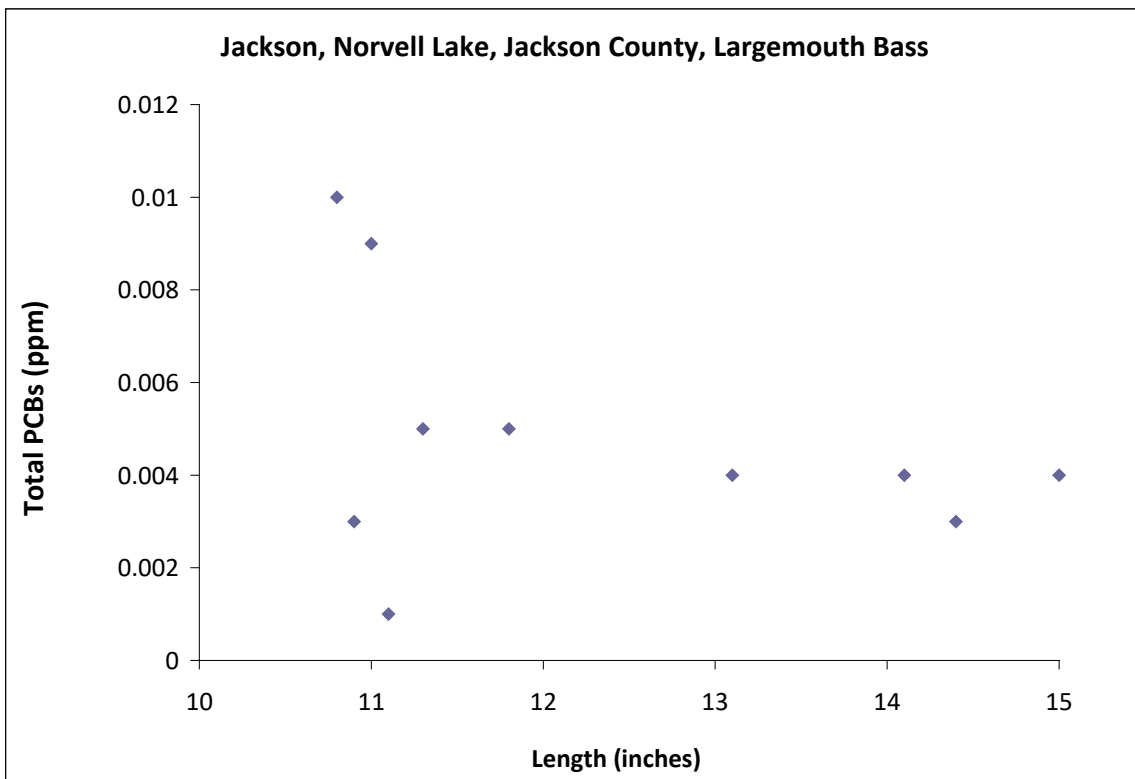
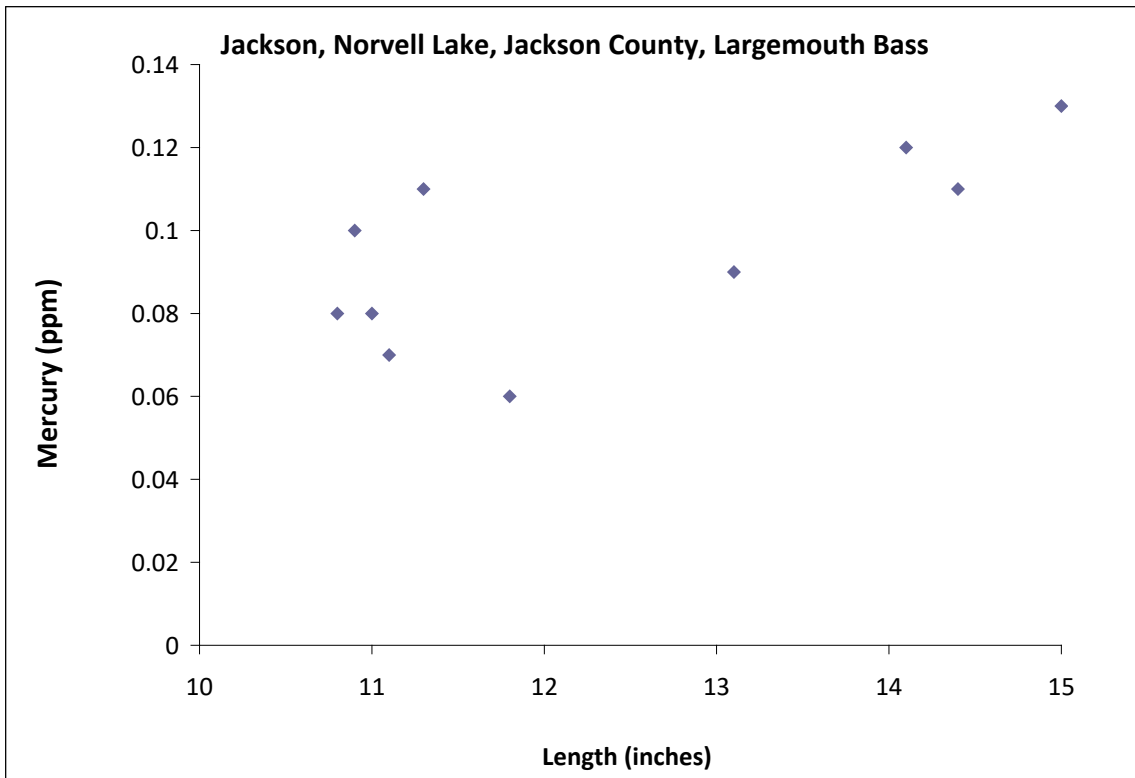
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	10.8	14	14.1	15
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.12	0.11	0.13	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.490	0.429				

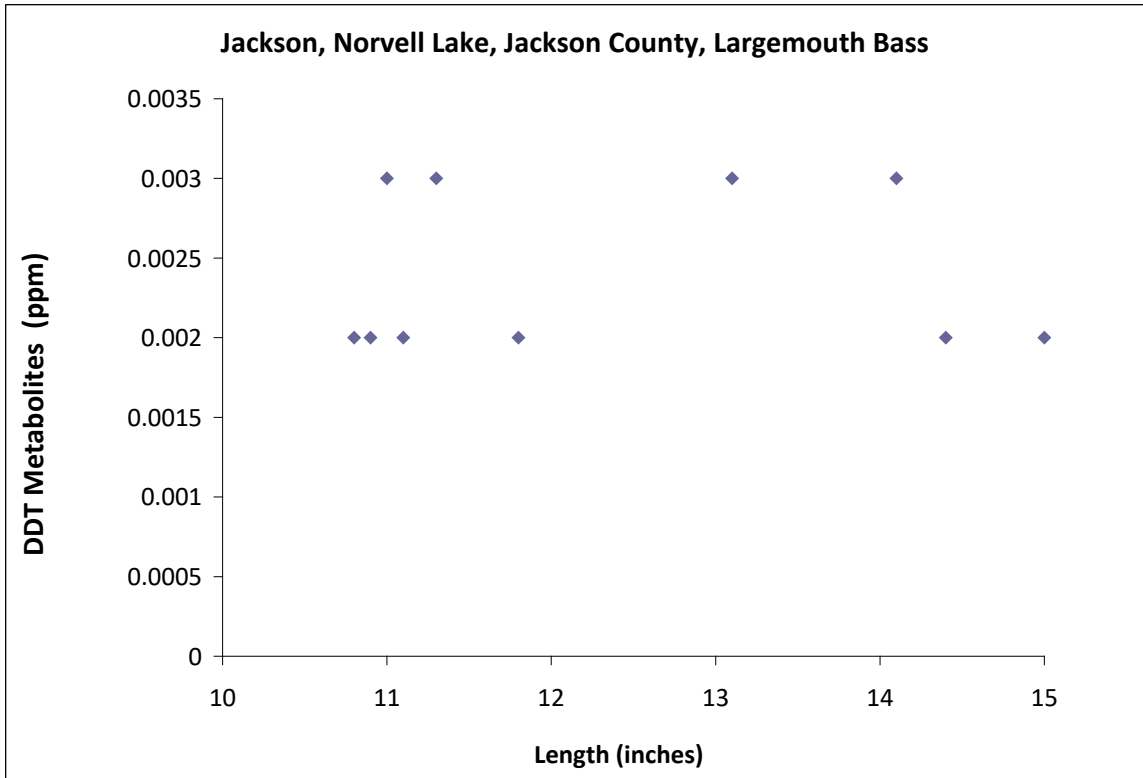
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	10.8	14	14.1	15
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	0.004	0.003	0.004	--	--
DDT	3	0.002	0.002	0.003	--	--
Chlordane	3	ND	--	--	--	--
Toxaphene	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.129	0.019				
DDT	0.000	0.000				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: No one should eat more than one meal per week of Norvell Lake largemouth bass larger than 18 inches due to mercury.

Recommendation: There are insufficient data from legal length fish to develop specific advice for Norvell Lake largemouth bass. The statewide consumption guidelines recommend that no one eat more than 2 meals per month of legal size largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.





Black Crappie

Portage Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	10	9.3	NA	9.3	11.2
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.22	0.13	0.33	0.26	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.727	0.716				

Organics Analysis:

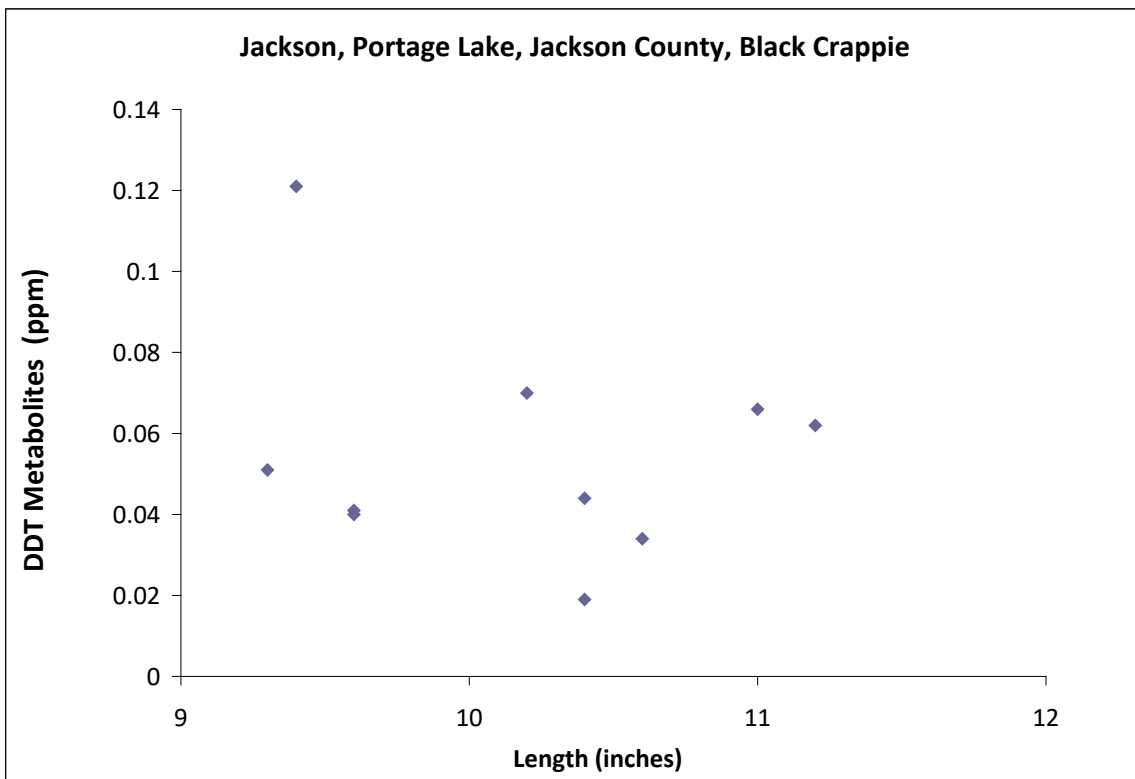
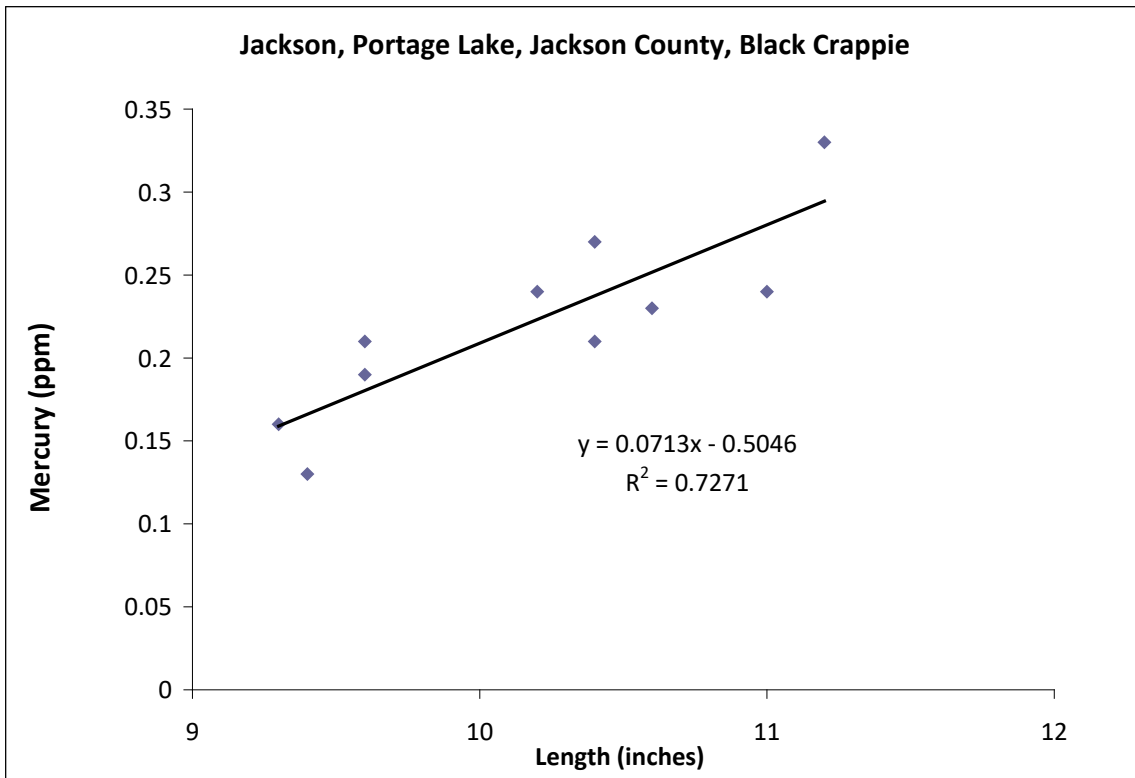
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	10	9.3	NA	9.3	11.2
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	0.055	0.019	0.121	0.070	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.040	0.019				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						4

Existing Advisory: Portage Lake black crappie are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Portage Lake crappie smaller than 10 inches or more than 2 meals per month of those fish larger than 10 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	-0.077	16
7	-0.006	16
8	0.066	16
9	0.137	4
10	0.208	4
11	0.280	2
12	0.351	2
13	0.422	2
14	0.494	2

Shaded area denotes extrapolated estimates



Largemouth Bass

Portage Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	5	13.2	14	14.6	16.9
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.56	0.500	0.62	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.836	0.800				

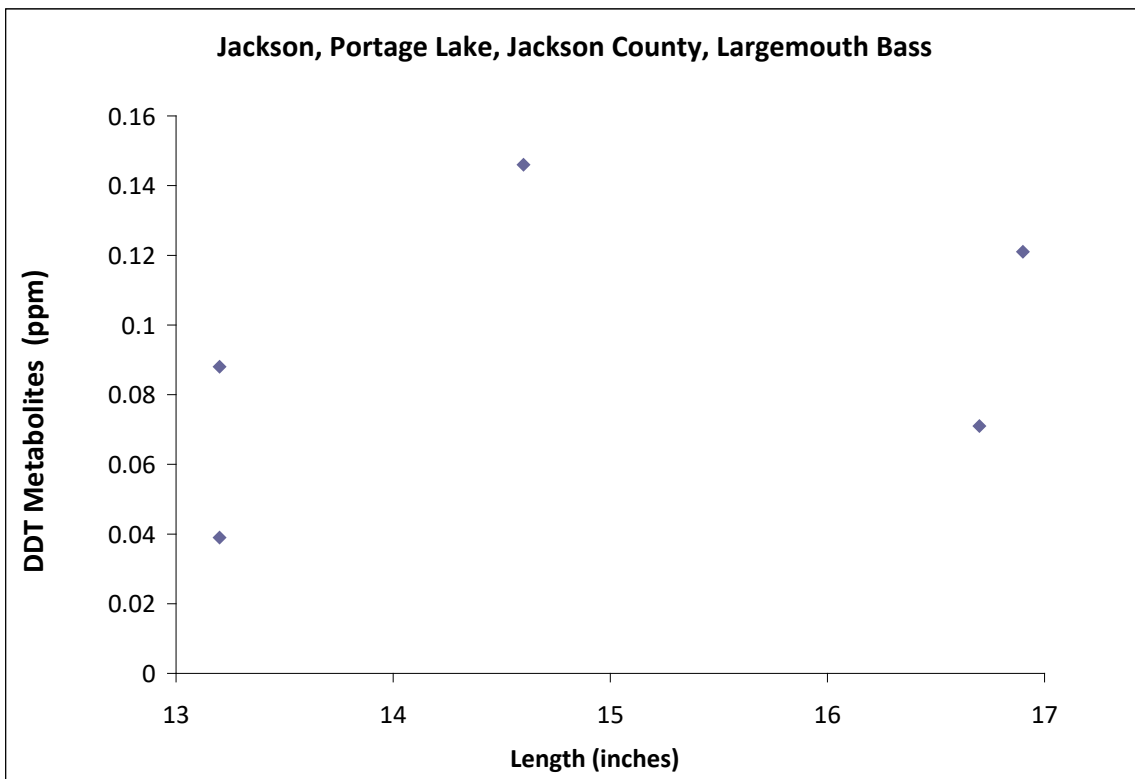
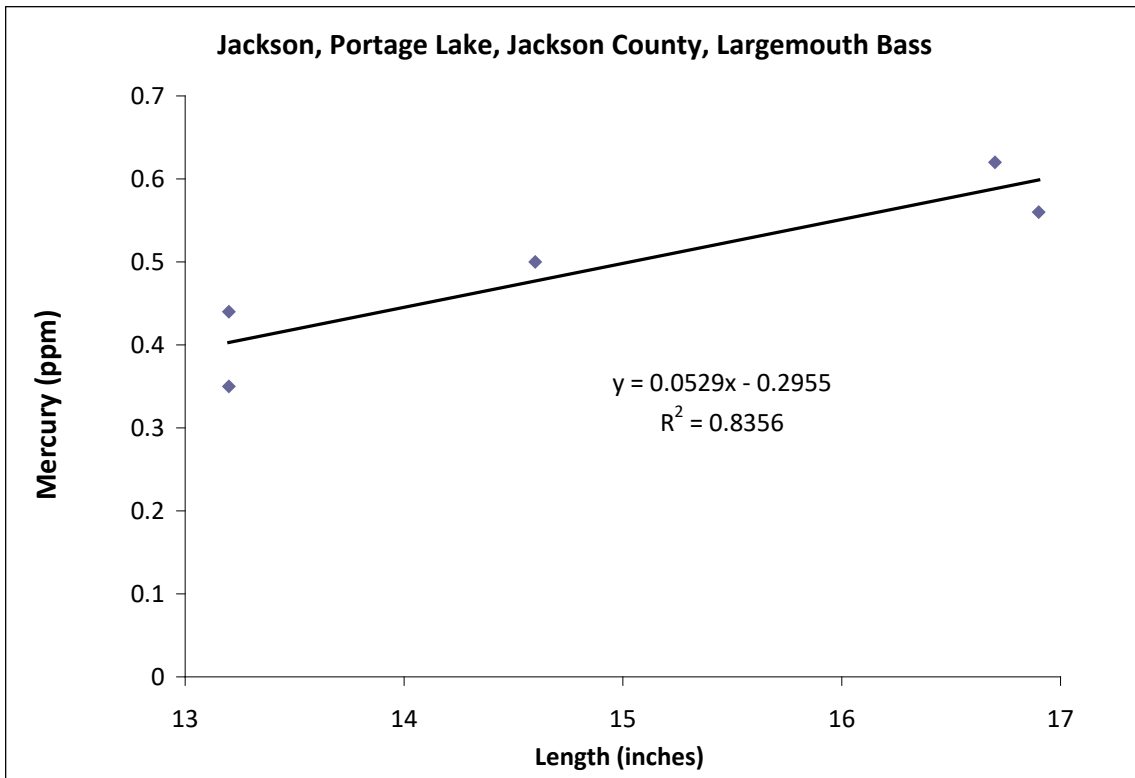
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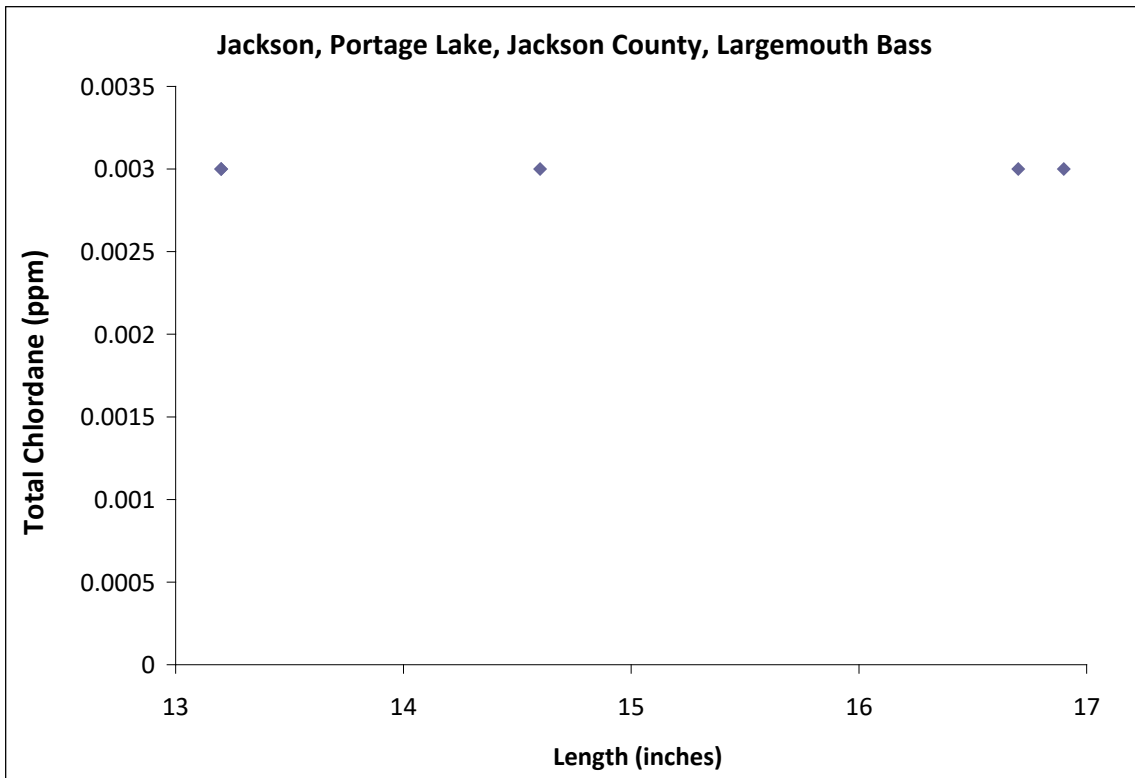
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	5	13.2	14	14.6	16.9
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	ND	--	--	--	--
DDT	3	0.113	0.071	0.146	--	--
Chlordane	3	0.003	0.003	0.003	--	--
Toxaphene	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.110	0.159				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Portage Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data from legal lengths to develop specific advice for Portage Lake largemouth bass. The statewide consumption guidelines apply and recommend that no one eat more than 2 meals per month of legal size largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.445	2
15	0.498	2
16	0.551	1
17	0.604	1
18	0.657	1
19	0.710	1
20	0.763	1
21	0.815	1
22	0.868	1
<i>Shaded area denotes extrapolated estimates</i>		





Northern Pike

Portage Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	8	20.9	24	25	29.3
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.92	0.74	1.11	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.860	0.792				

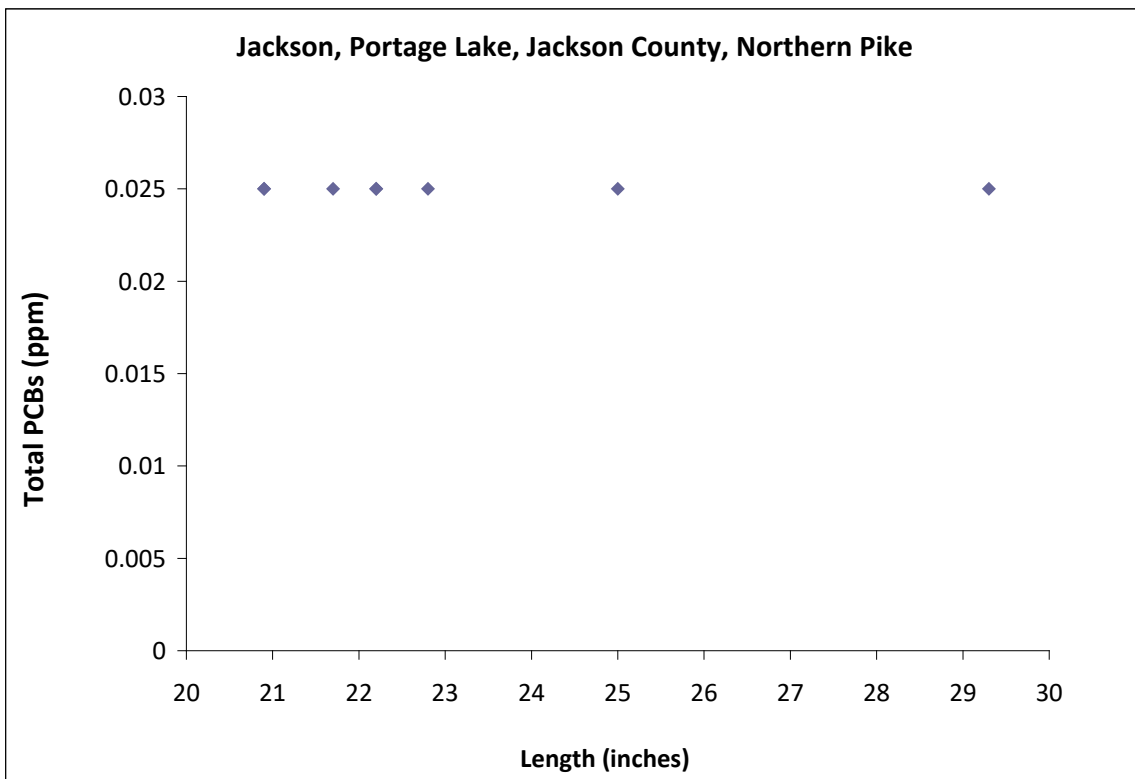
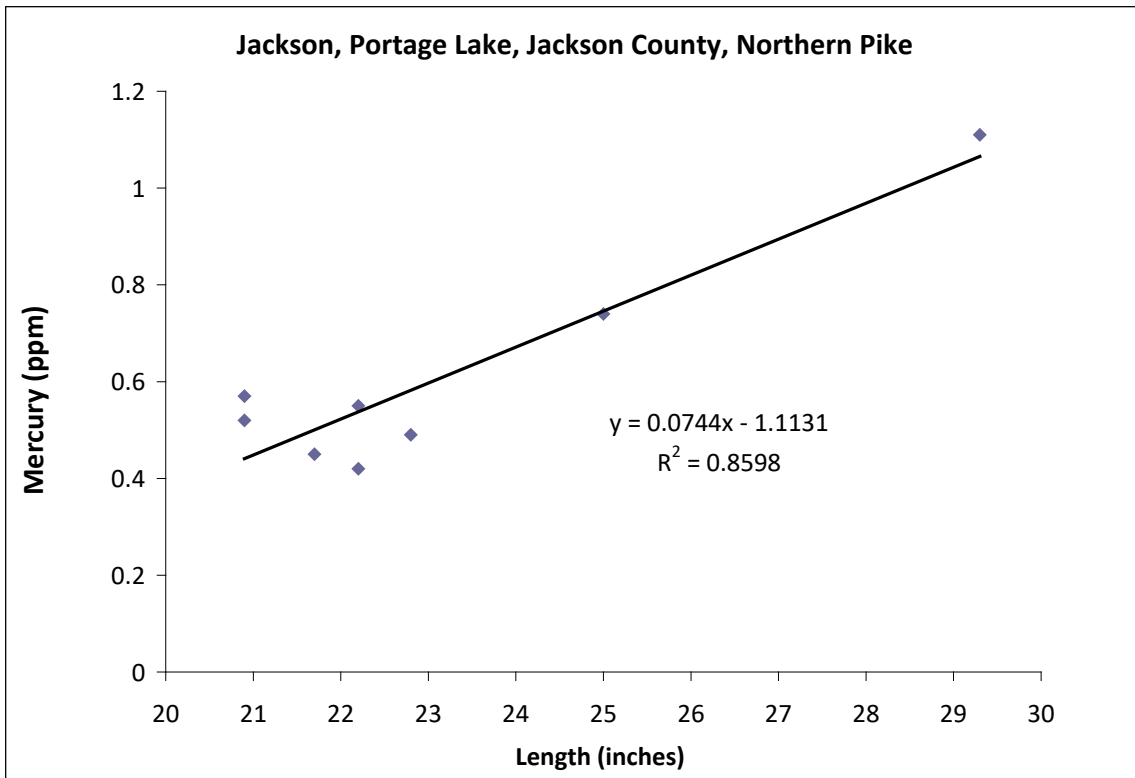
Organics Analysis:

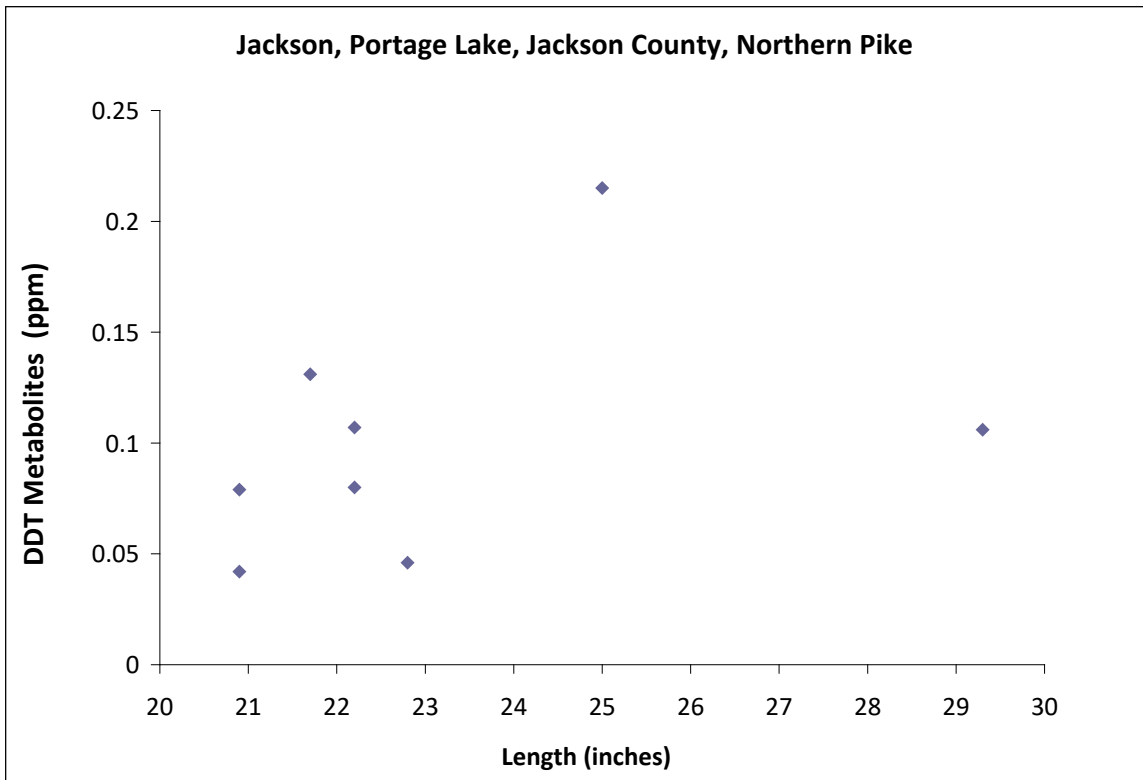
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	8	20.9	24	25	29.3
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	0.02	0.02	0.02	--	--
DDT	2	0.16	0.11	0.22	--	--
Chlordane	2	ND	--	--	--	--
Toxaphene	2	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.000	0.000				
DDT	0.145	0.163				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Portage Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 6 meals per year of northern pike over 30 inches or more than 1 meal per month of northern pike under 30 inches in length due to mercury. The dataset has mostly sub-legal lengths and the slope of the regression is determined by two data points. Mercury concentrations suggest the statewide guideline would be under-protective, thus the available dataset was used to set the guideline.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.673	1
25	0.747	1
26	0.821	1
27	0.896	1
28	0.970	1
29	1.045	1
30	1.119	0.5
31	1.193	0.5
32	1.268	0.5
<i>Shaded area denotes extrapolated estimates</i>		





Black Crappie

Tims Lake

Jackson County

Hg Analysis:

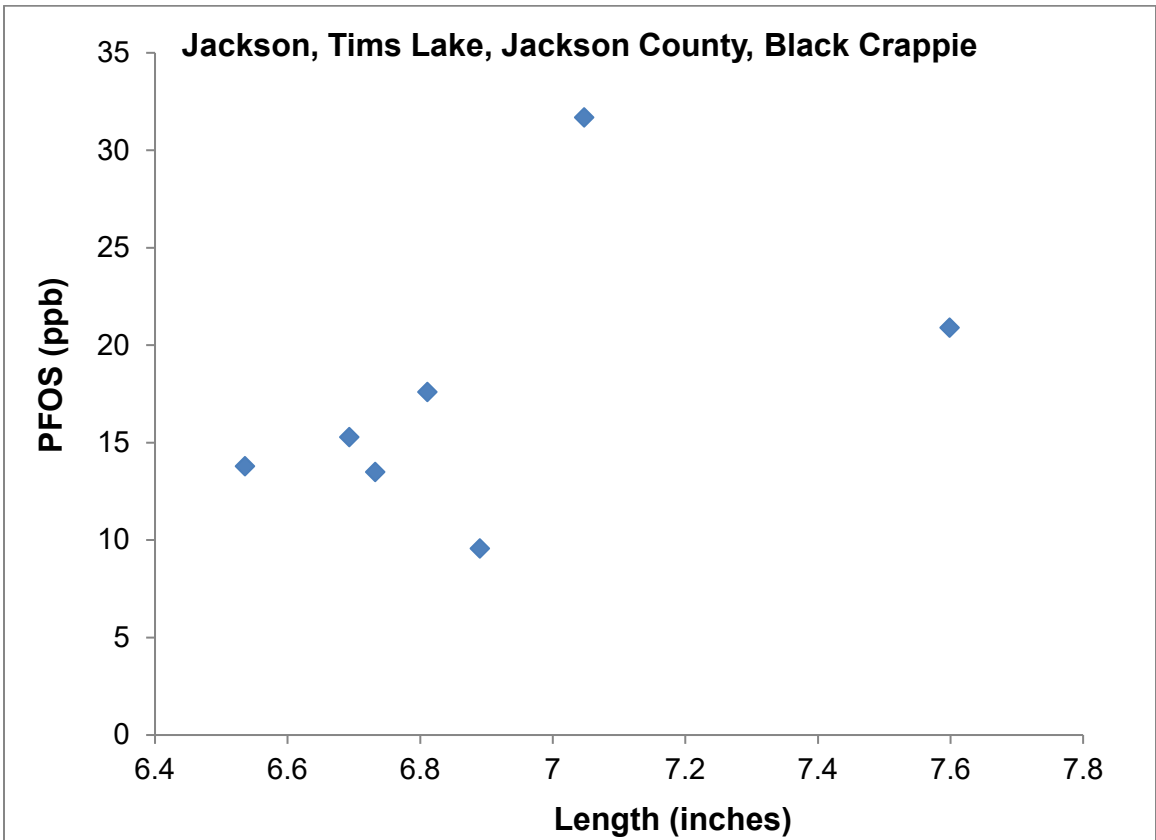
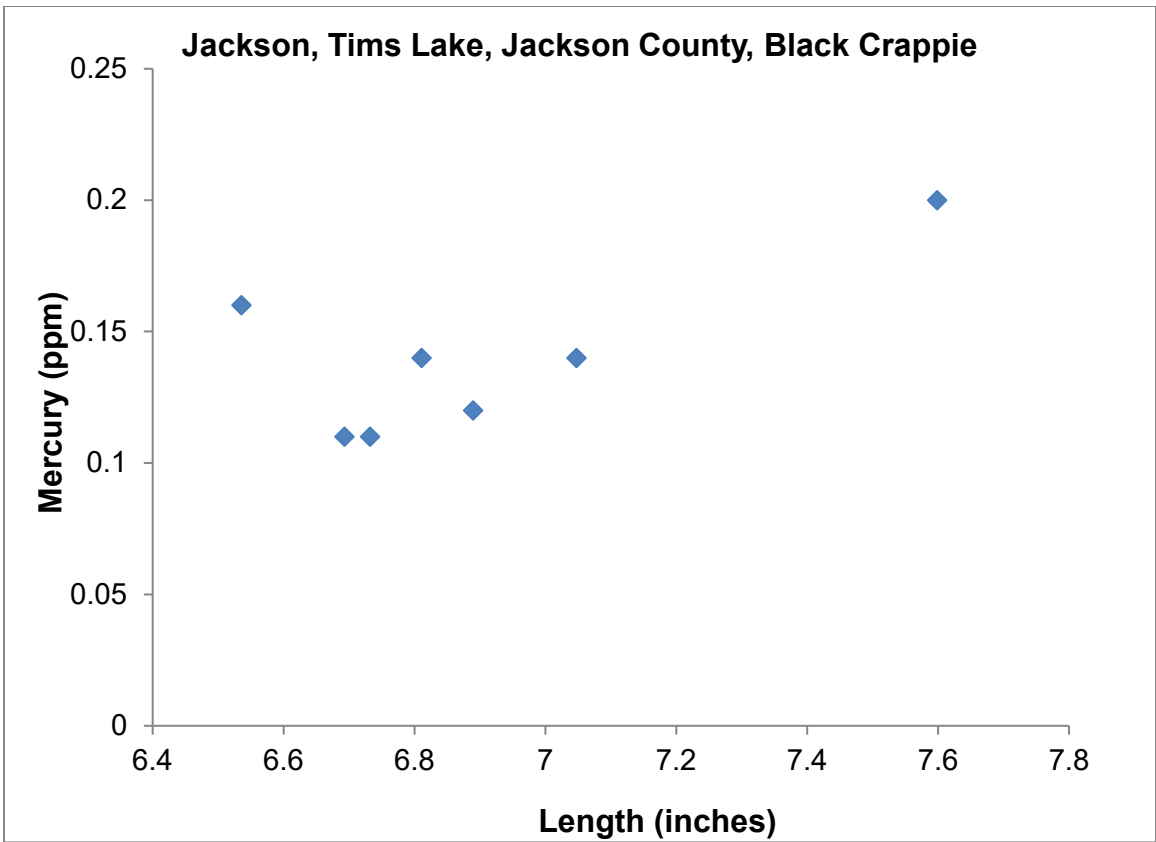
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	6.5	NA	6.5	7.6
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.140	0.110	0.200	0.170	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.474	0.421				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	6.5	NA	6.5	7.6
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	7	17.5 ppb	9.6 ppb	31.7 ppb	24.4 ppb	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.220	0.227				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Black and White Crappie from Tims Lake in Jackson County are currently covered under the statewide mercury advisory. No one should eat more than 4 meals per month of crappie of any size.

Recommendation: No one should eat more than 4 meals per month of black or white crappie of any size from Tims Lake in Jackson County due to mercury and PFOS.



Bluegill

Tims Lake

Jackson County

Hg Analysis:

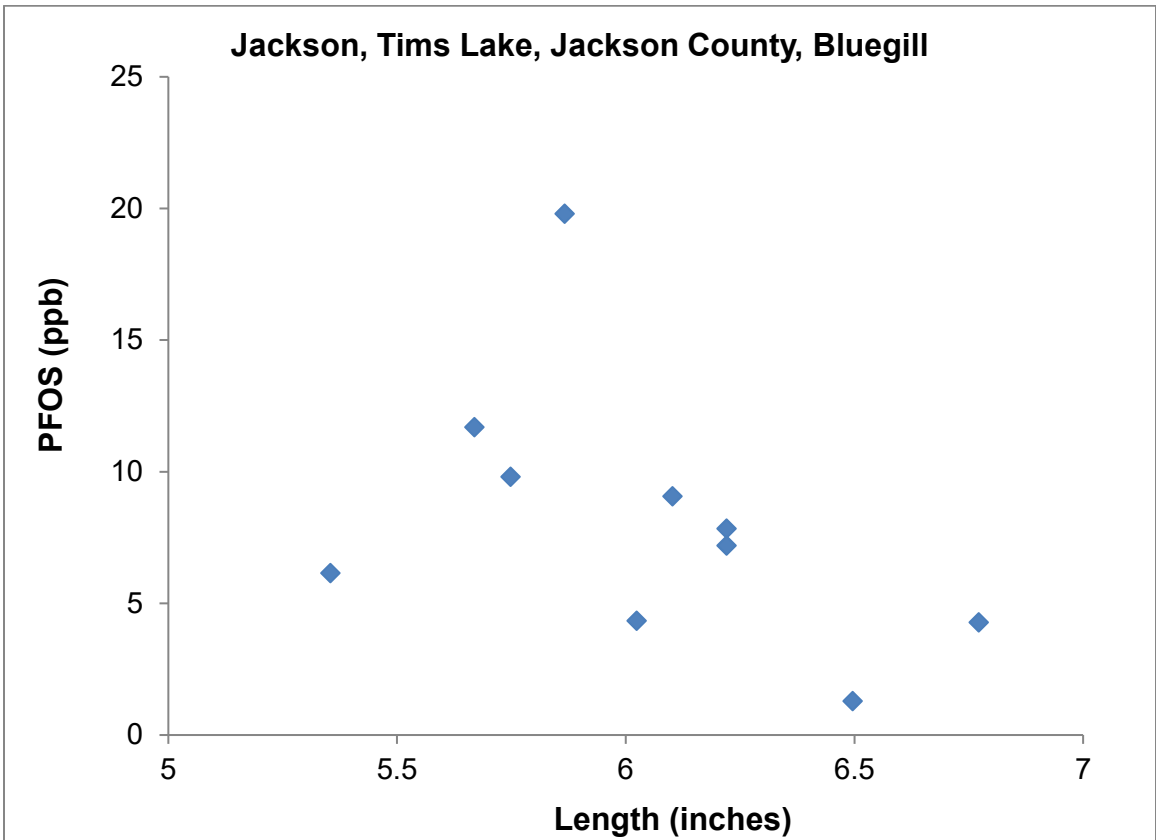
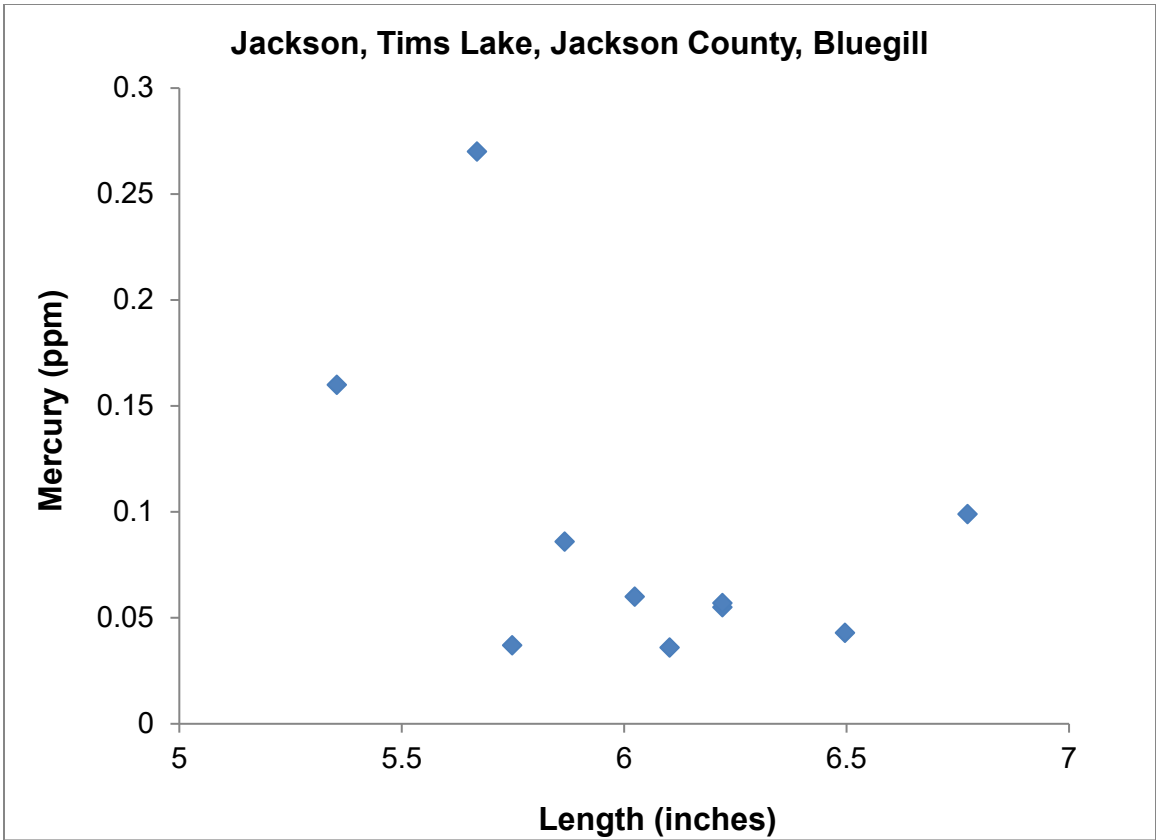
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	5.4	NA	5.4	6.8
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.090	0.036	0.270	0.143	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.222	0.171				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	5.4	NA	5.4	6.8
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	8.2 ppb	1.3 ppb	19.8 ppb	11.8 ppb	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.203	0.285				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Bluegill and sunfish from Tims Lake in Jackson County are currently covered under the statewide mercury advisory. No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 4 meals per month of bluegill or sunfish of any size from Tims Lake in Jackson County due to mercury. PFOS causes less restrictive advice.



Largemouth Bass

Tims Lake

Jackson County

Hg Analysis:

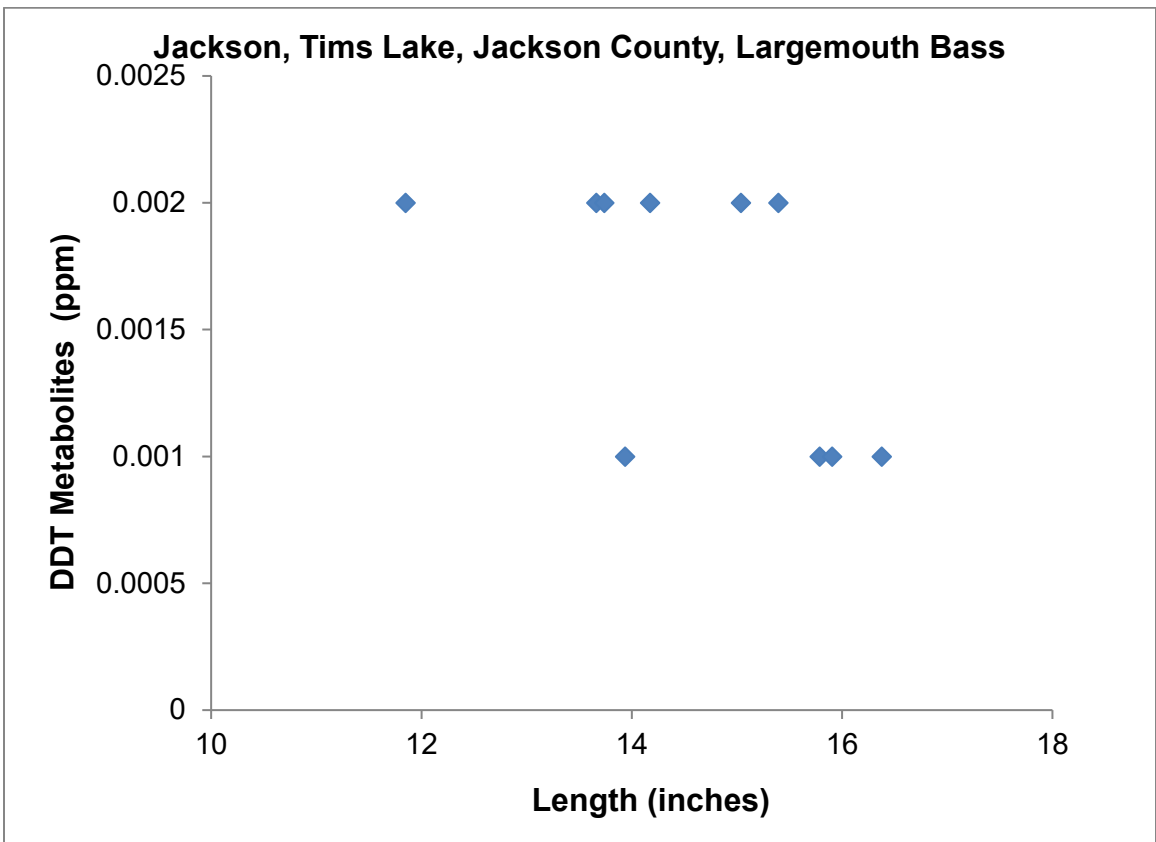
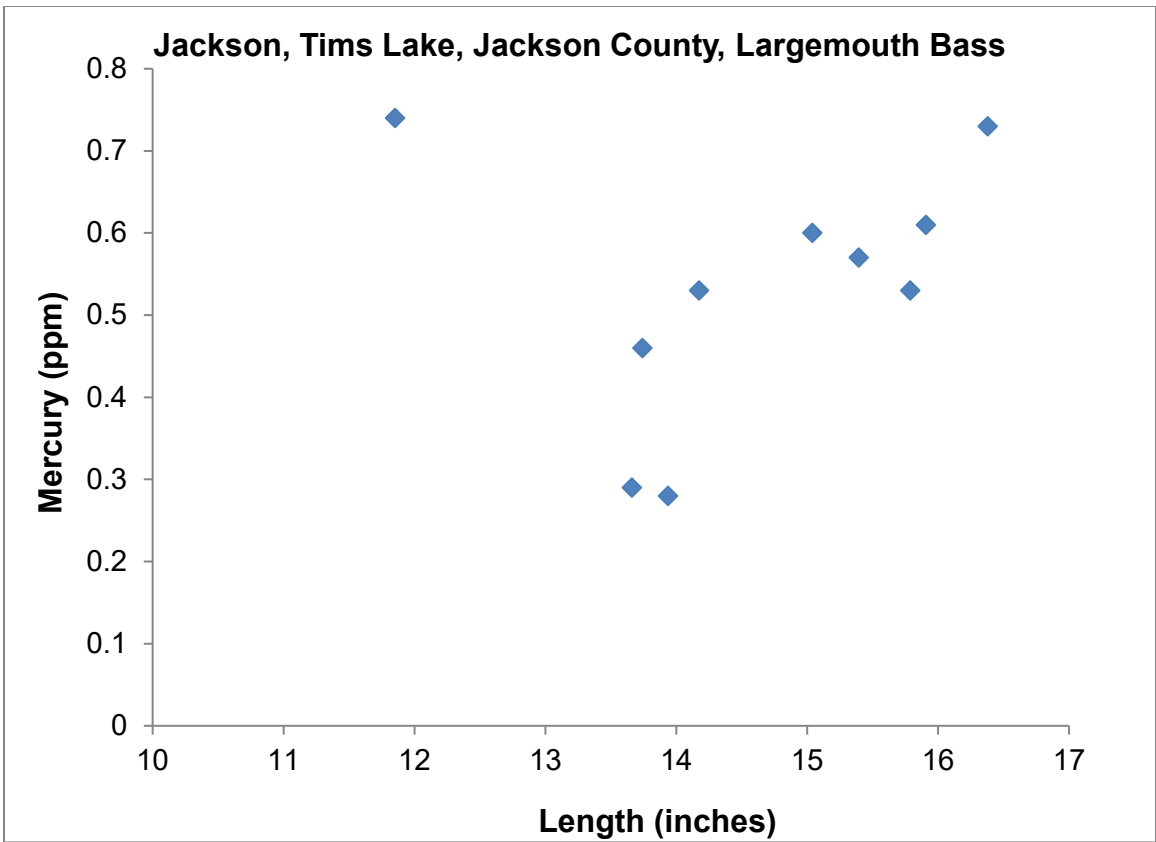
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	11.9	14.0	13.7	16.4
Datasets available: 2021						
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.511	0.280	0.730	0.625	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.042	0.064				

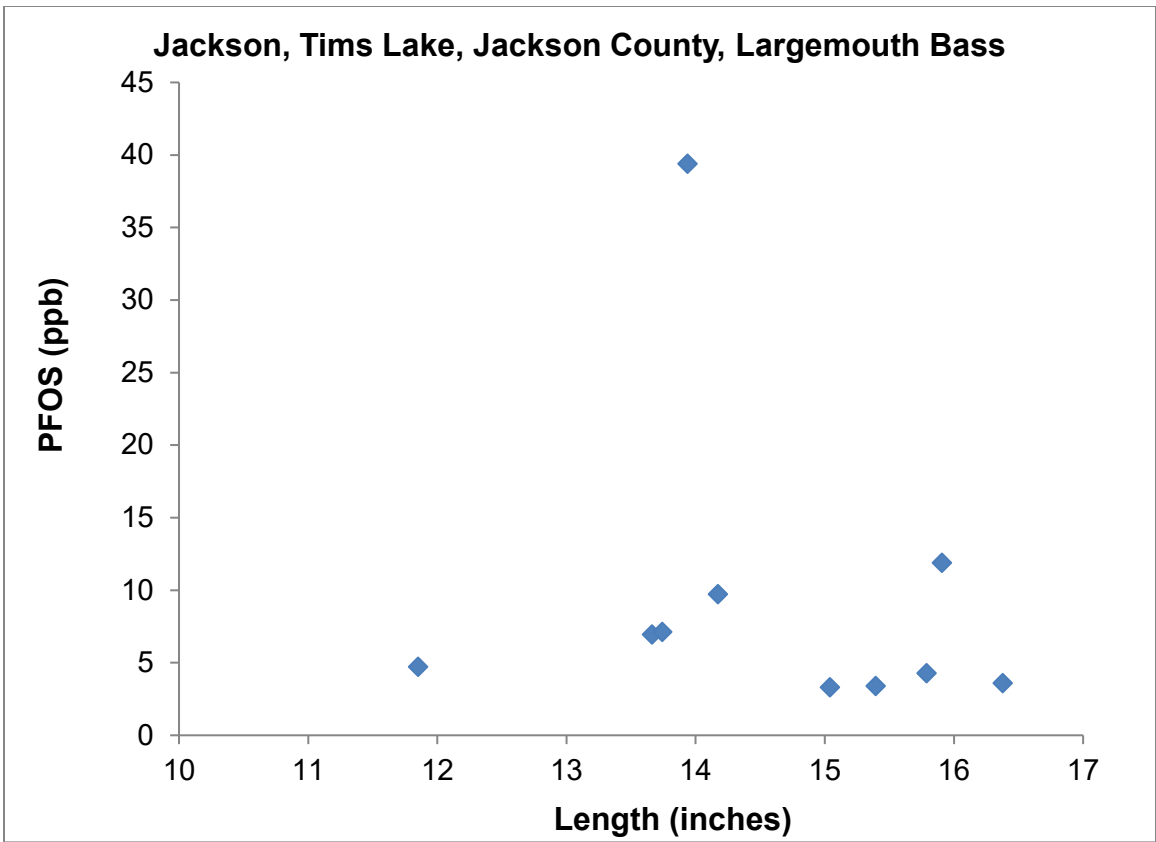
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	11.9	14.0	13.7	16.4
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	ND	--	--	--	16
DDT	9	0.002	<0.001	0.002	0.001	16
Chlordane	9	ND	--	--	--	--
Toxaphene	9	ND	--	--	--	--
PFOS	9	10.0 ppb	3.3 ppb	39.4 ppb	18.8 ppb	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.058	0.105				
DDT	0.331	0.331				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.030	0.054				
Final meal category based on UCL:						1

Existing MDHHS Advisory: Largemouth and smallmouth bass from Tims Lake in Jackson County are currently covered under the statewide guidance for mercury. No one should eat more than 2 per month of largemouth or smallmouth bass less than 18 inches in length or no more than 1 meal per month of largemouth or smallmouth bass greater than 18 inches in length.

Recommendation: No one should eat more than one meal per month of largemouth or smallmouth bass smaller than 18 inches or no more than 6 meals per year of largemouth or smallmouth bass larger than 18 inches from Tims Lake in Jackson County due to mercury. PFOS causes less-restrictive advice. State-wide length break was applied due to limited size range of bass in the mercury analysis.





Bluegill

Vandercook Lake

Jackson County

Hg Analysis:

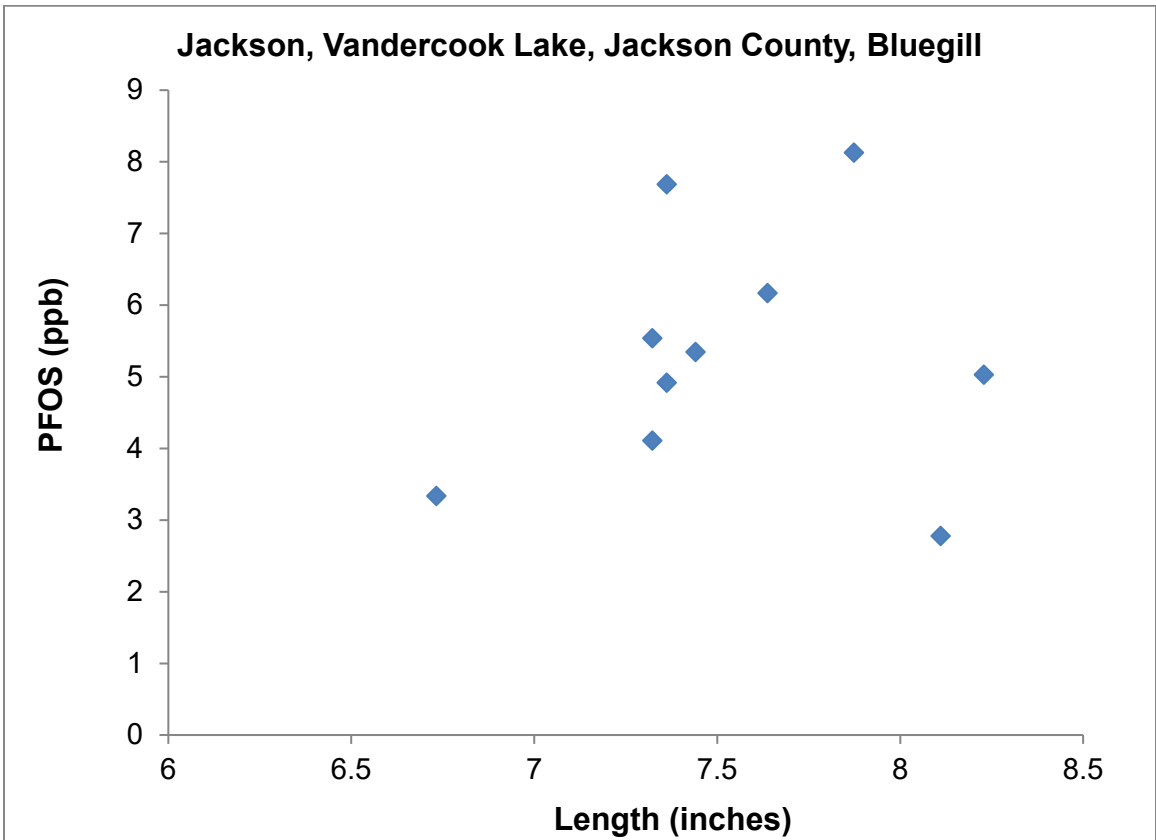
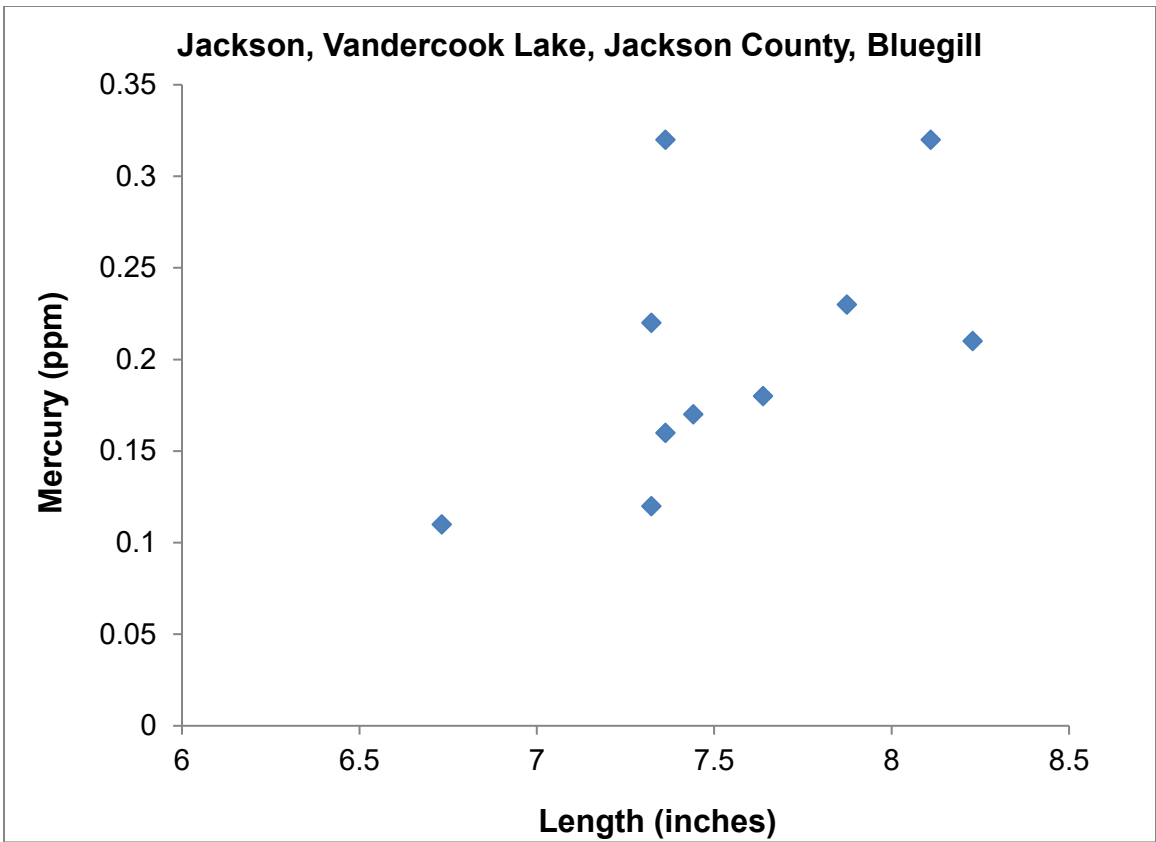
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	6.7	NA	6.7	8.2
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.204	0.110	0.320	0.256	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.302	0.385				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	6.7	NA	6.7	8.2
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	5.3 ppb	2.8 ppb	8.1 ppb	6.5 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.015	0.008	Final meal category based on UCL:			4

Existing MDHHS Advisory: Bluegill and pumpkinseed from Vandercook Lake in Jackson County are currently covered under the statewide mercury advisory. No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 4 meals per month of bluegill or sunfish of any size from Vandercook Lake in Jackson County due to mercury.



Carp

Vandercook Lake

Jackson County

Hg Analysis:

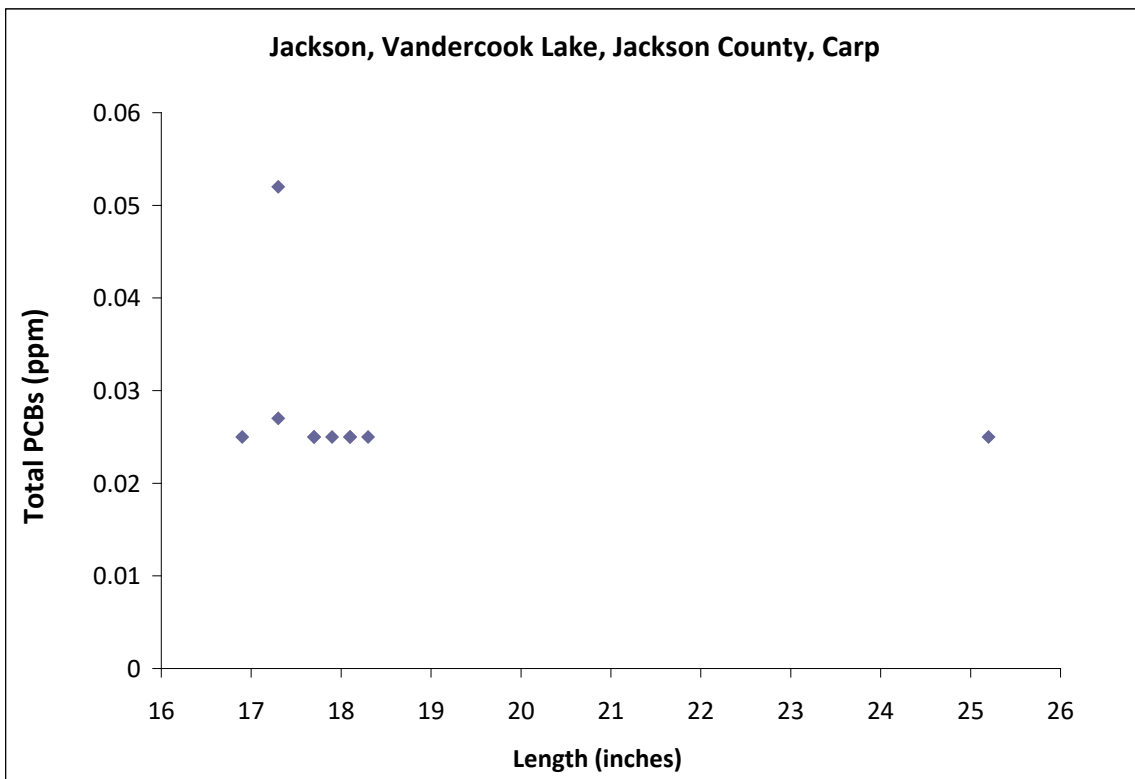
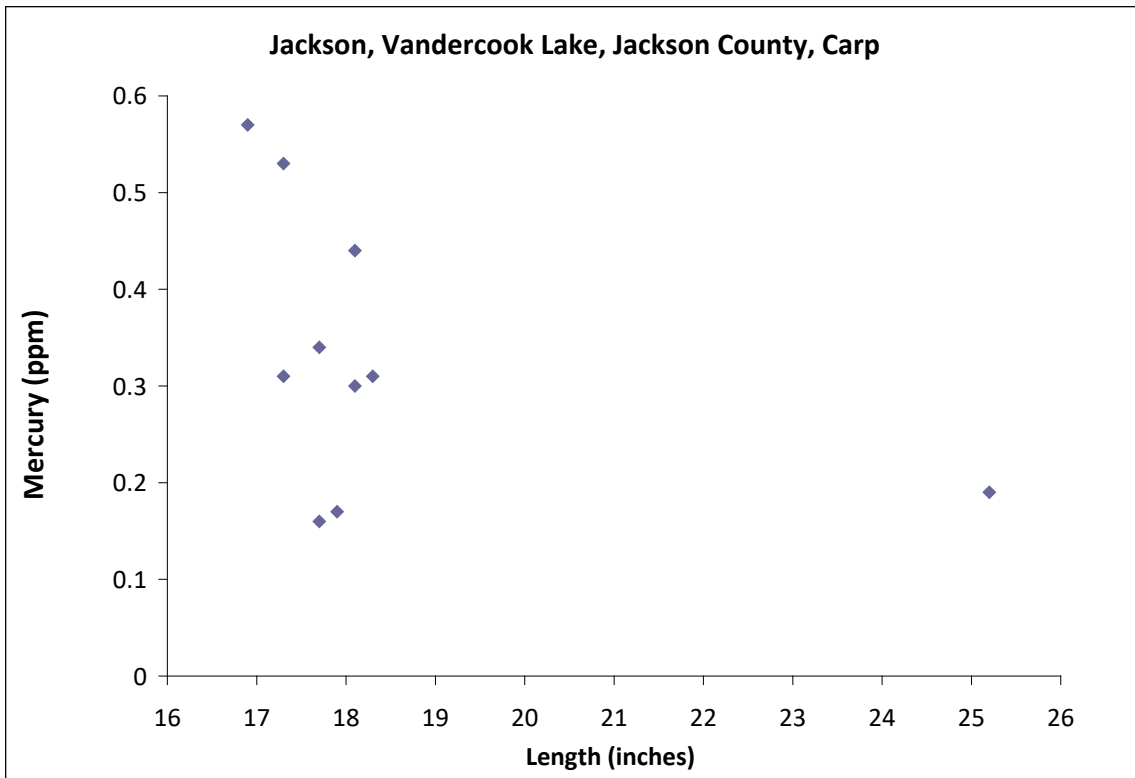
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	16.9	NA	16.9	25.2
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.33	0.16	0.57	0.43	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.185	0.186				

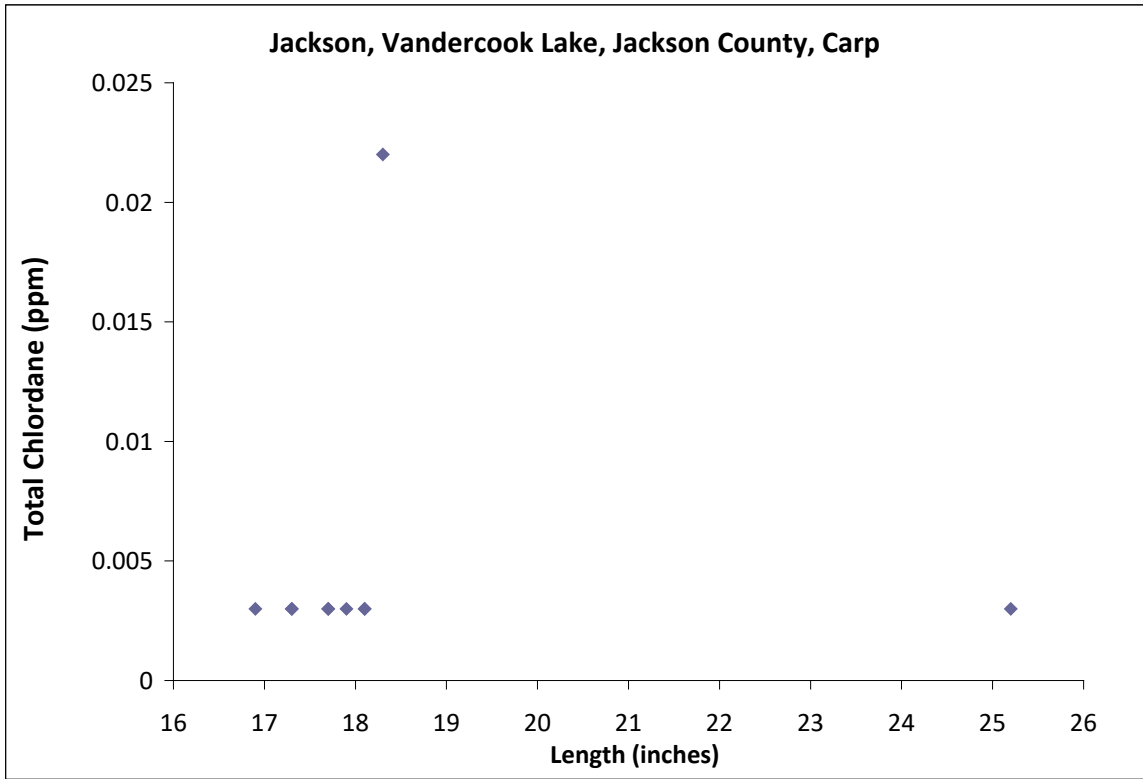
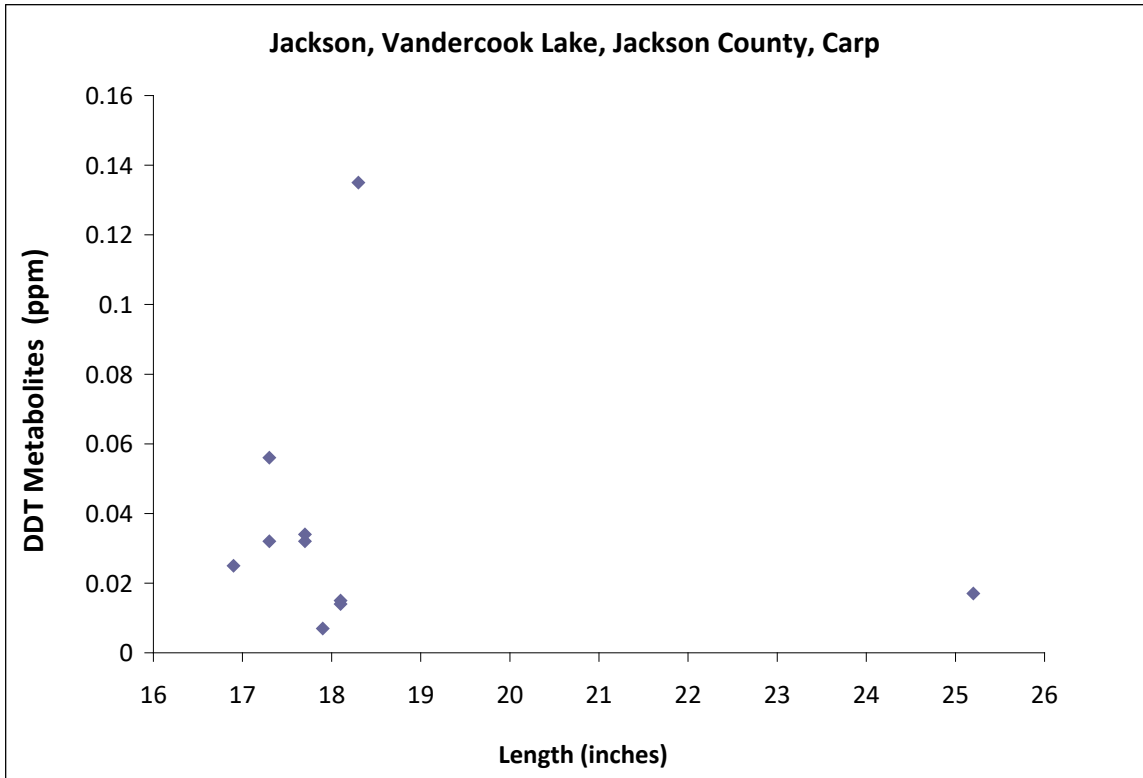
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	16.9	NA	16.9	25.2
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.028	0.025	0.052	0.030	8
DDT	10	0.037	0.007	0.135	0.060	16
Chlordane	10	0.005	0.003	0.022	0.010	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.033	0.035				
DDT	0.018	0.037				
Chlordane	0.000	0.000				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: There are no current consumption advisories for Vandercook Lake carp.

Recommendation: No one should eat more than 2 meals per month of Vandercook Lake carp due to mercury. Dataset is limited due to age of the data. PCBs concentrations would likely have decreased and would not cause an advisory.





Yellow Perch

Vandercook Lake

Jackson County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	4.9	NA	4.9	7.4
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.113	0.076	0.150	0.129	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.739	0.703				

Organics Analysis:

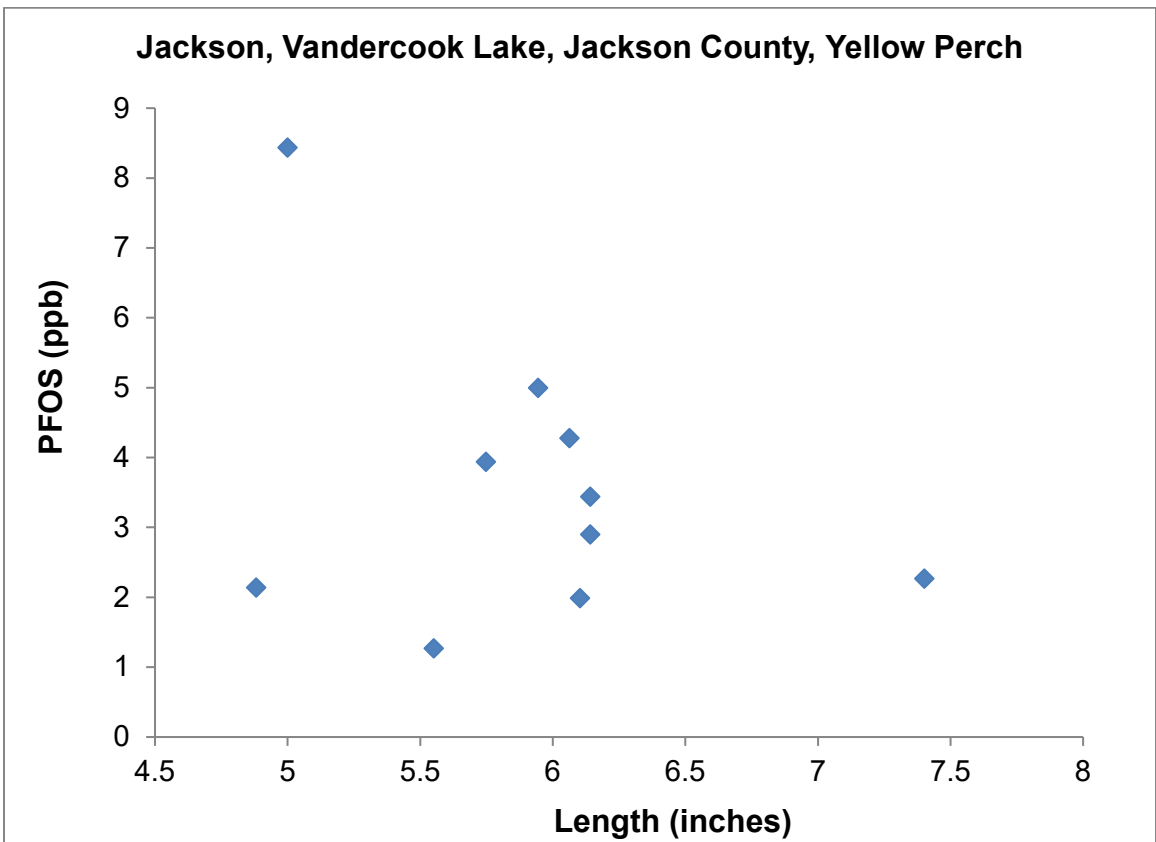
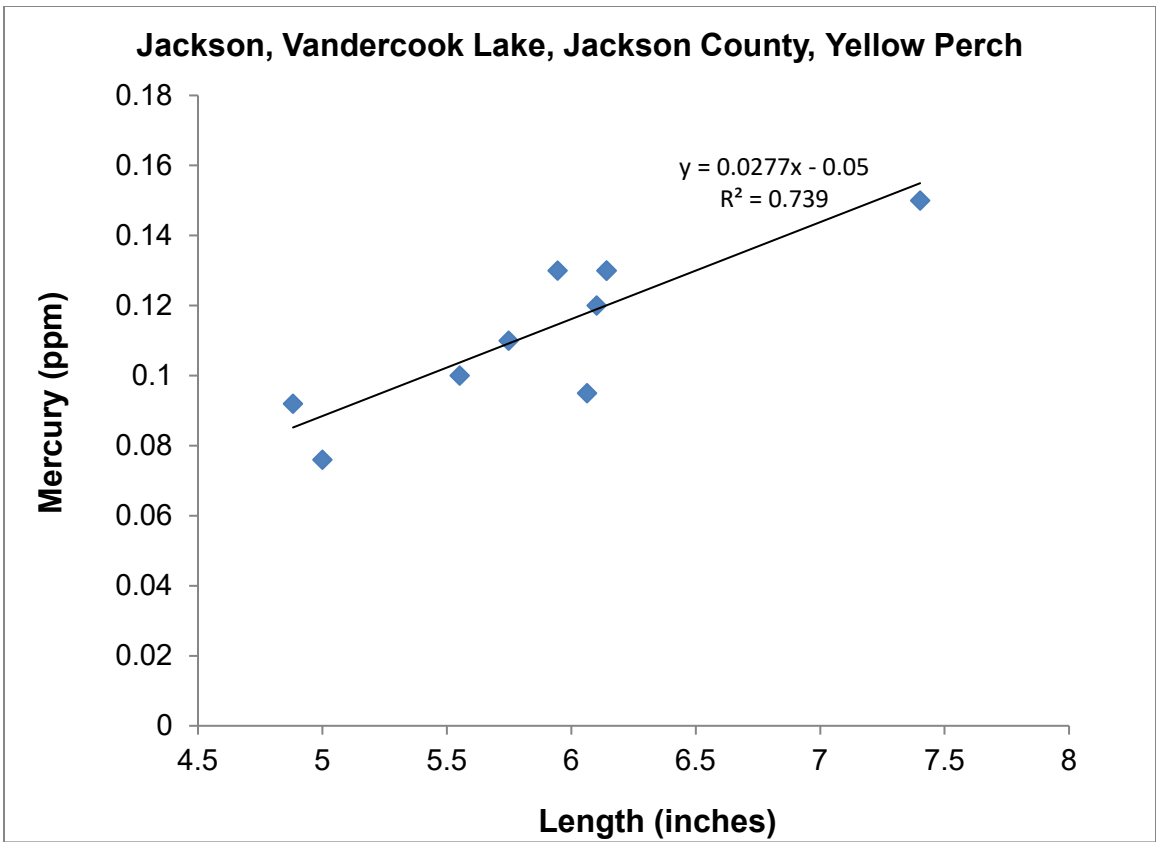
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	4.9	NA	4.9	7.4
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	3.6 ppb	1.3 ppb	8.4 ppb	5.0 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.117	0.045				
Final meal category based on UCL:						8

Existing MDHHS Advisory: Yellow perch from Vandercook Lake in Jackson County are currently covered under the statewide mercury advisory. No one should eat more than 4 meals per month of yellow perch of any size.

Recommendation: No one should eat more than 4 meals per month of yellow perch of any size from Vandercook Lake in Jackson County due to mercury. While there was a significant correlation between fish size and mercury concentration, size-specific guidance is not recommended due to the limited size of the fish used in the analysis.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
5	0.089	12
6	0.116	8
7	0.144	4
8	0.172	4
9	0.199	4
10	0.227	4
11	0.255	4
<i>Shaded area denotes extrapolated estimates</i>		

Note: The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.



Kalamazoo County

Bluegill

Austin Lake

Kalamazoo County

Hg Analysis:

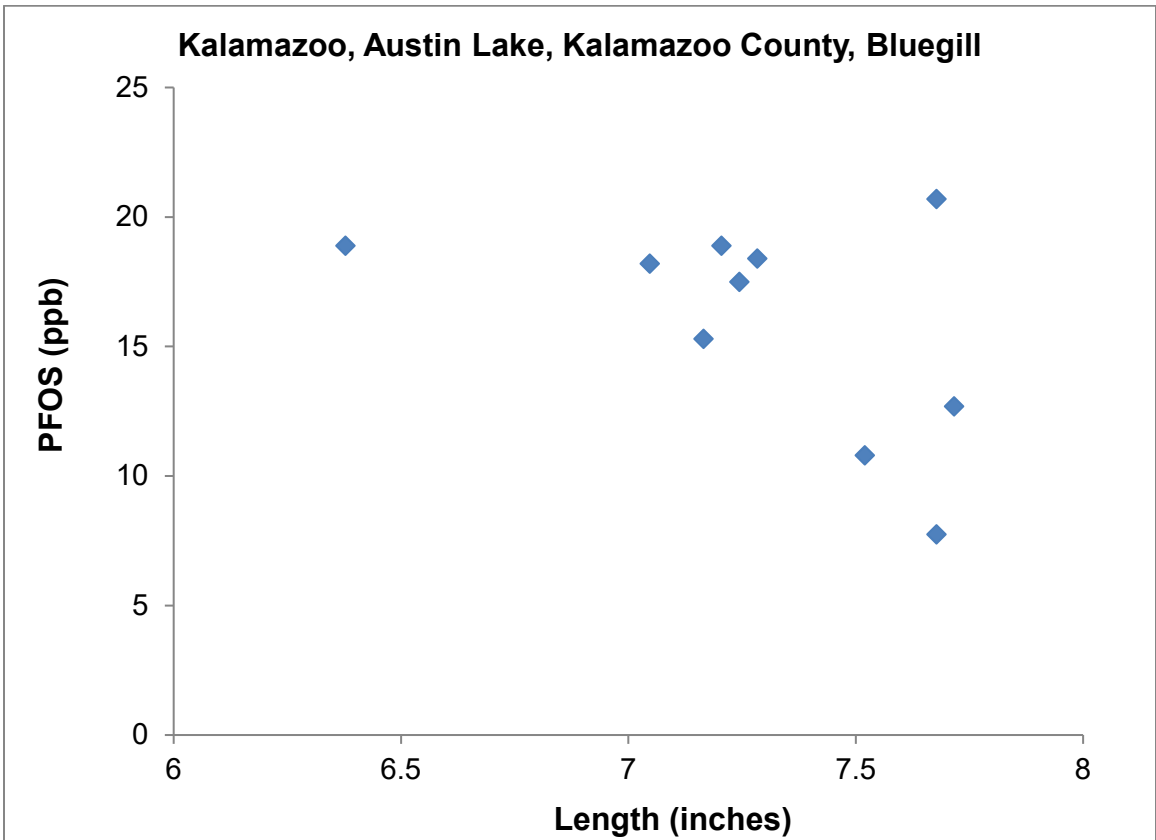
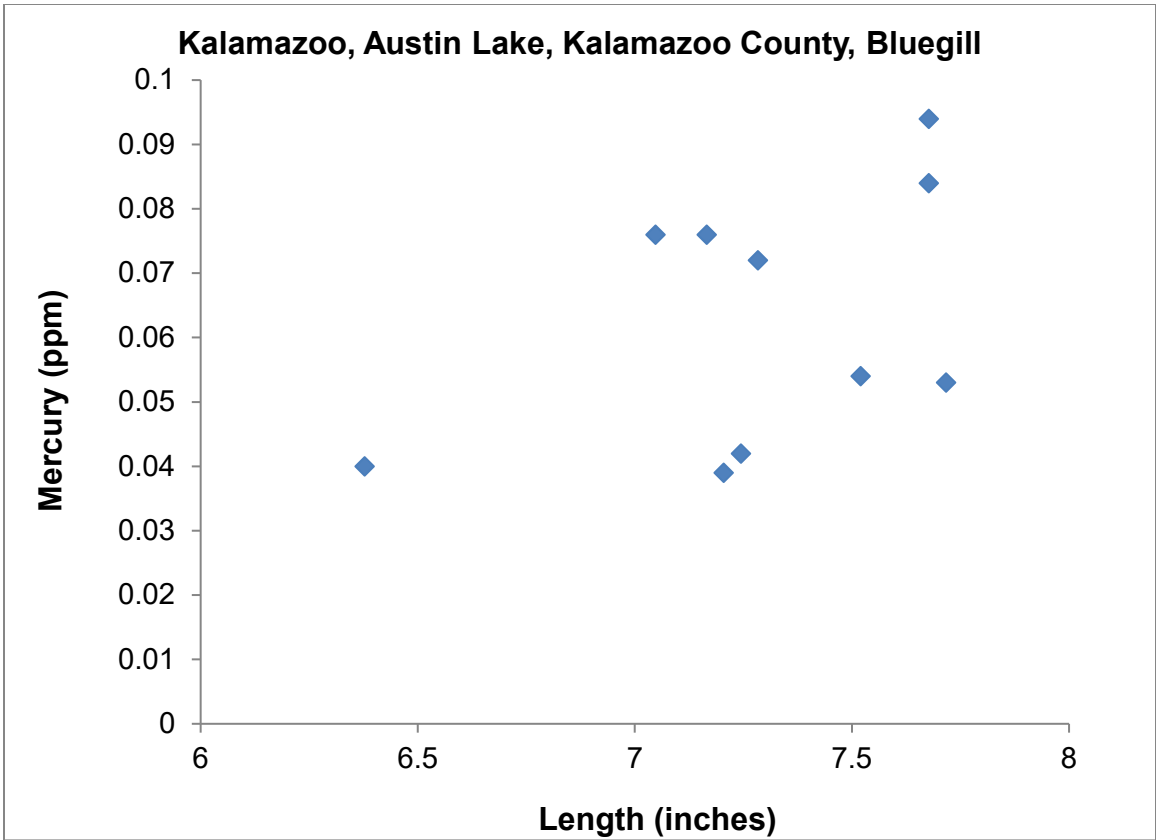
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	6.4	NA	6.4	7.7
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.063	0.039	0.094	0.077	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.211	0.226				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	6.4	NA	6.4	7.7
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	15.9 ppb	7.8 ppb	20.7 ppb	18.9 ppb	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.239	0.251				
Final meal category based on UCL:						8

Existing MDHHS Advisory: Bluegill and sunfish from Austin Lake in Kalamazoo County are currently covered under the statewide mercury advisory. No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 8 meals per month of bluegill or sunfish of any size due to PFOS. Mercury causes less restrictive advice.



Carp

Austin Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1993	2003	16	17.7	na	17.7	38.5
Datasets available: 1993, 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	16	0.03	0.02	0.05	0.03	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.503	0.482				

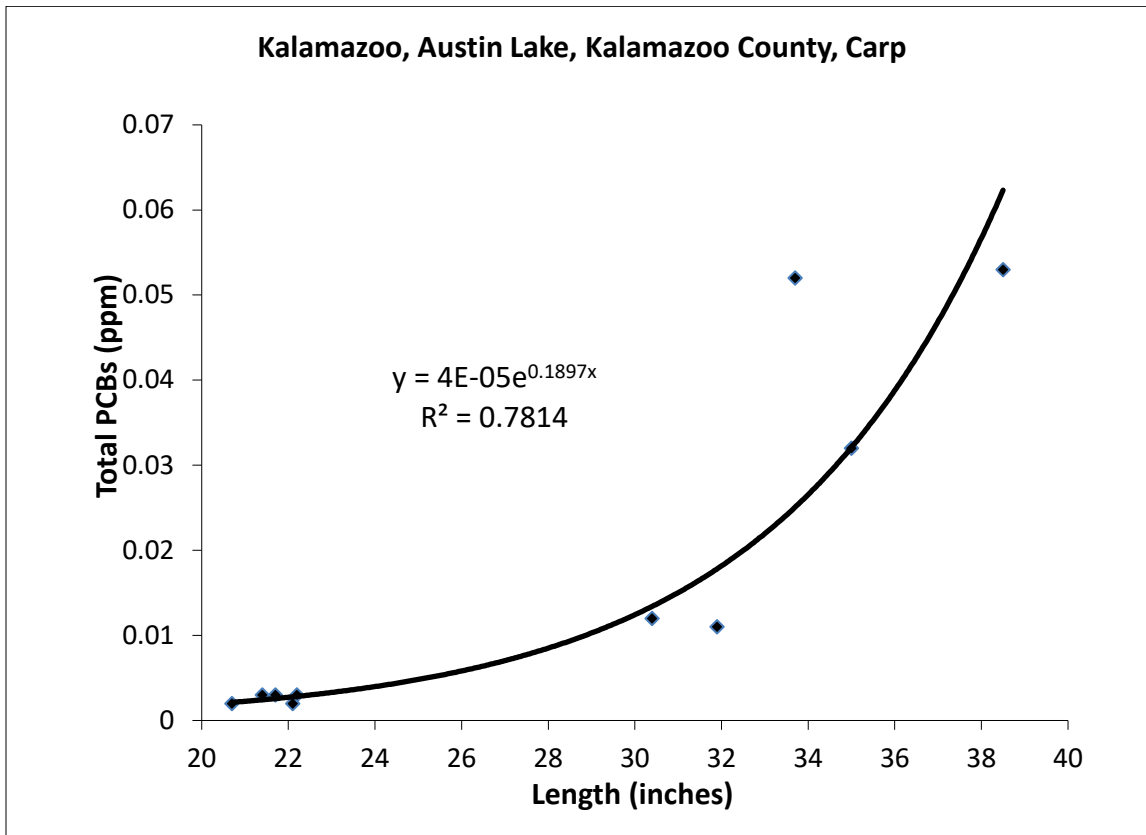
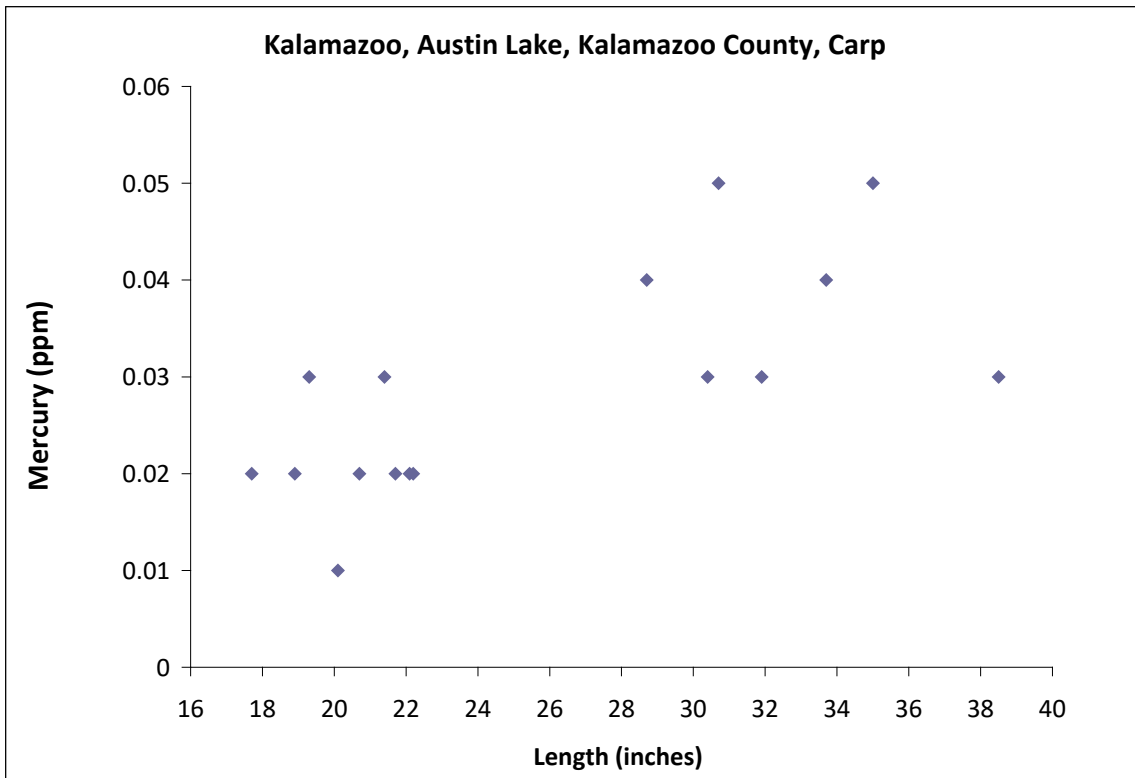
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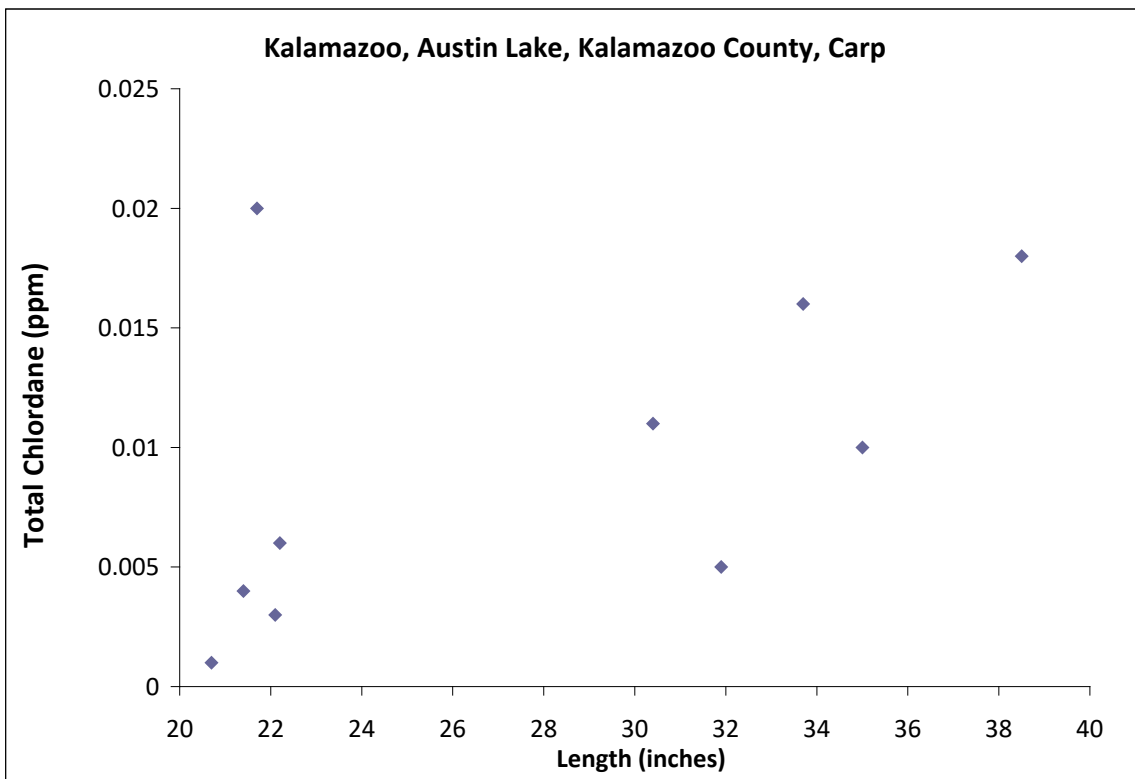
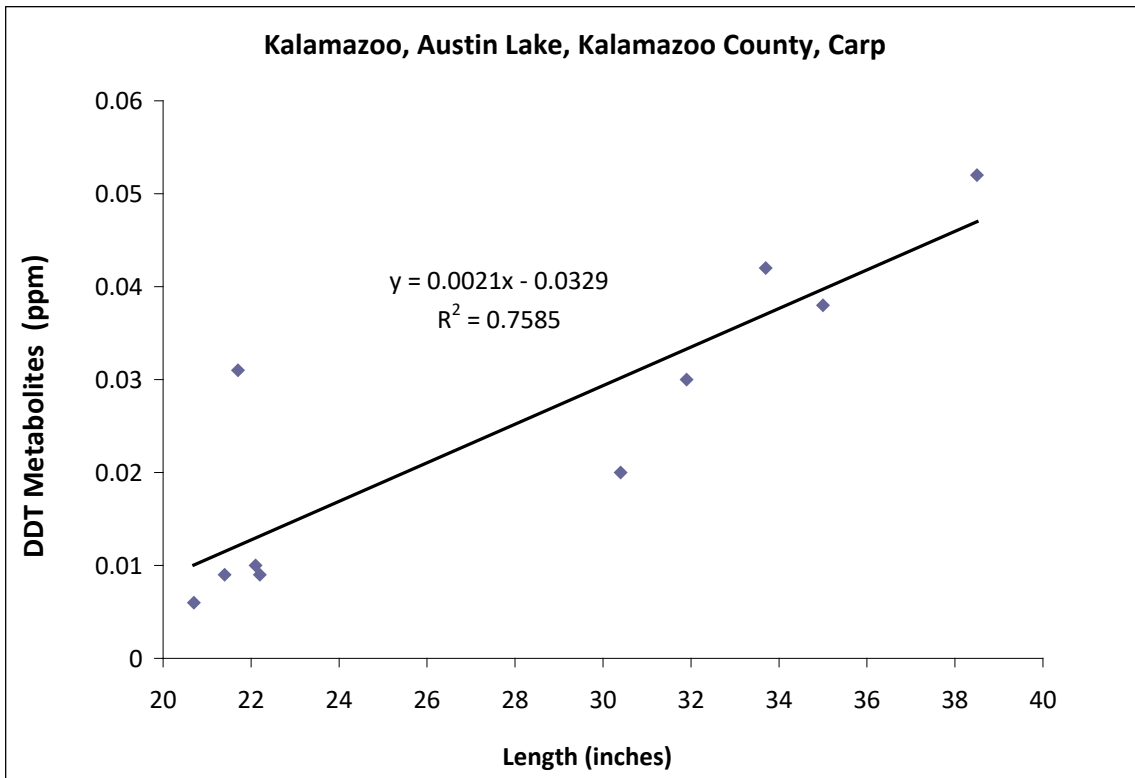
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	20.7	na	20.7	38.5
Datasets available: 1993, 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.017	0.002	0.05	0.03	8
DDT	10	0.025	0.006	0.05	0.04	16
Chlordane	10	0.009	0.001	0.02	0.01	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.765	0.938				
DDT	0.759	0.717				
Chlordane	0.253	0.349				
Toxaphene	--	--				
Final meal category based on UCL:						8

Existing Advisory: There are no current consumption advisories for Austin Lake carp.

Recommendation: People can eat 16 meals per month of carp less than 30 inches due to PCBs and mercury. No one should eat more than 8 meals per month of Austin Lake carp between 30 and 34 inches or more than 2 meals per month of those fish larger than 34 inches due to PCBs.

Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
18	0.001	16
20	0.002	16
22	0.003	16
24	0.004	16
26	0.006	16
28	0.008	16
30	0.012	12
32	0.017	12
34	0.025	8
36	0.037	4
38	0.054	2
<i>Shaded area denotes extrapolated estimates</i>		





Largemouth Bass

Austin Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1993	2020	28	11.8	14.0	13.5	17.7	
Datasets available: 1993, 2003, 2020							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	16	0.339		0.200	0.580	0.391	2
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.499	0.442					

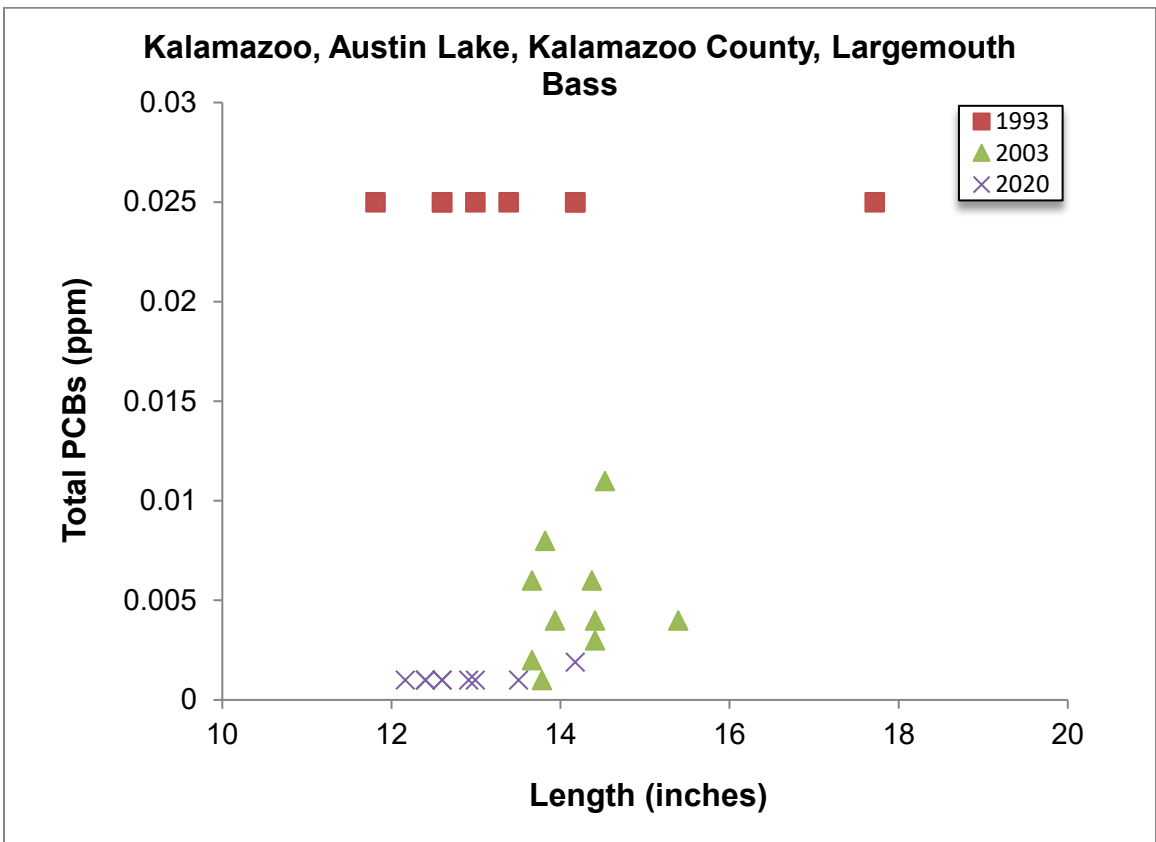
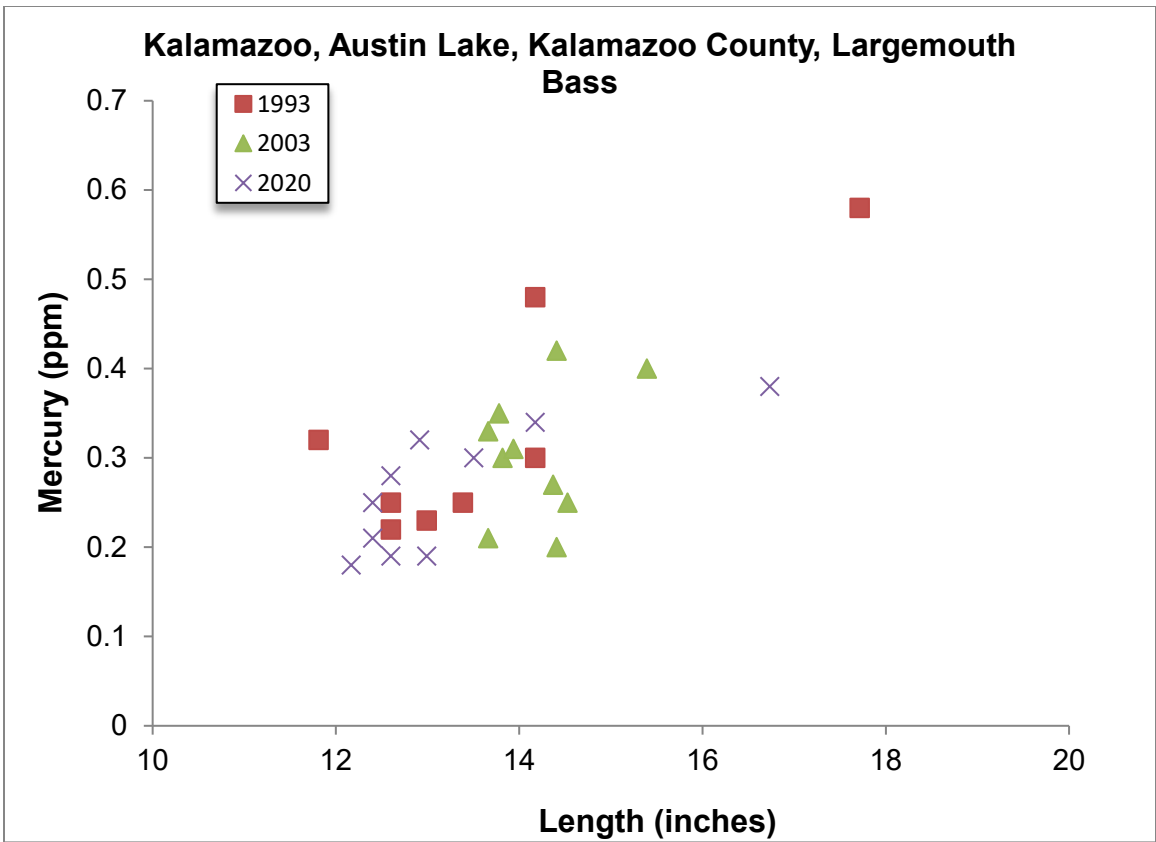
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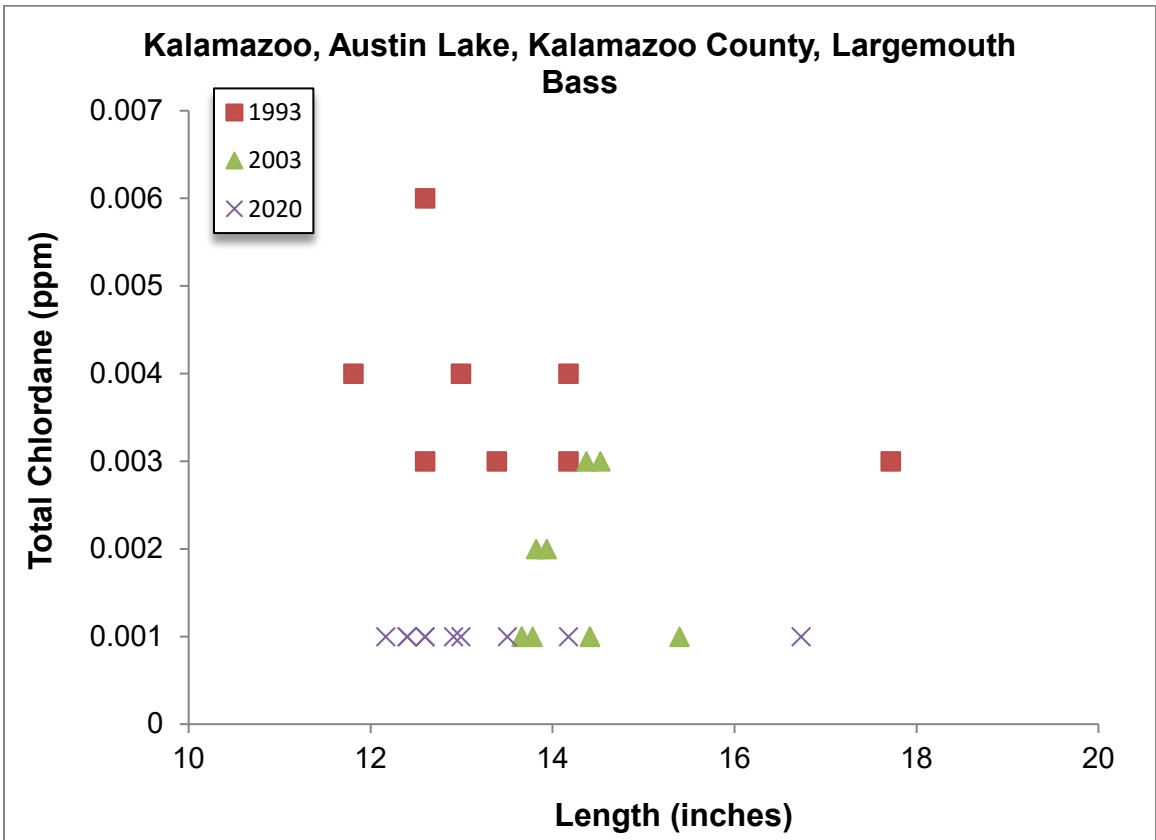
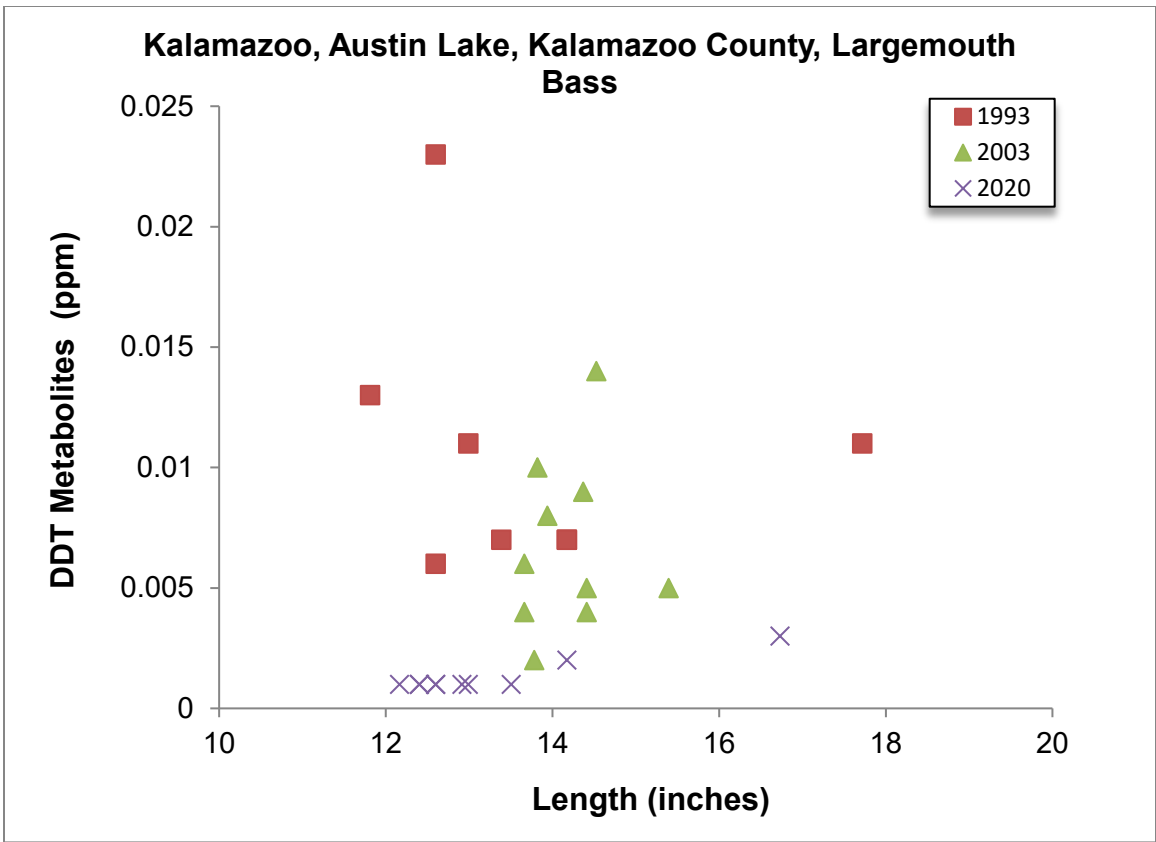
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2003	2020	20	12.2	14.0	13.5	16.7	
Datasets available: 1993 (No PFOS), 2003 (No PFOS), 2020							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	13	0.004		<0.001	0.011	0.006	16
DDT	13	0.006		<0.001	0.014	0.008	16
Chlordane	13	0.001		<0.001	0.003	0.002	16
Toxaphene	13	ND		--	--	--	--
PFOS	10*	18.6 ppb		12.6 ppb	29.7 ppb	22.7 ppb	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.002	0.000					
DDT	0.011	0.099					
Chlordane	0.003	0.000					
Toxaphene	--	--					
PFOS	0.116	0.101					
Final meal category based on UCL:							2

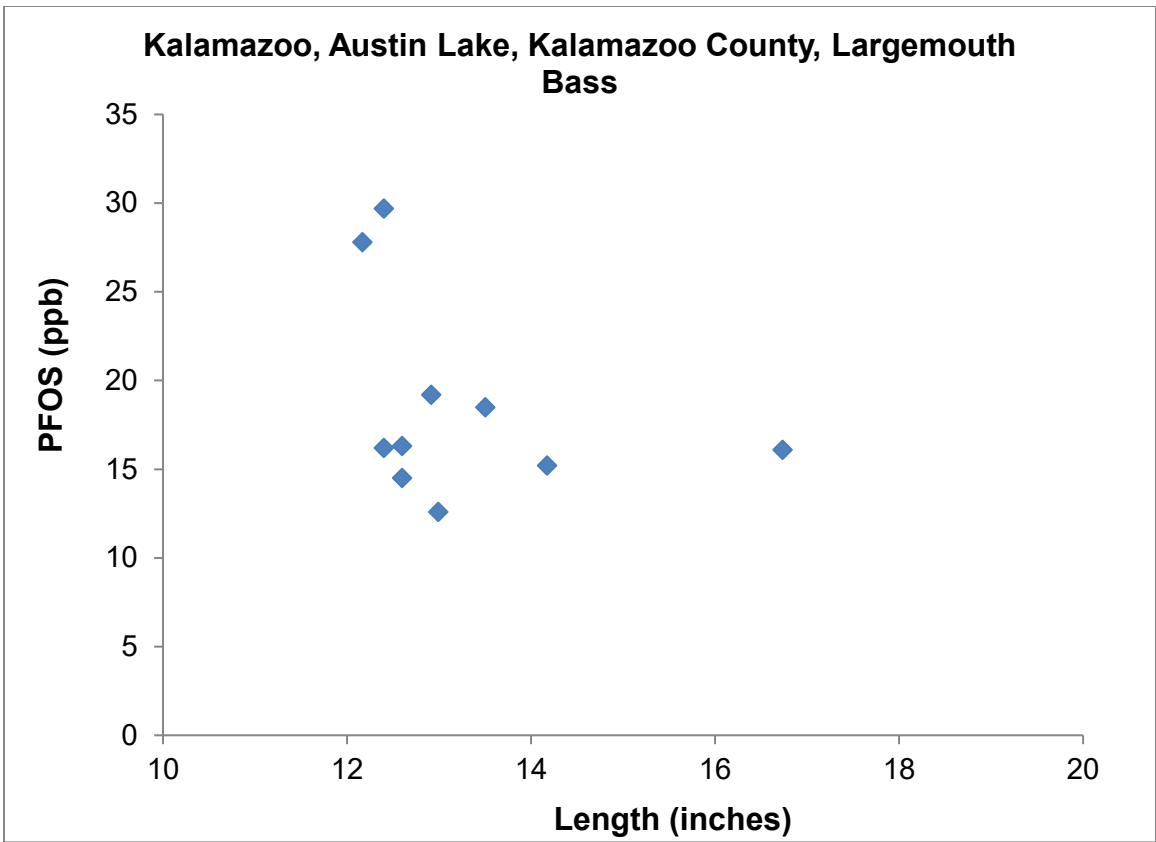
*Sub-legal sized fish were used in the PFOS analysis as no correlation between fish size and PFOS concentration has been observed in the statewide dataset.

Existing MDHHS Advisory: No one should eat more than 2 meals per month of largemouth or smallmouth bass from Austin Lake in Kalamazoo County smaller than 18 inches or no more than 1 meal per month of these species larger than 18 inches due to mercury. The statewide length break was applied as the size range of the dataset was limited.

Recommendation: No change to the advisory is recommended. PFOS should be added to the list of contaminants causing a less restrictive advisory.







Yellow Bullhead

Austin Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	7.8	NA	7.8	13.6
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.16	0.07	0.30	0.22	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.846	0.875				

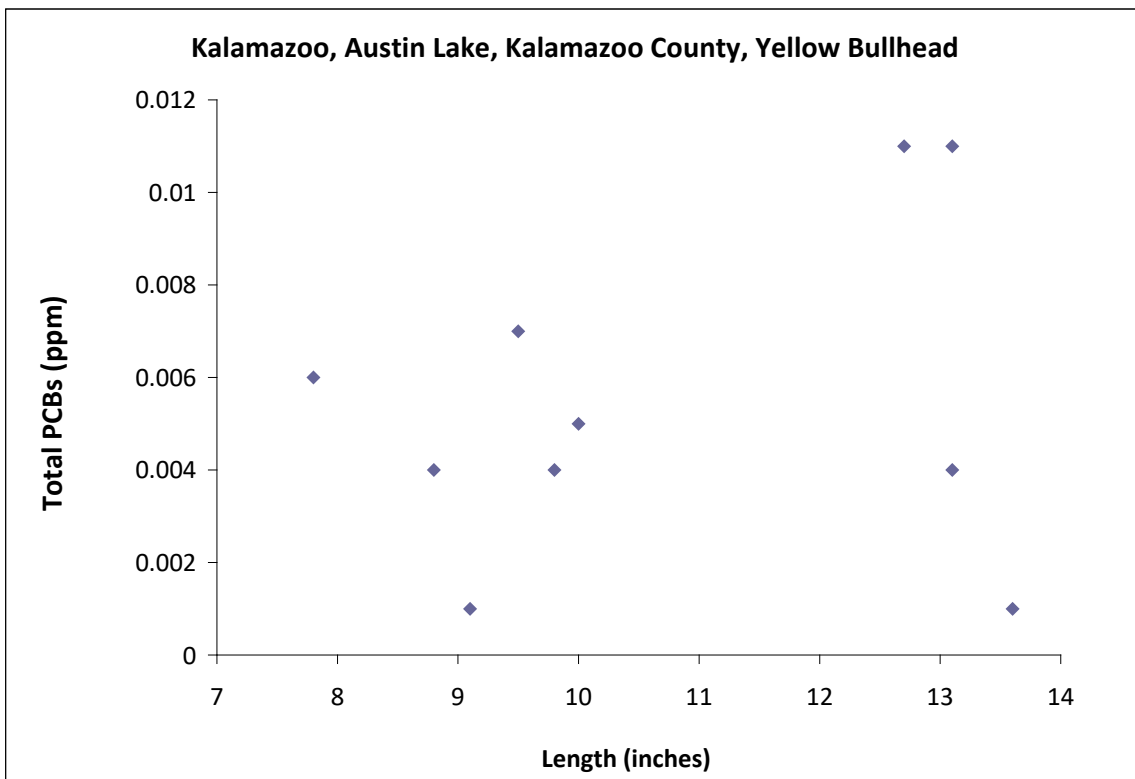
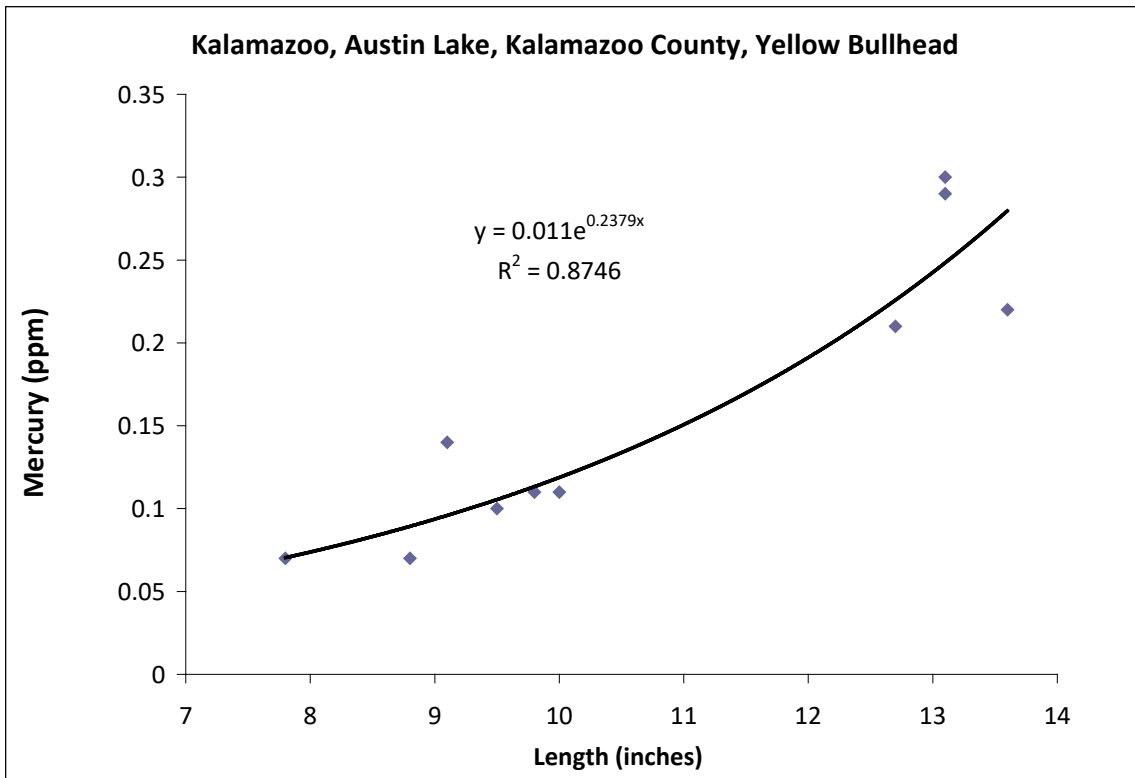
Organics Analysis:

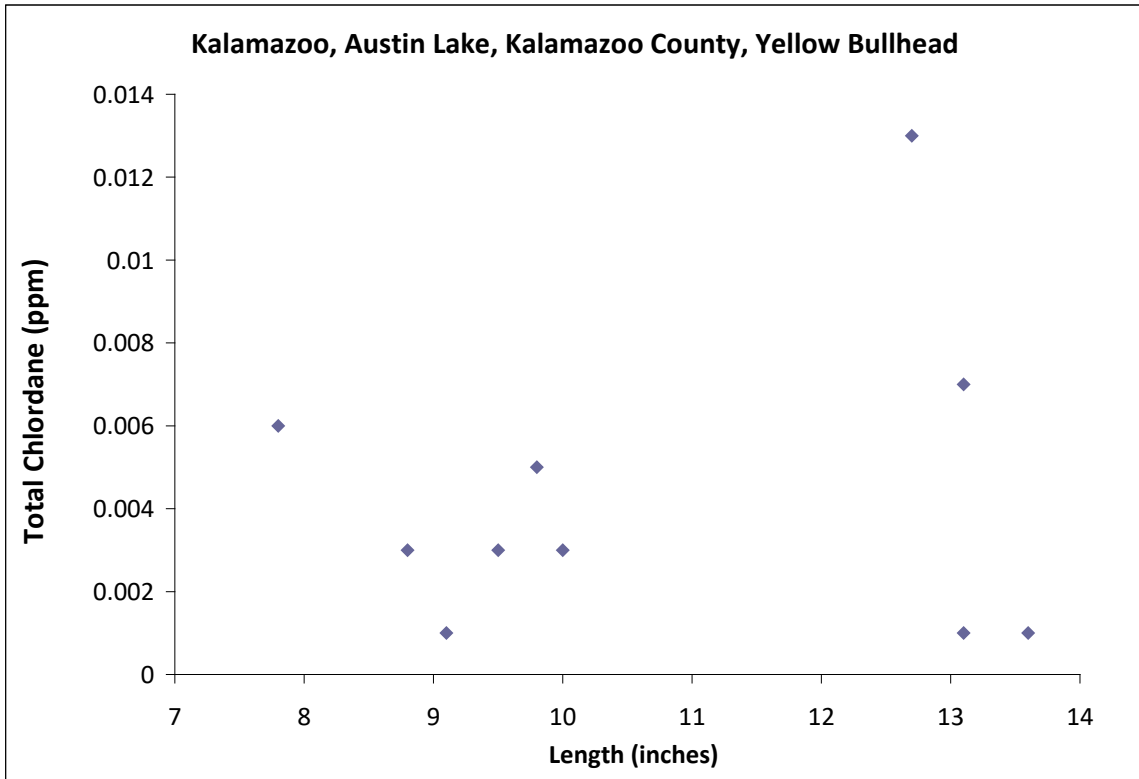
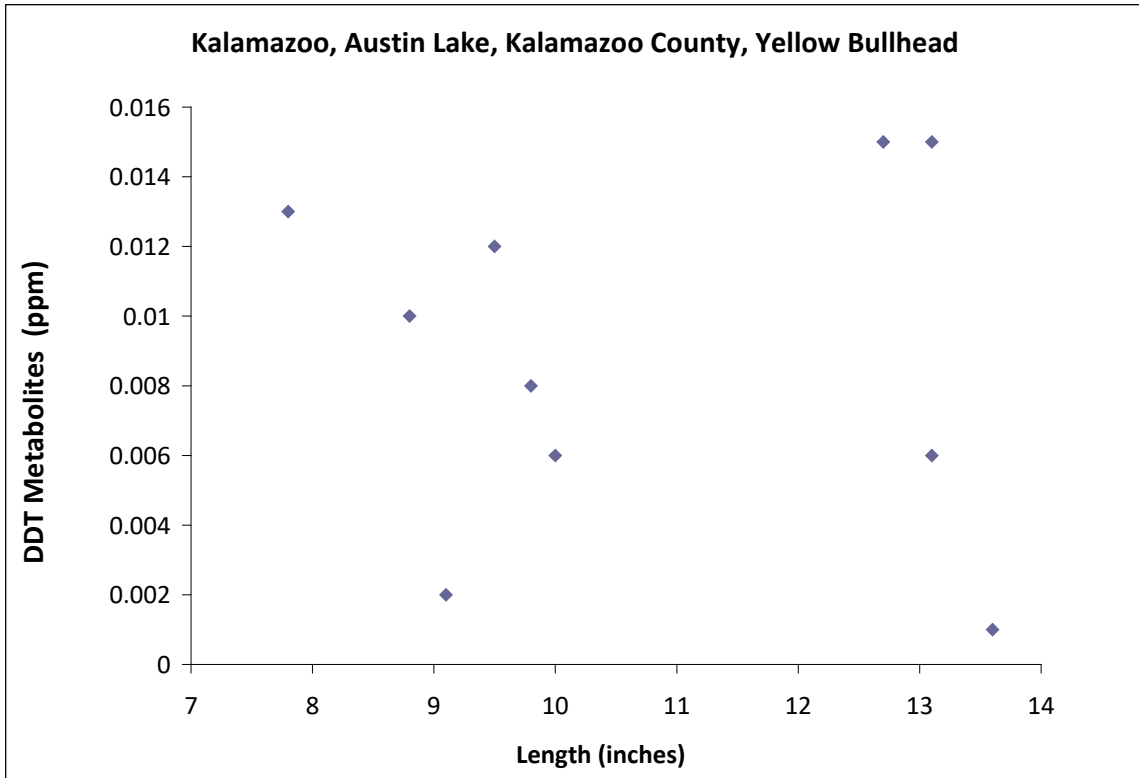
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	7.8	NA	7.8	13.6
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.005	0.001	0.011	0.01	16
DDT	10	0.009	0.001	0.015	0.01	16
Chlordane	10	0.004	0.001	0.007	0.01	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.057	0.001				
DDT	0.005	0.047				
Chlordane	0.024	0.008				
Toxaphene	--	--				
Final meal category based on UCL:						4

Existing Advisory: There are no current consumption advisories for Austin Lake yellow bullhead.

Recommendation: No one should eat more than 8 meals per month of Austin Lake bullhead less than 10 inches or more than 4 meals per month of those fish greater than 10 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
8	0.074	12
9	0.094	8
10	0.119	8
11	0.151	4
12	0.191	4
13	0.242	4
14	0.308	2
15	0.390	2
16	0.495	2
<i>Shaded area denotes extrapolated estimates</i>		





Hg Analysis:

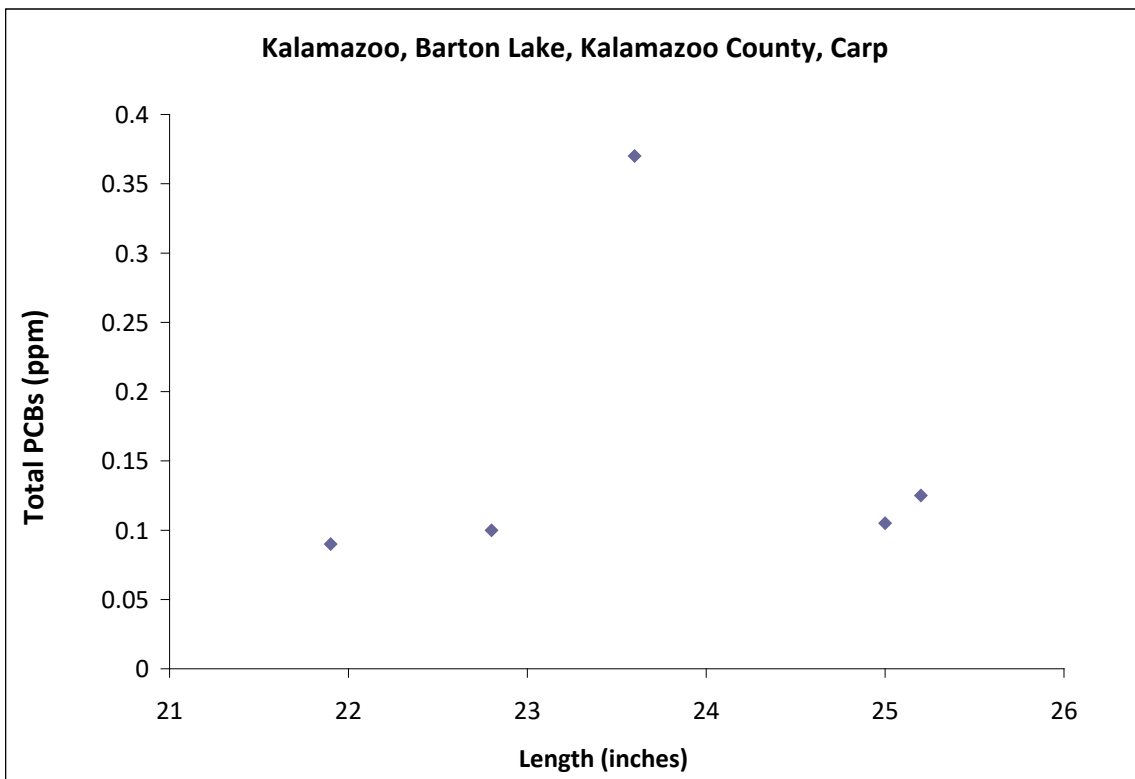
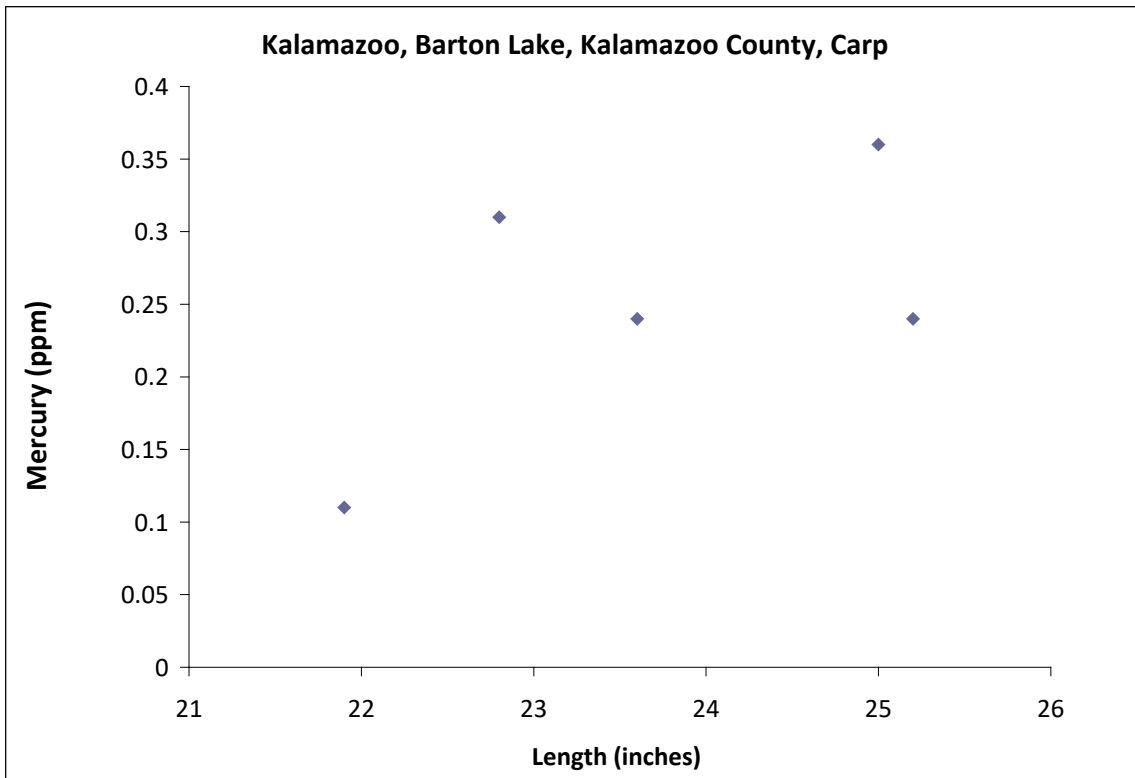
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	5	21.9	NA	21.9	25.2
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.25	0.11	0.36	0.37	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.377	0.433				

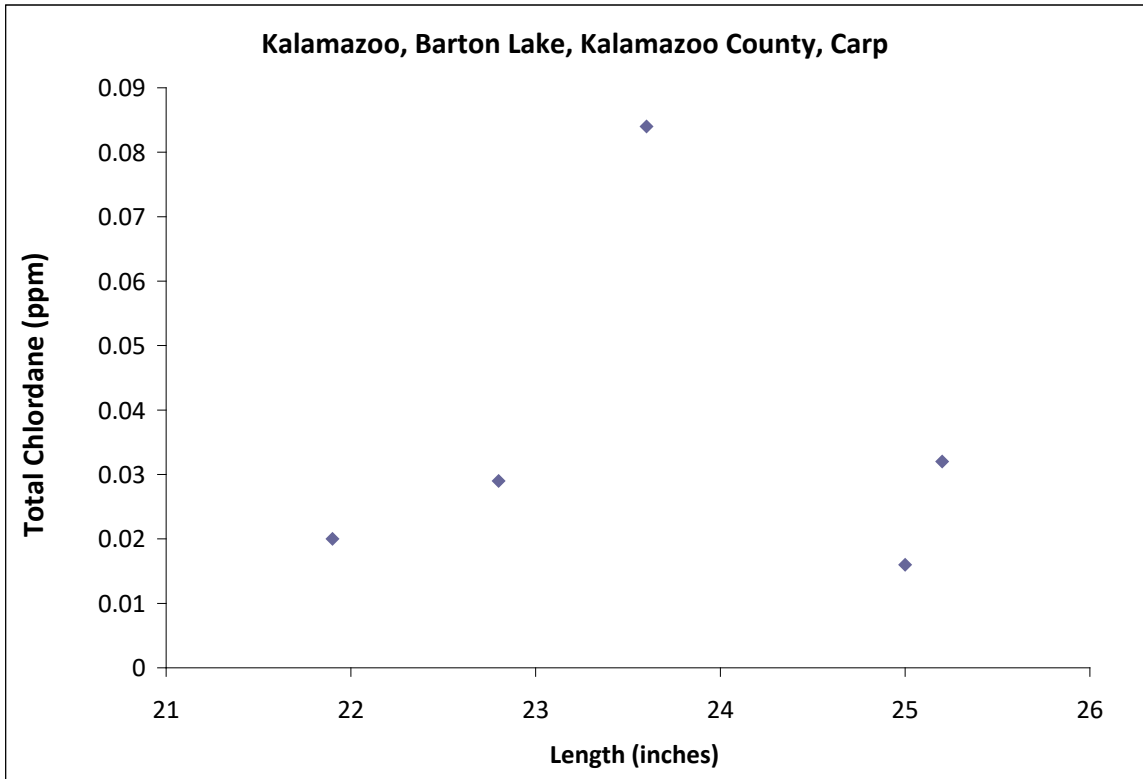
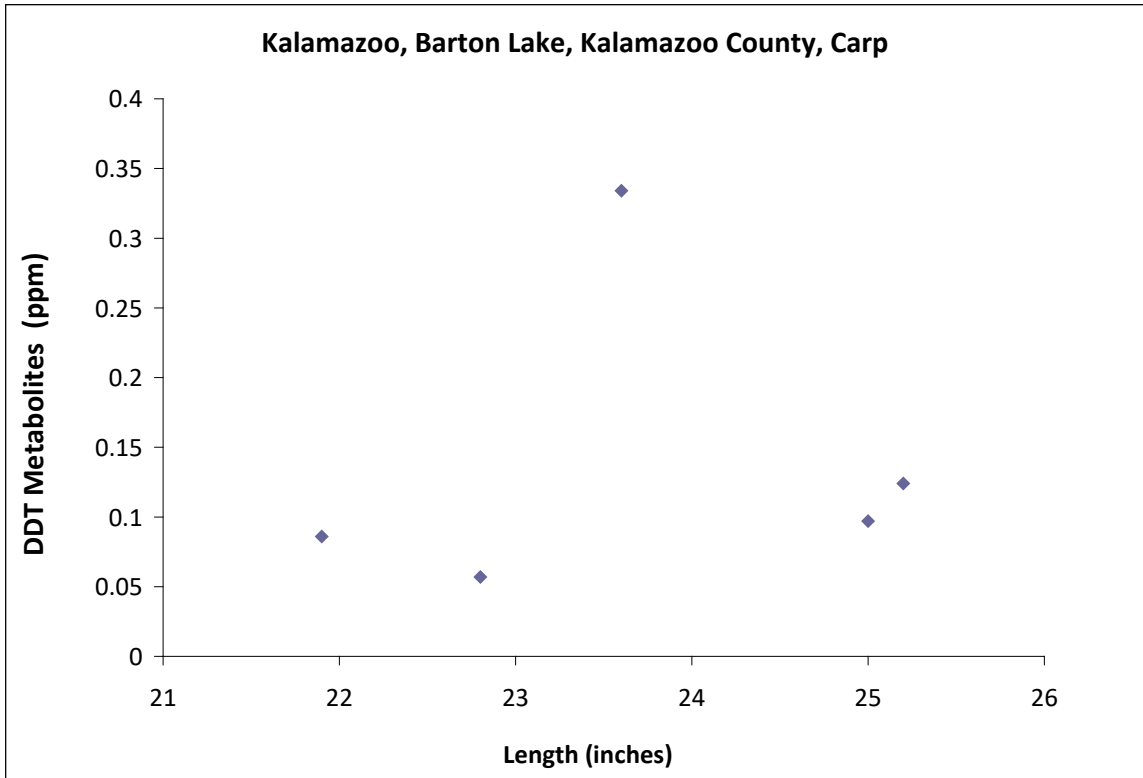
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	5	21.9	NA	21.9	25.2
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.16	0.09	0.12	0.31	0.5
DDT	5	0.14	0.06	0.33	0.28	4
Chlordane	5	0.04	0.02	0.08	0.07	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.003	0.019				
DDT	0.013	0.063				
Chlordane	0.000	0.000				
Toxaphene	--	--				
Final meal category based on UCL:						0.5*

Existing Advisory: Women and children should eat no more than one meal per week of Barton Lake carp greater than 14 inches in length due to PCBs.

Recommendation: No one should eat more than 1 meal per month of Barton Lake carp due to PCBs. Mercury and DDT would cause advisories. Dataset is limited due to the age of the data. *Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥ 15 years old are expected to have declined to a concentration that allows a less restrictive meal category than determined by the assessment when no point sources have been identified and the inputs are expected to be atmospheric.





Largemouth Bass

Barton Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	4	12.4	14	15.1	17.6
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.560	0.460	0.660	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	4	12.4	14	15.1	17.6
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	ND	--	--	--	--
DDT	2	0.014	0.012	0.016	--	--
Chlordane	2	0.004	0.003	0.005	--	--
-Toxaphene	2	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Barton Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: There are insufficient data available to develop specific advice for Barton Lake largemouth bass. Statewide guidelines apply that recommend no one eat more than 2 meals per month of legal size largemouth bass under 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Northern Pike

Barton Lake

Kalamazoo County

Hg Analysis:

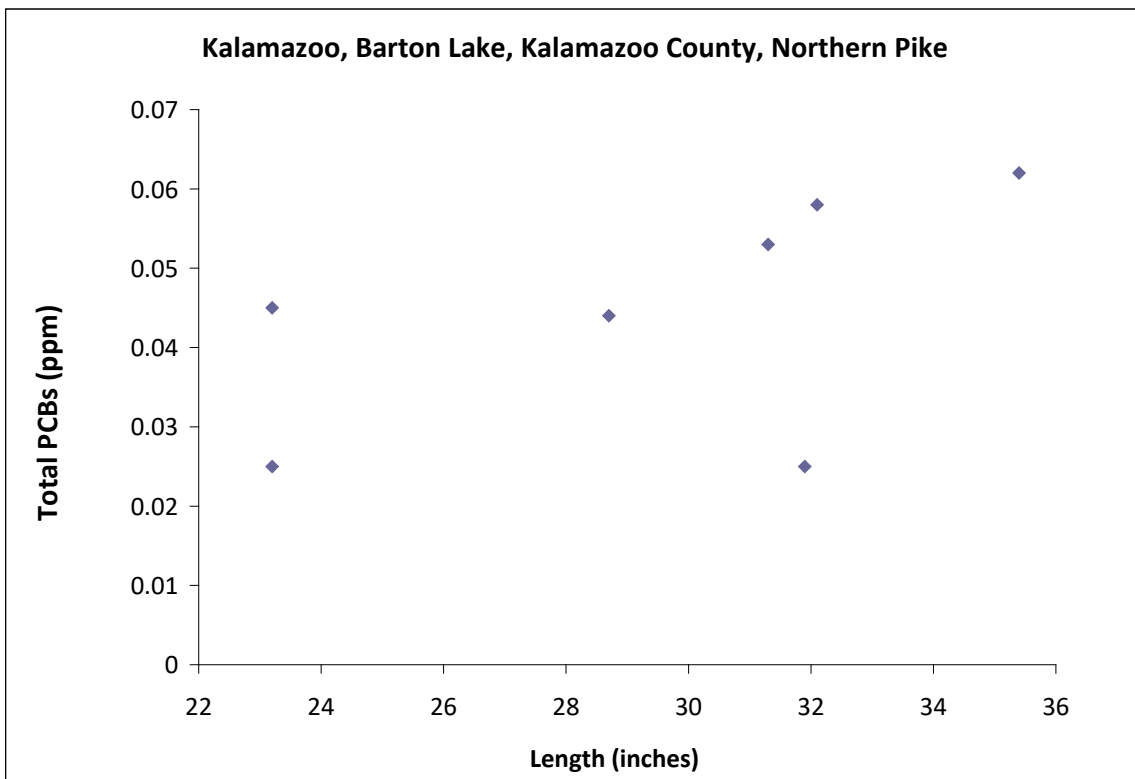
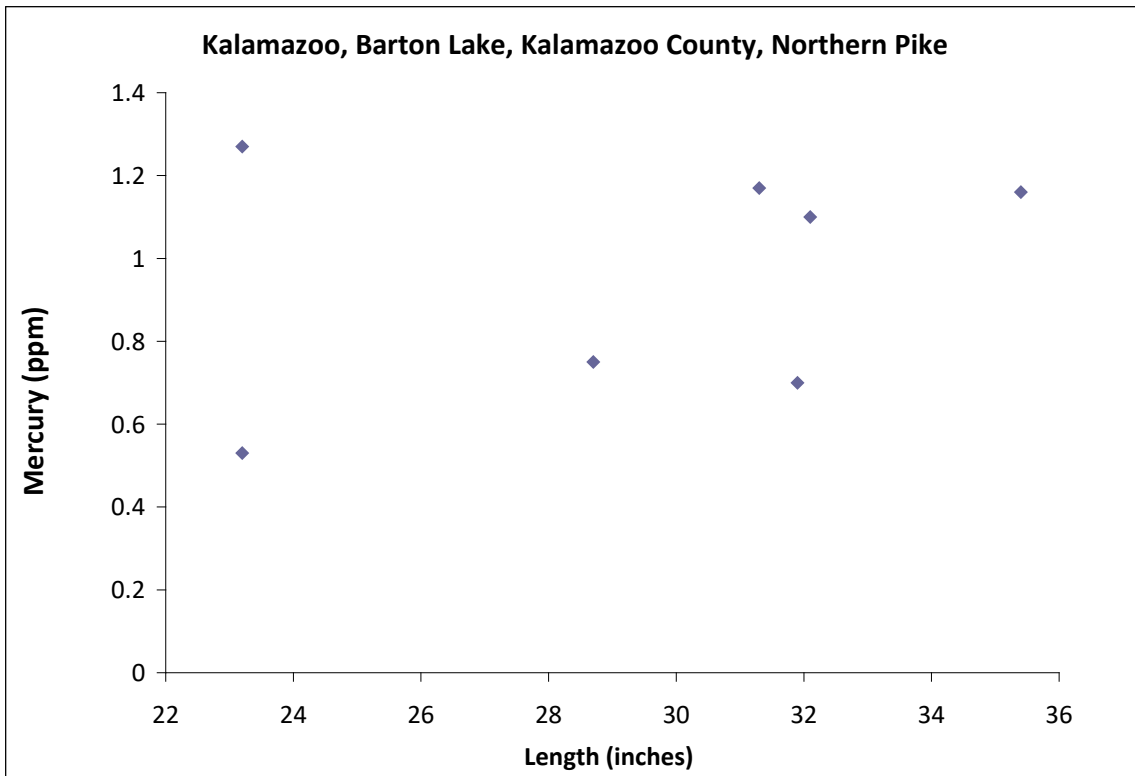
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	7	23.2	24	28.7	35.4
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.976	0.700	1.17	1.260	0.5
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.076	0.118				

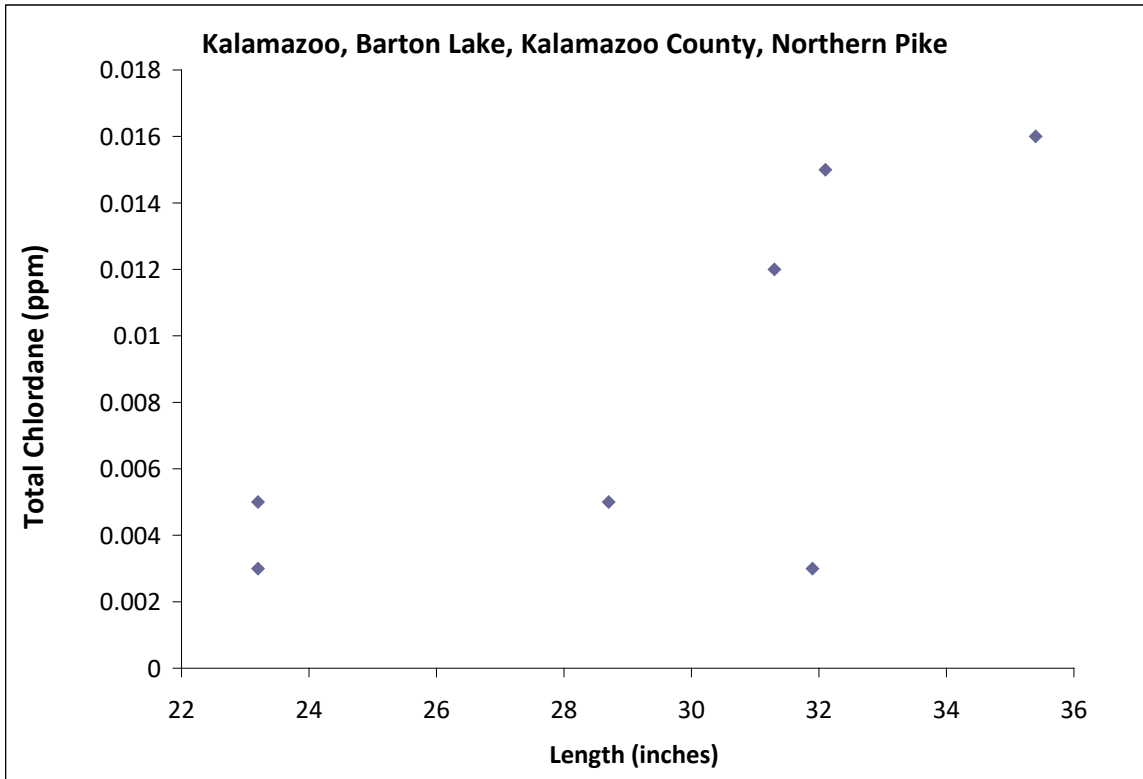
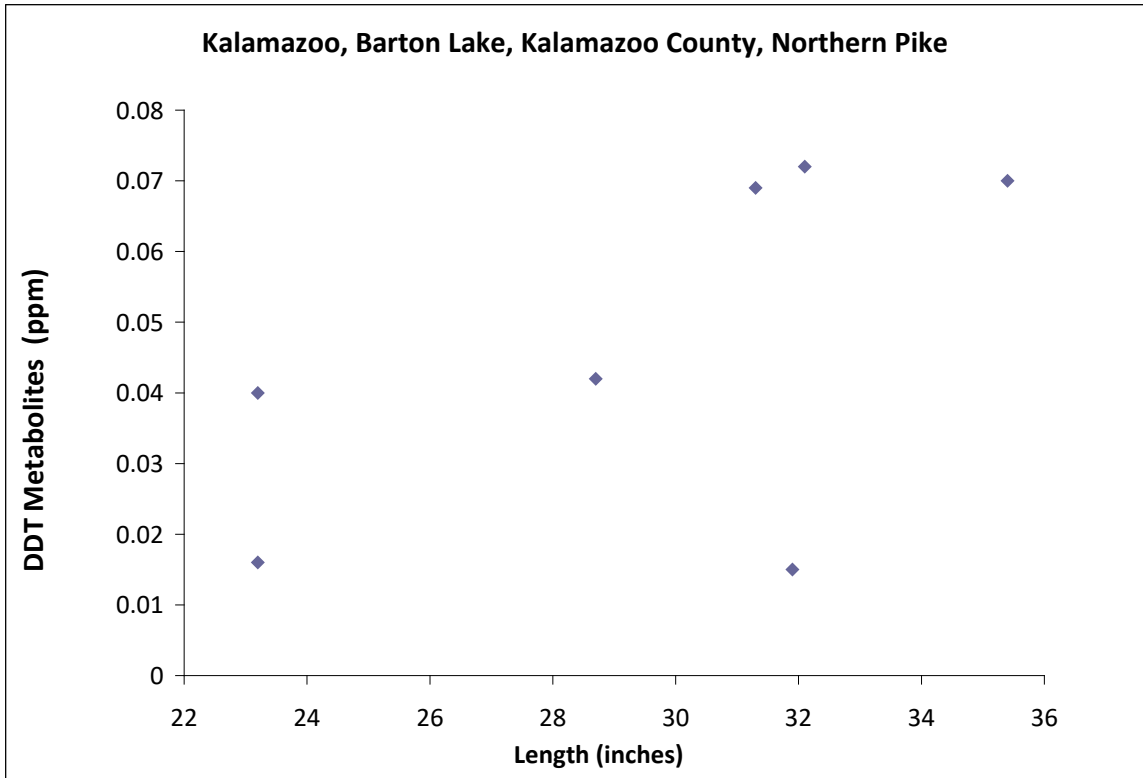
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1991	1991	7	23.2	24	28.7	35.4
Datasets available: 1991						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.05	0.02	0.06	0.07	2
DDT	5	0.05	0.02	0.07	0.08	16
Chlordane	5	0.01	0.003	0.02	0.02	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.299	0.234				
DDT	0.343	0.234				
Chlordane	0.506	0.435				
Toxaphene	--	--				
Final meal category based on UCL:						0.5

Existing Advisory: Barton Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 6 meals per year of Barton Lake northern pike due to mercury. PCBs would cause an advisory.





Largemouth Bass

Eagle Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2008	2008	10	12.8	14	14.1	19.1
Datasets available: 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.62	0.18	0.87	0.80	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.608	0.740				

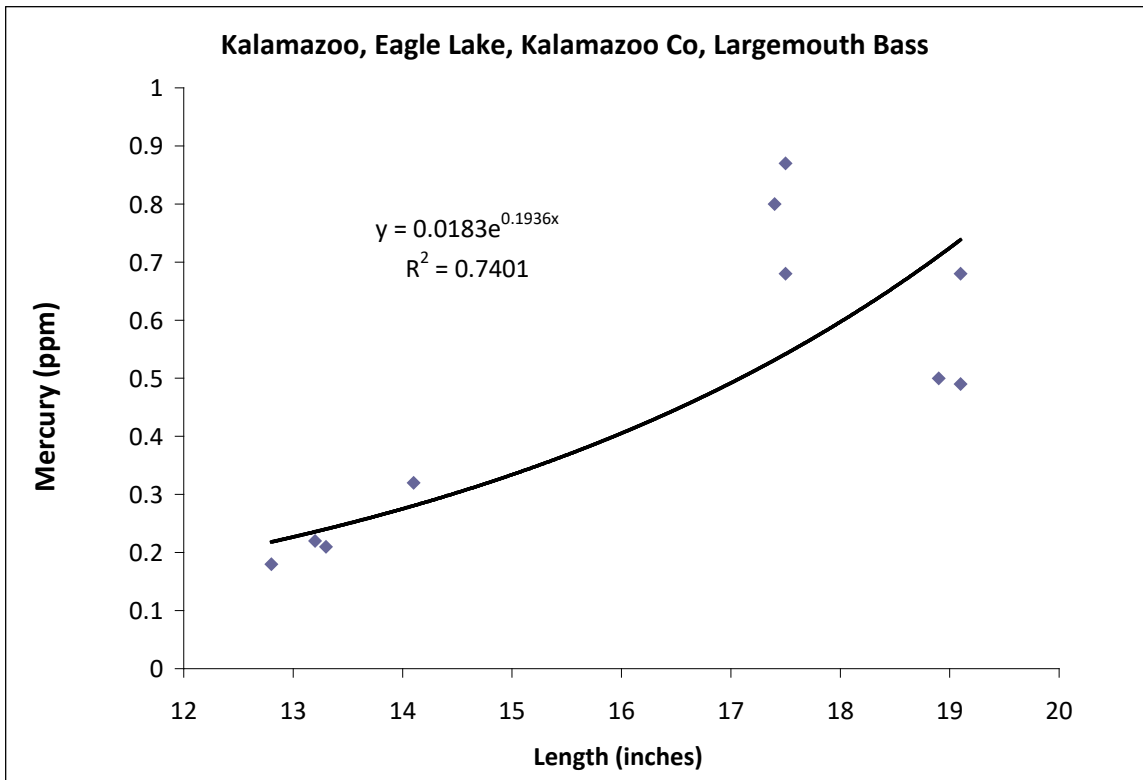
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	na	--	--	--	--
DDT	0	na	--	--	--	--
Chlordane	0	na	--	--	--	--
Toxaphene	0	na	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Eagle Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of legal size Eagle Lake largemouth or smallmouth bass under 18 inches or more than 1 meal per month of those fish over 18 inches. The mercury regression equation yields estimated mercury concentrations that are in line with the statewide consumption guidelines.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.275	2
15	0.334	2
16	0.405	2
17	0.492	2
18	0.597	1
19	0.724	1
20	0.879	1
21	1.067	1
22	1.295	0.5
<i>Shaded area denotes extrapolated estimates</i>		



Northern Pike

Gourdneck Lake

Kalamazoo County

Hg Analysis:

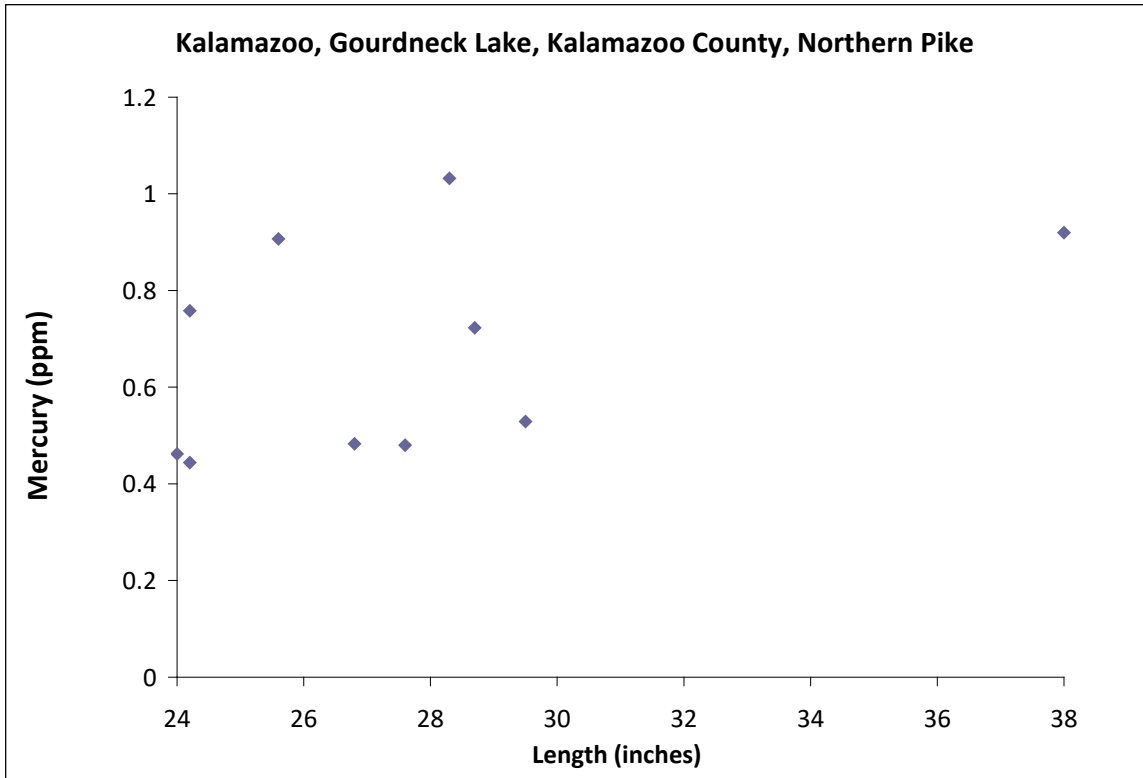
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2005	2005	10	24	24	38	
Datasets available: 2005						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.674	0.44	1.03	0.83	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.182	0.185				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	na	--	--	--	--
DDT	0	na	--	--	--	--
Chlordane	0	na	--	--	--	--
Toxaphene	0	na	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Gourdneck Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Gourdneck Lake northern pike due to mercury.



Bluegill

Gull Lake

Kalamazoo County

Hg Analysis:

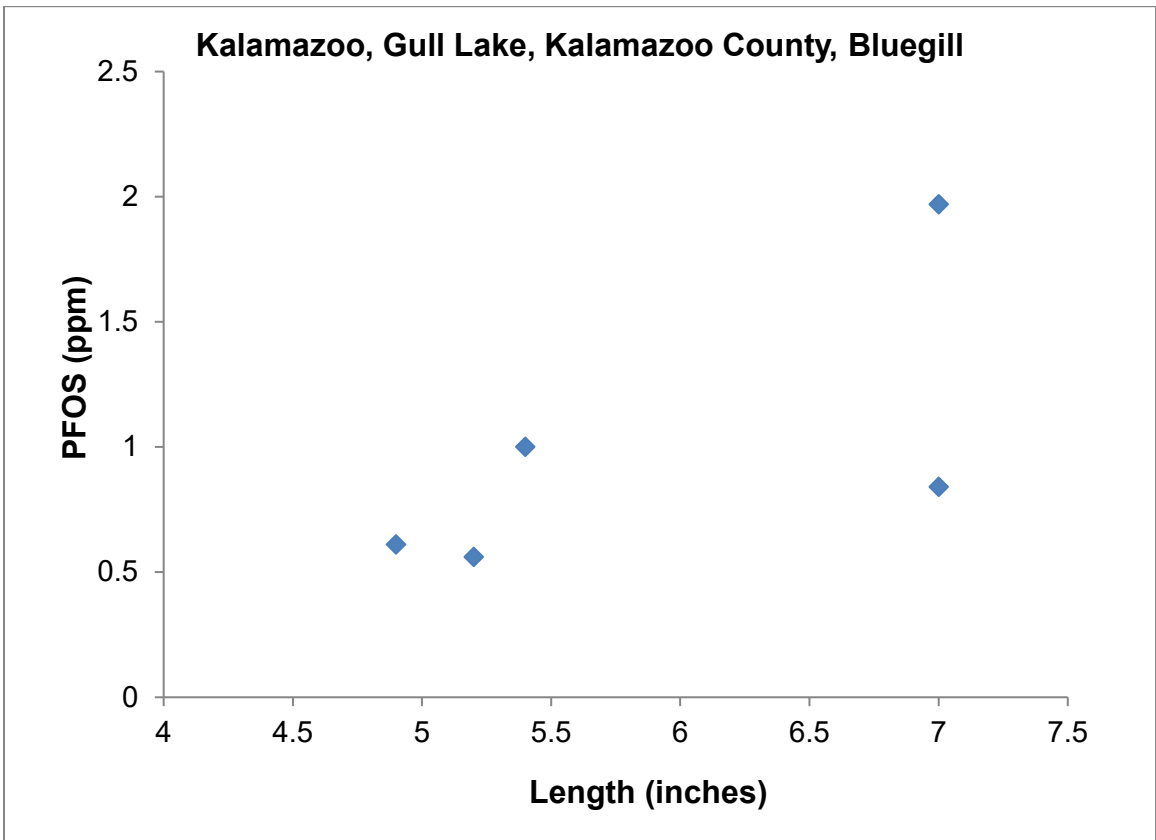
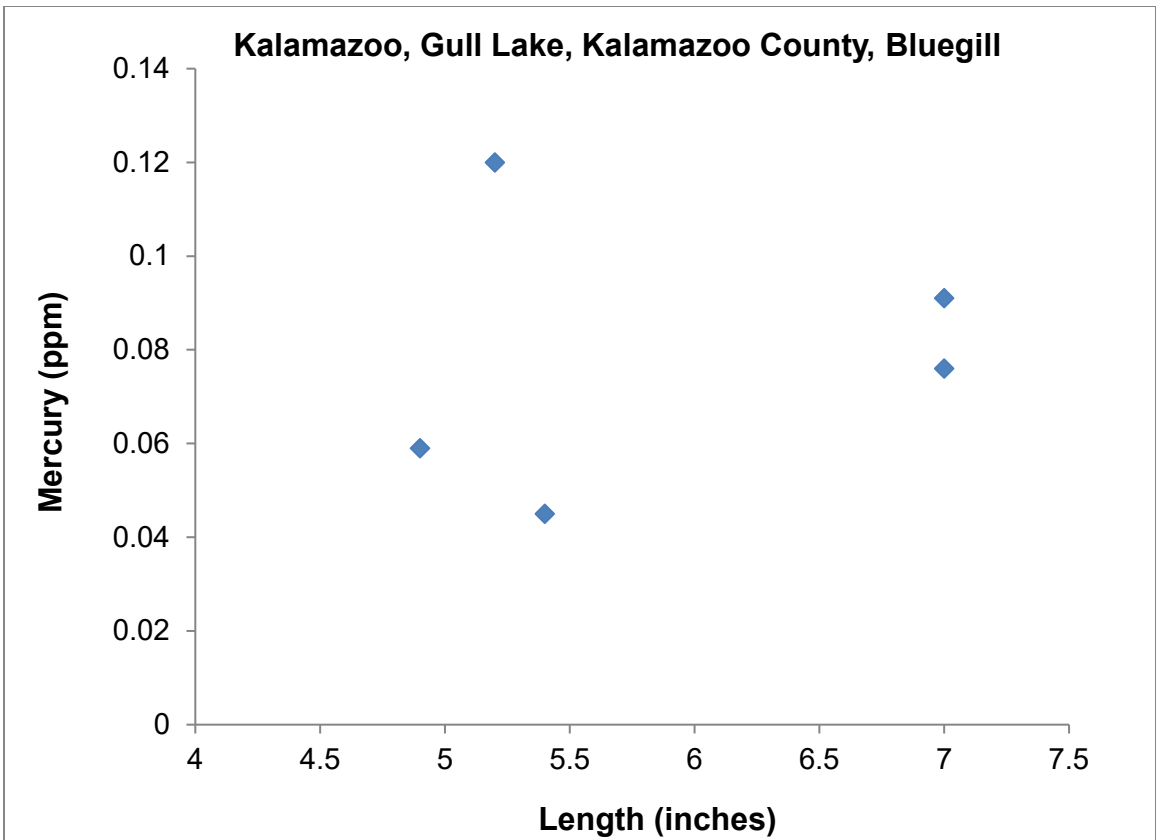
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	4.9	na	4.9	7
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.08	0.04	0.12	0.11	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.024	0.065				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	4.9	na	4.9	7
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	5	1 ppb	0.6 ppb	2.0 ppb	1.7 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.463	0.506				
Final meal category based on UCL:						8

Existing MDHHS Advisory: Gull Lake bluegill and sunfish are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 8 meals per month of Gull Lake bluegill or sunfish of any size due to mercury.



Largemouth Bass

Gull Lake

Kalamazoo County

Hg Analysis:

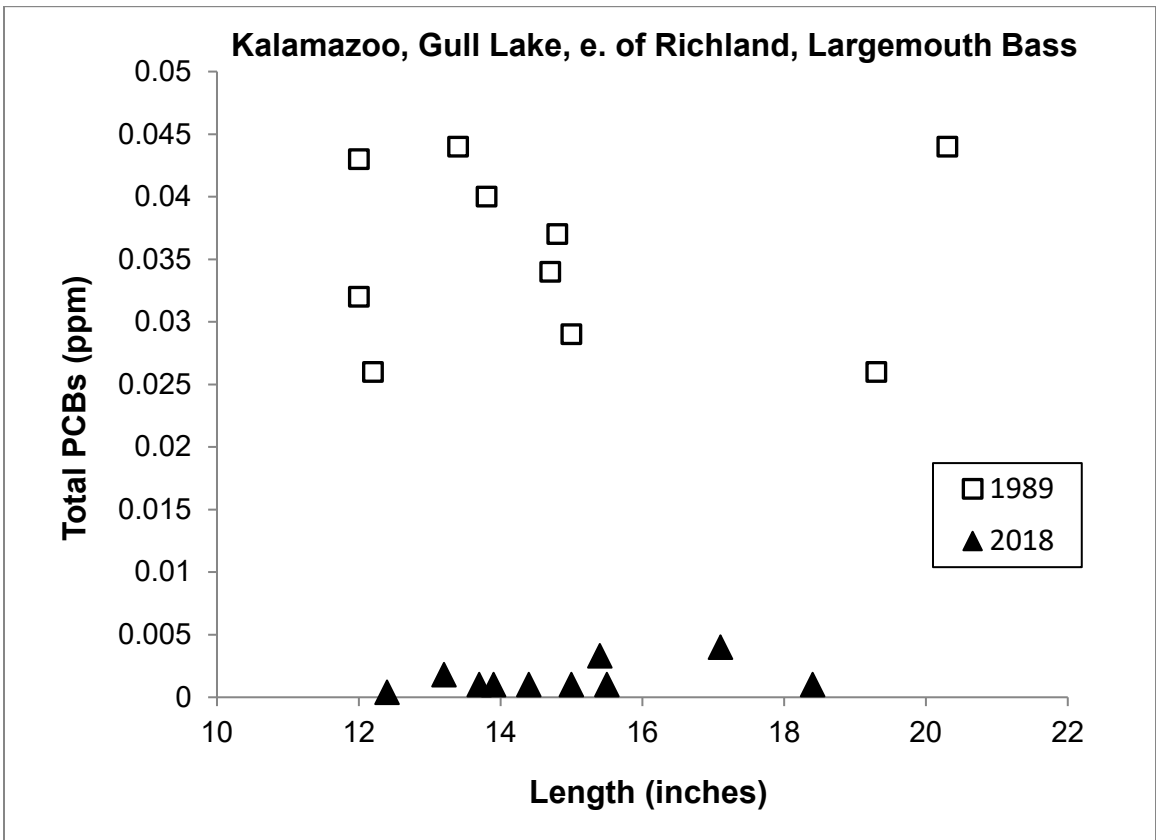
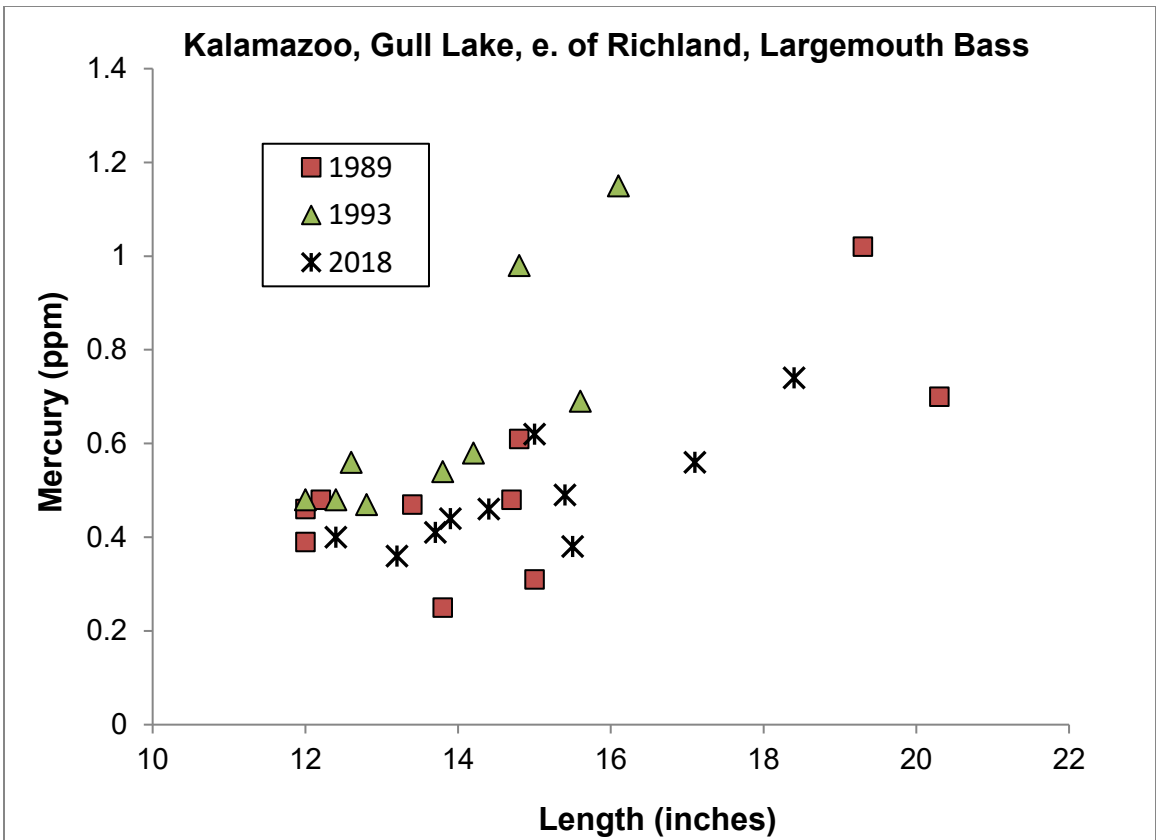
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	2018	29	12	14	13.7	20.3
Datasets available: 1989, 1993, 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	19	0.60	0.25	1.2	0.72	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.325	0.307				

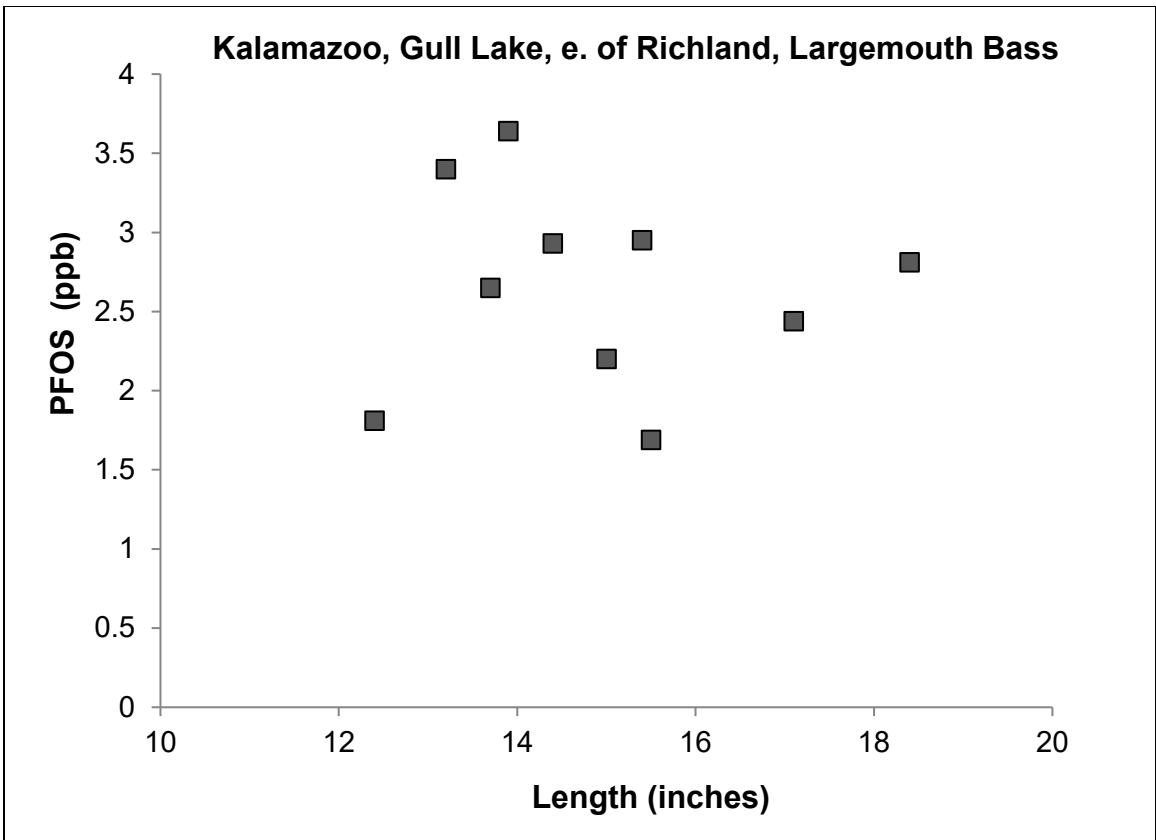
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	12	14	13.7	20.3
Datasets available: 1989, 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	8	0.002	< 0.001	0.004	0.003	16
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	8	2.7 ppb	1.7 ppb	3.6 ppb	3.1 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.004	0.000	Final meal category based on UCL:			1

Existing MDHHS Advisory: No one should eat more than 1 meal per month of Gull Lake largemouth or smallmouth bass due to mercury. PCBs would cause an advisory.

Recommendation: No change is recommended. PCBs can be removed from the list of contaminants causing an advisory.





Northern Pike

Gull Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1993	16	22.6	24	25.2	35.8
Datasets available: 1989, 1993						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.45	0.30	0.94	0.55	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.058	0.038				

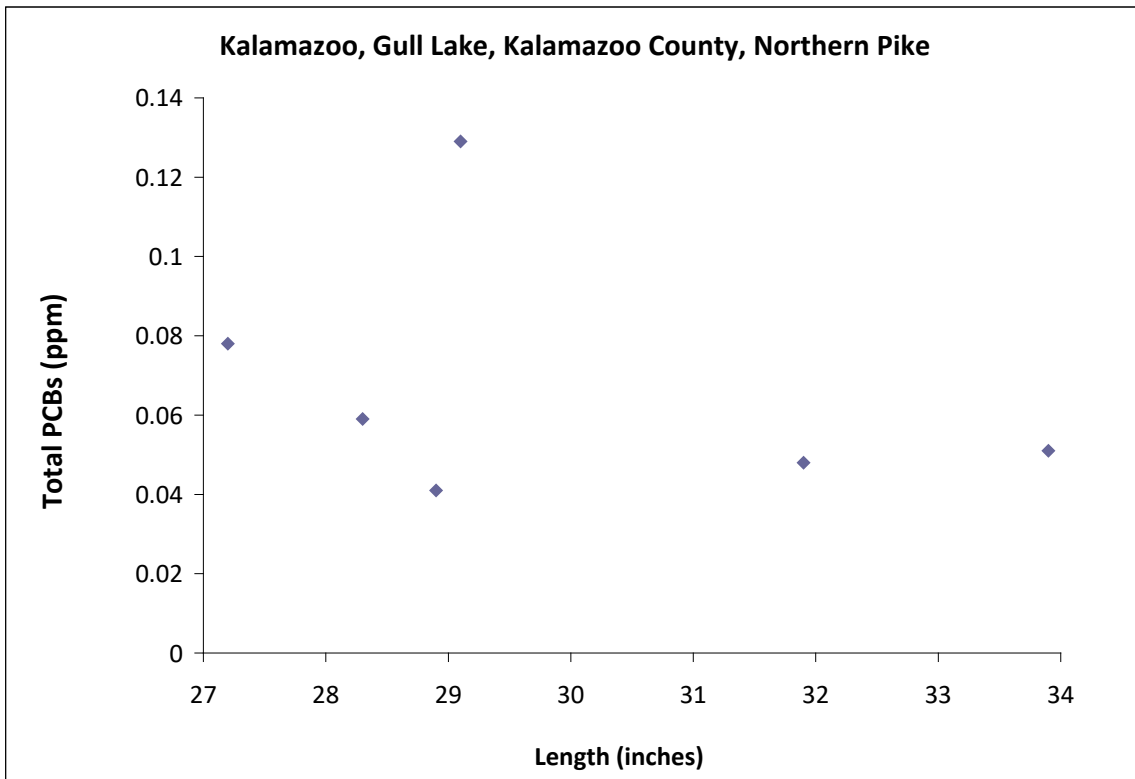
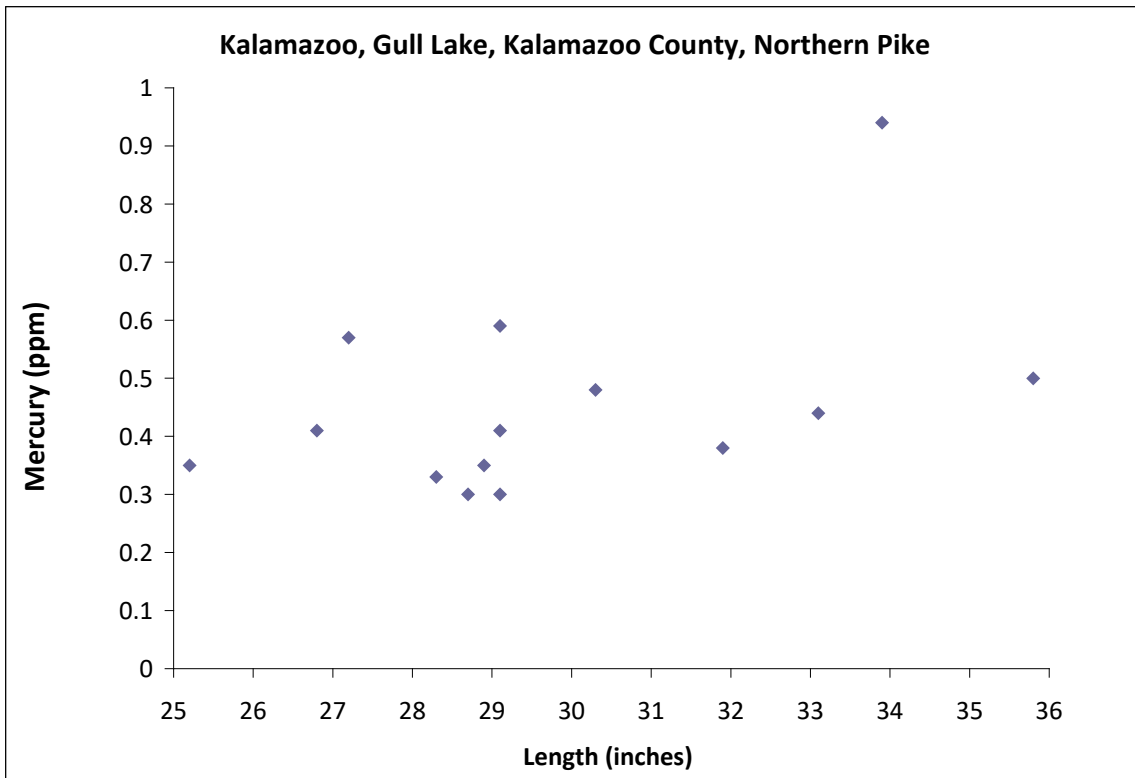
Organics Analysis:

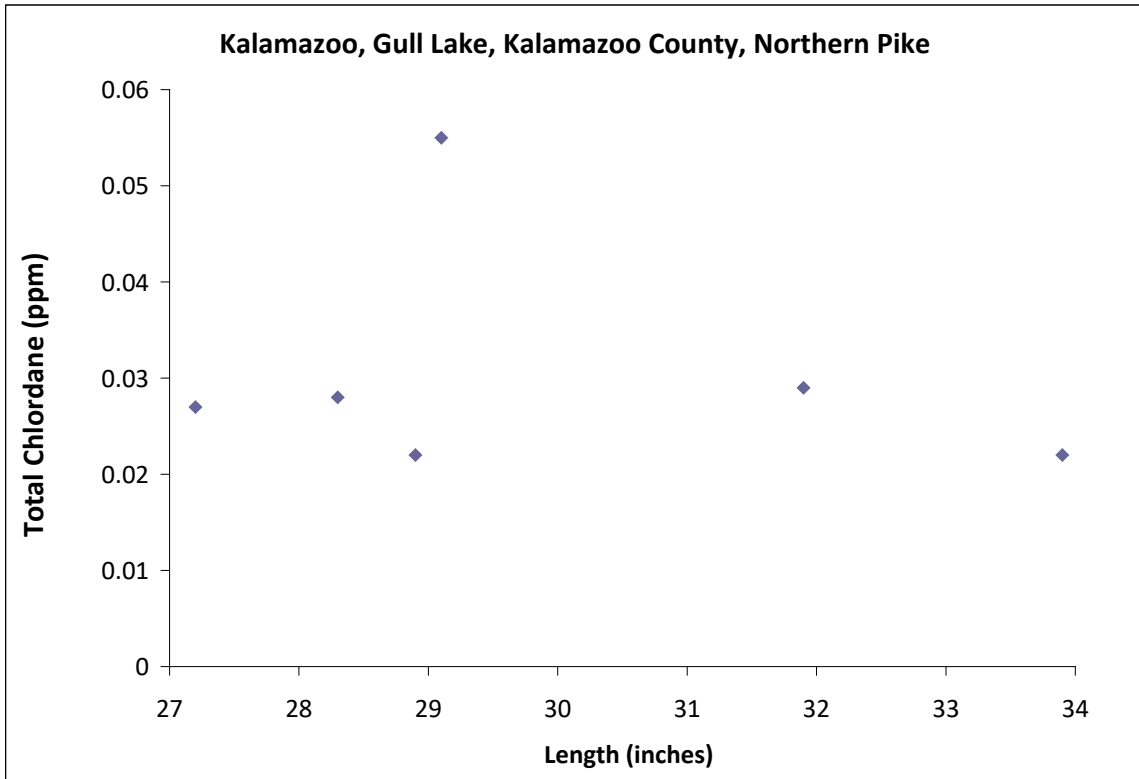
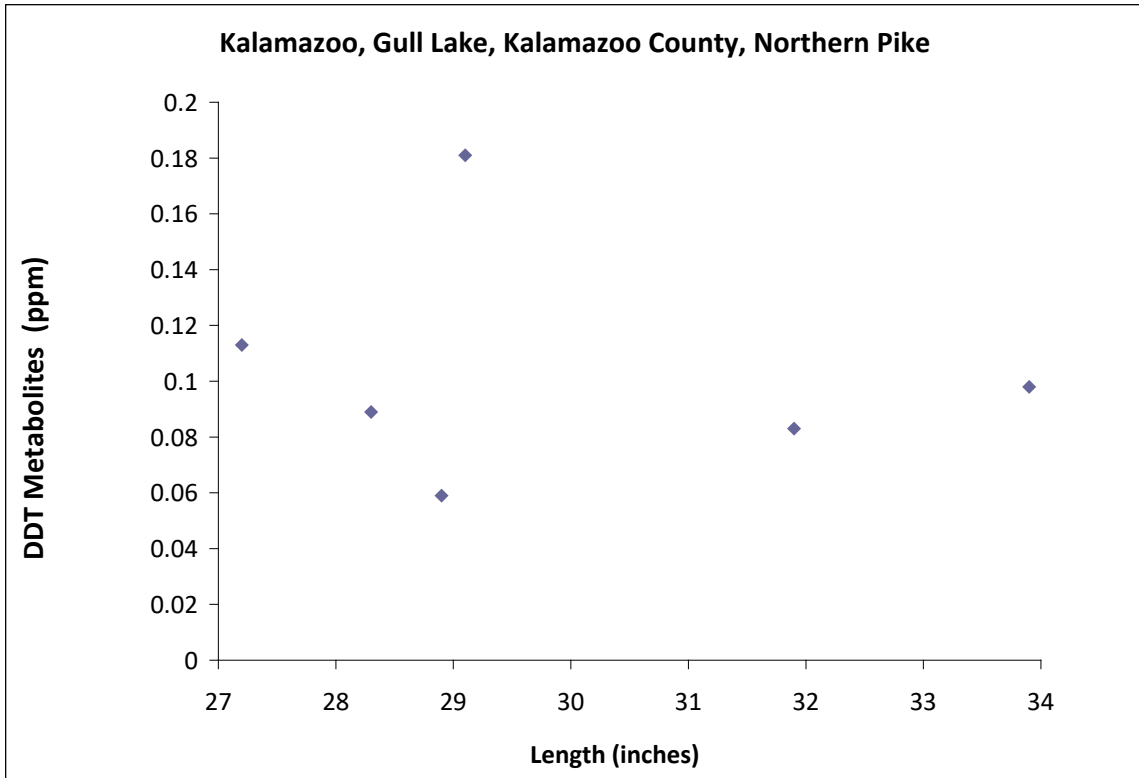
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	8	22.6	24	27.2	33.9
	1989					
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	0.07	0.04	0.13	0.10	2
DDT	6	0.10	0.06	0.18	0.15	12
Chlordane	6	0.03	0.02	0.06	0.04	--
Toxaphene	6	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.003	0.003				
DDT	0.006	0.007				
Chlordane	0.130	0.249				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Women and children should not eat more than one meal per month of Gull Lake northern pike greater than 26 inches in length due to PCBs and mercury.

Recommendation: No one should eat more than 1 meal per month of Gull Lake northern pike due to mercury. PCBs would cause an advisory.

Note: The organics data are nearly 25 years old, thus DDT is unlikely to cause an advisory.





Rainbow Smelt

Gull Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	60*	3.7	NA	3.7	4.9
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3*	0.059	0.057	0.061	0.059	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	NA	NA				

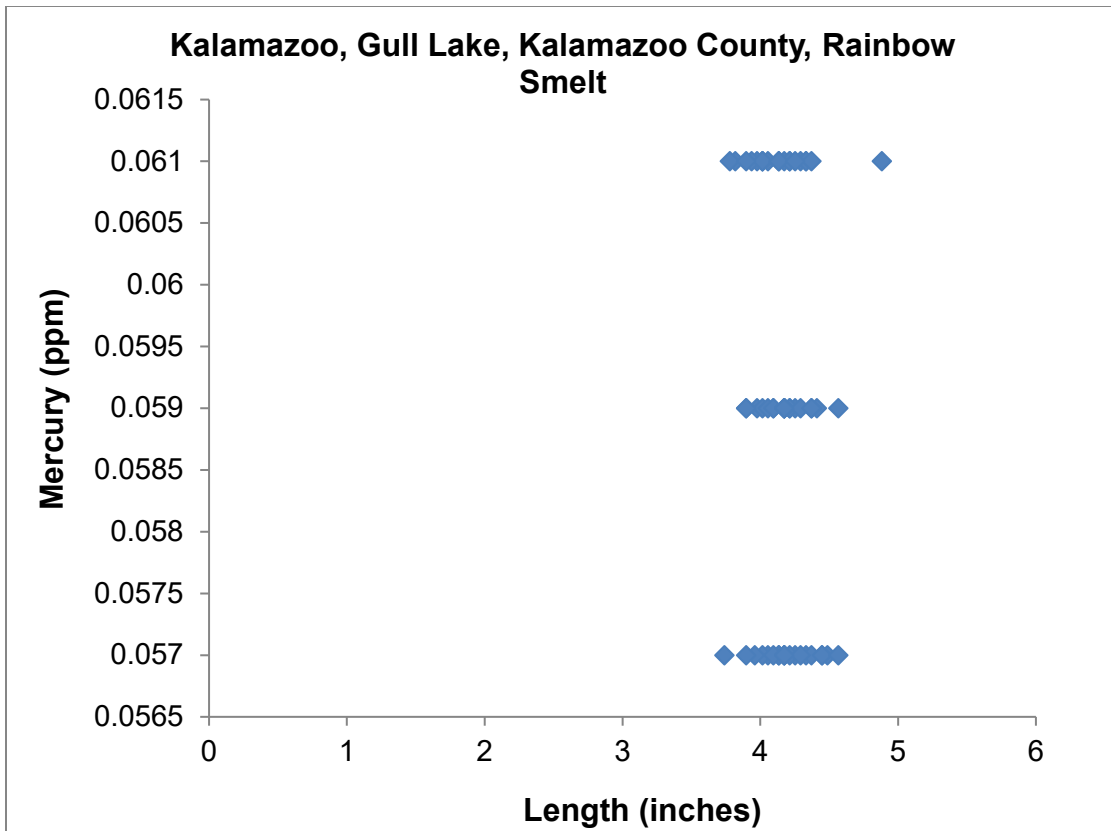
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	60*	3.7	NA	3.7	4.9
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3*	0.001	<0.001	0.002	0.001	16
DDT	3*	0.004	0.003	0.005	0.005	16
Chlordane	3*	0.001	<0.001	0.004	0.001	16
Toxaphene	3*	ND	--	--	--	--
PFOS	3*	72.2 ppb	66.5 ppb	78.2 ppb	73.4 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	NA	NA				
DDT	NA	NA				
Chlordane	NA	NA				
Toxaphene	NA	NA				
PFOS	NA	NA				
Final meal category based on UCL:						2

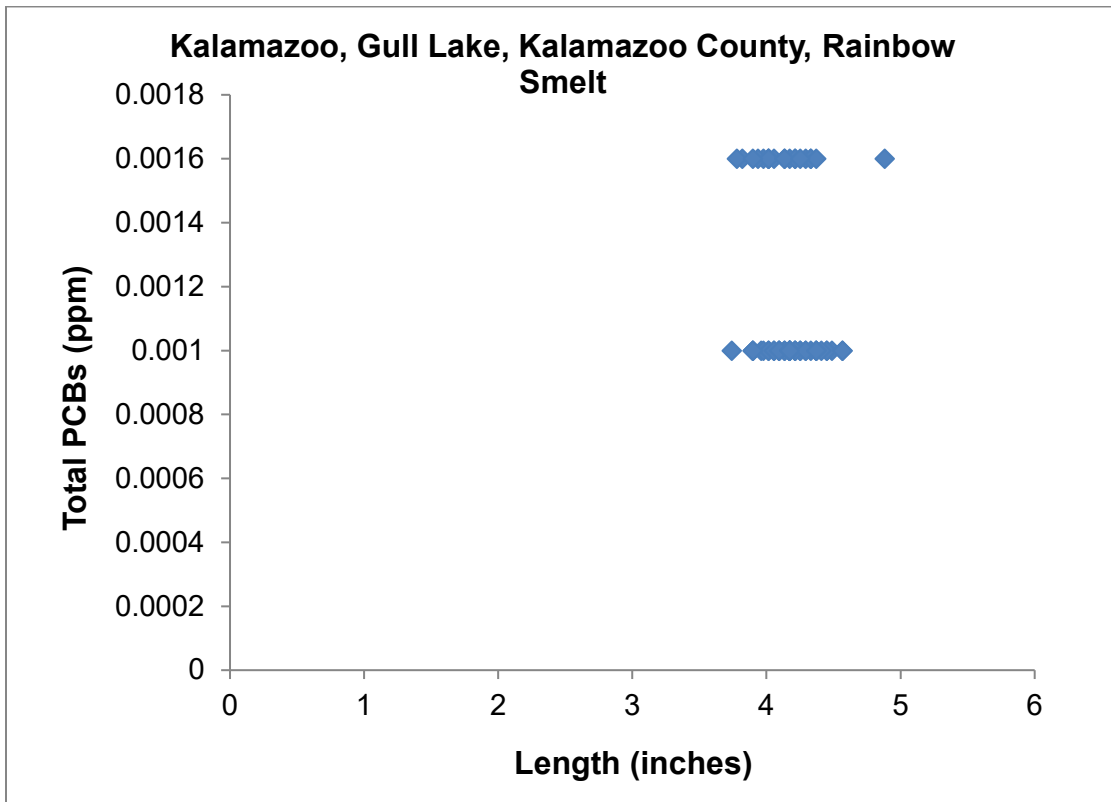
*Due to sample size requirements for the laboratory analysis, composites (N = 3) of twenty individuals were analyzed.

Existing MDHHS Advisory: There is currently no guideline for rainbow smelt from Gull Lake.

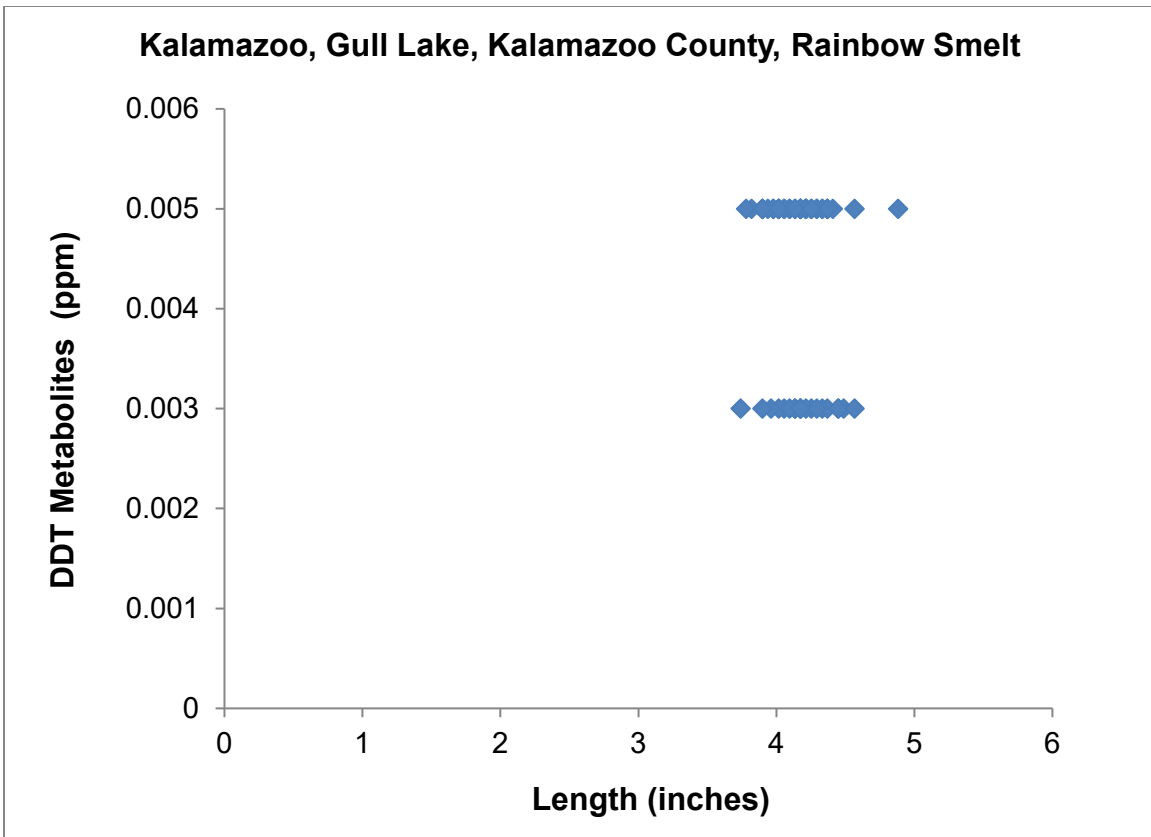
Recommendation: No one should eat more than 2 meals per month of smelt from Gull Lake in Kalamazoo County due to PFOS.



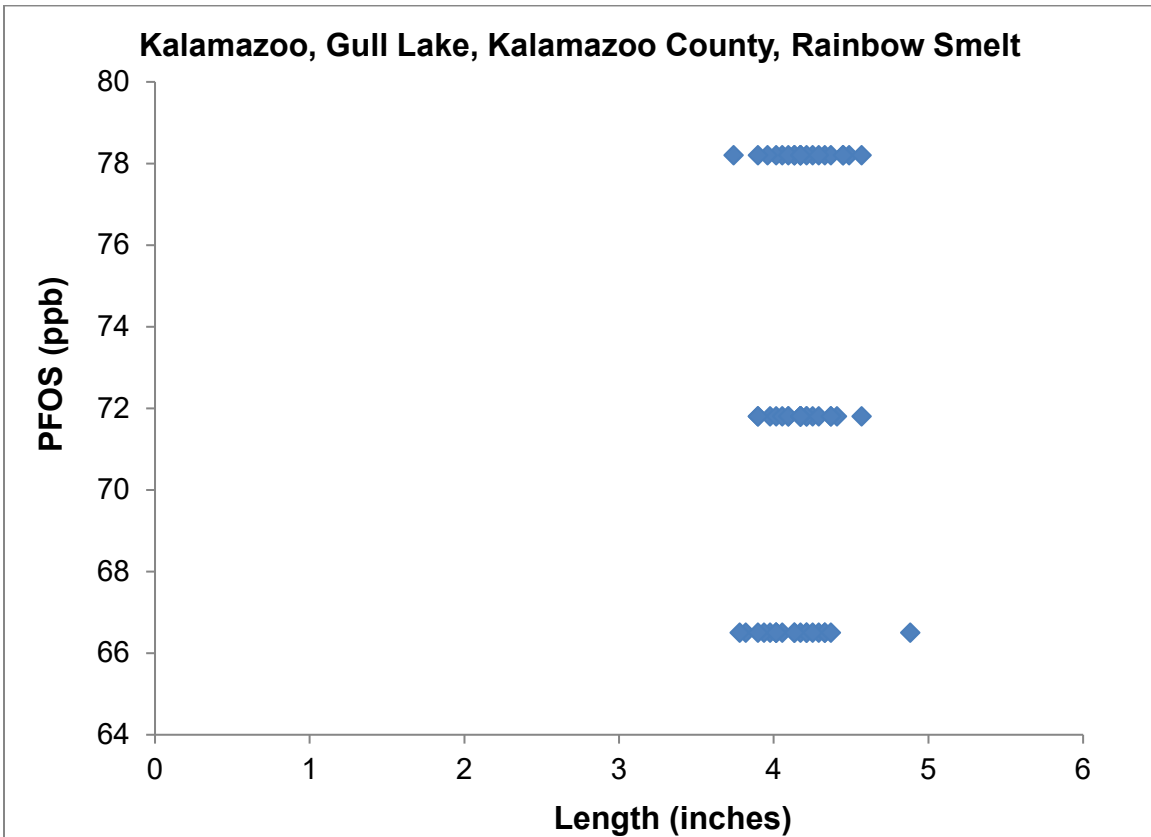
Note: Includes individual data points for each fish used in the composite samples (N=3).



Note: Includes individual data points for each fish used in the composite samples (N=2).



Note: Includes individual data points for each fish used in the composite samples (N=2).



Note: Includes individual data points for each fish used in the composite samples (N=3).

Rock Bass

Gull Lake

Kalamazoo County

Hg Analysis:

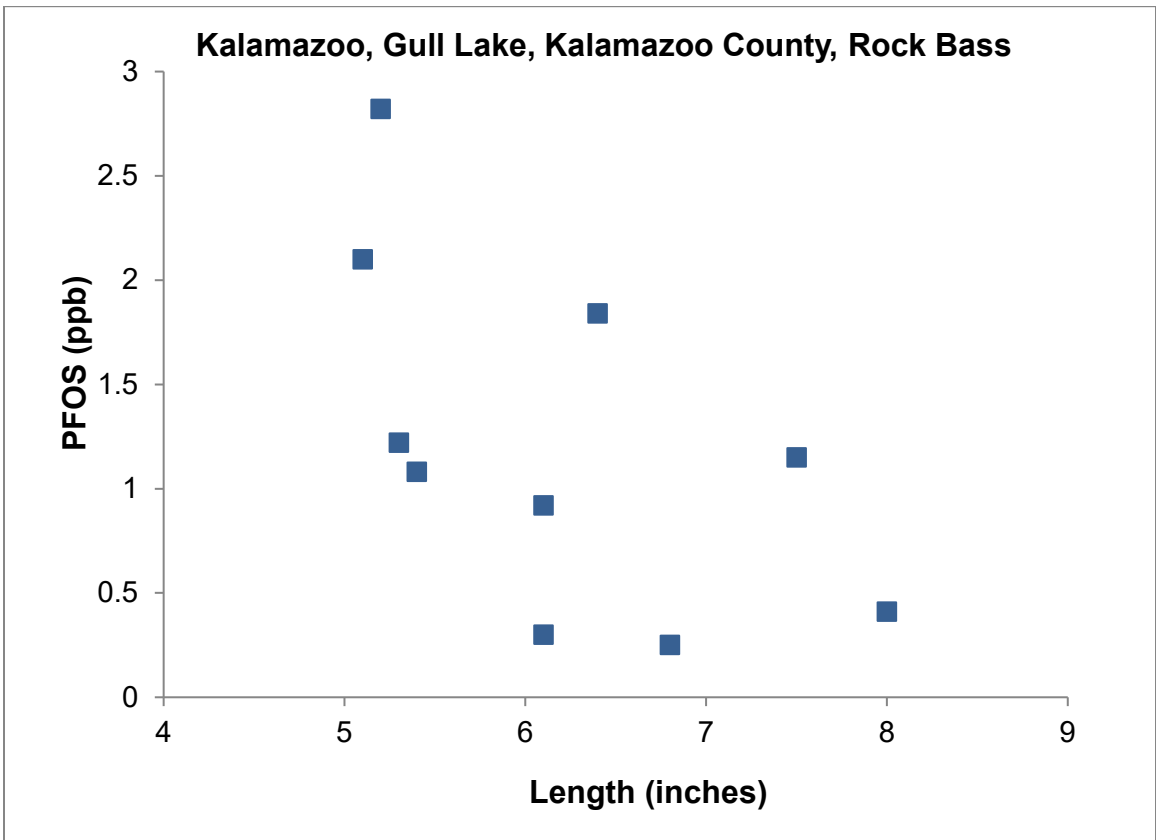
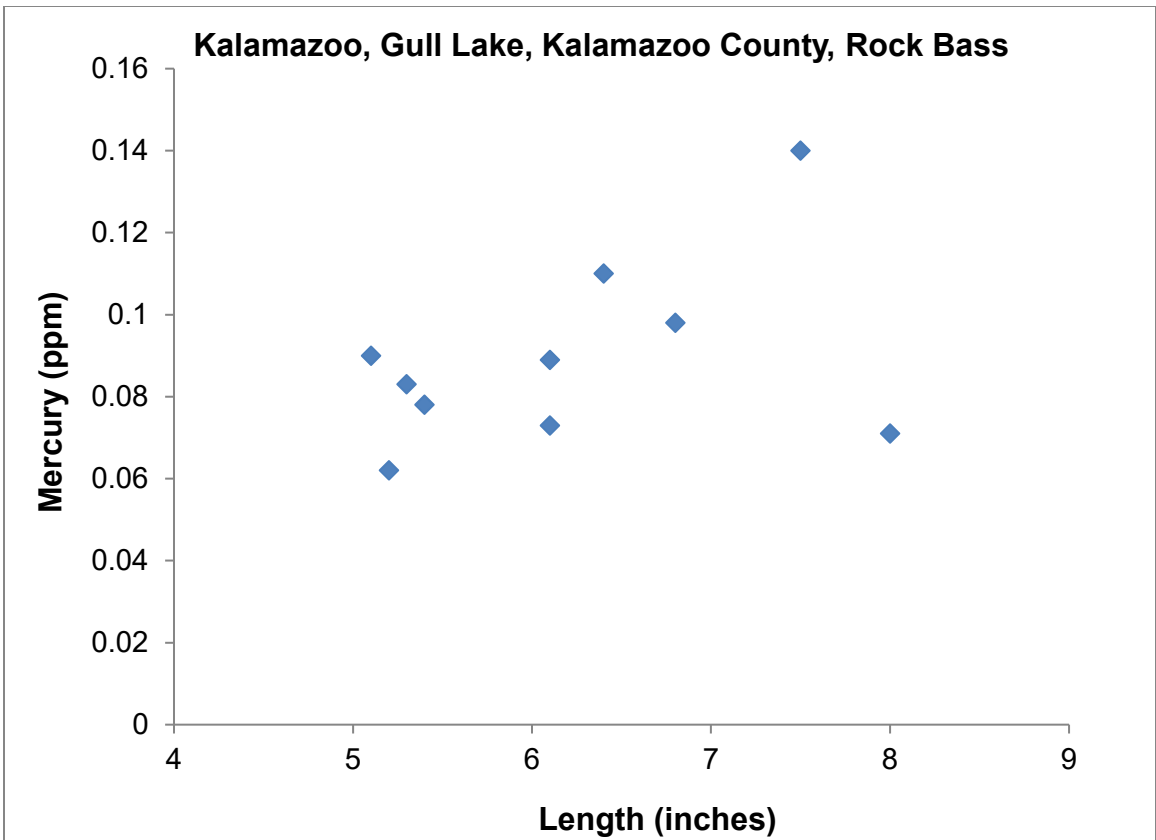
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	5.1	na	5.1	8
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.09	0.06	0.14	0.11	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.176	0.149				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	5.1	na	5.1	8
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	1.2 ppb	< 0.25 ppb	2.8 ppb	1.8 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.333	0.303				
Final meal category based on UCL:						8

Existing MDHHS Advisory: Gull Lake rock bass are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of rock bass of any size.

Recommendation: No one should eat more than 8 meals per month of Gull Lake rock bass due to mercury.



Black Crappie

Long Lake

Kalamazoo County

Hg Analysis:

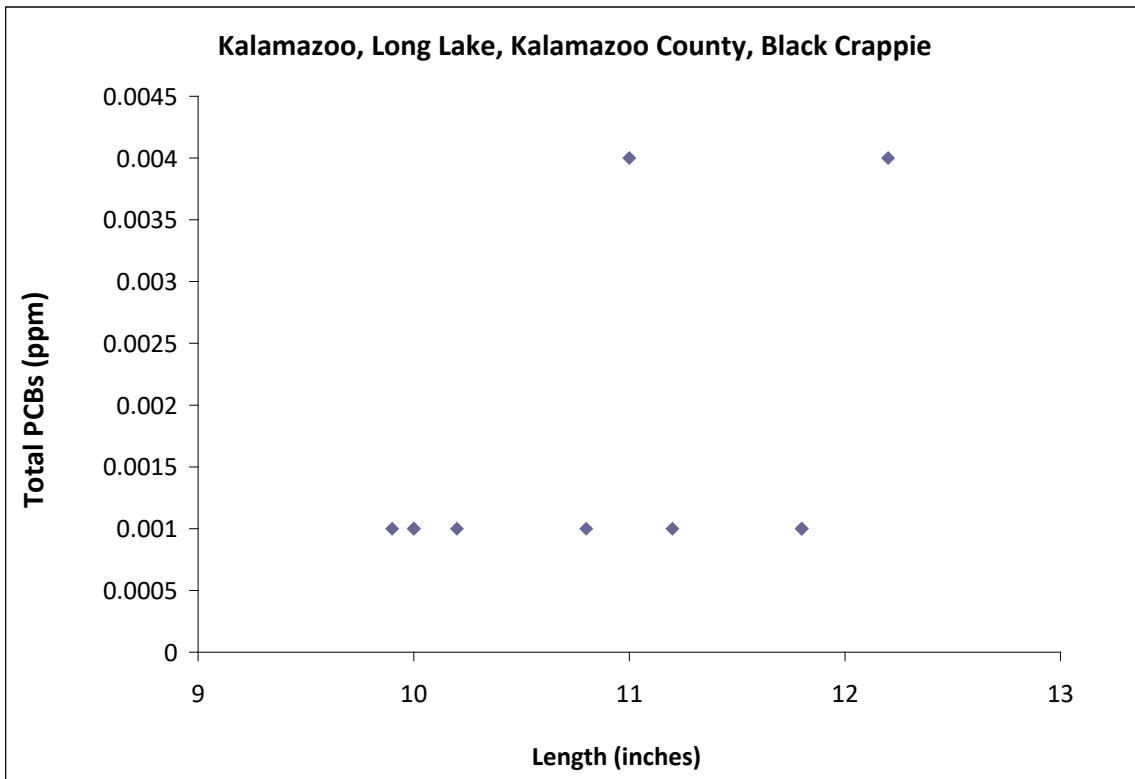
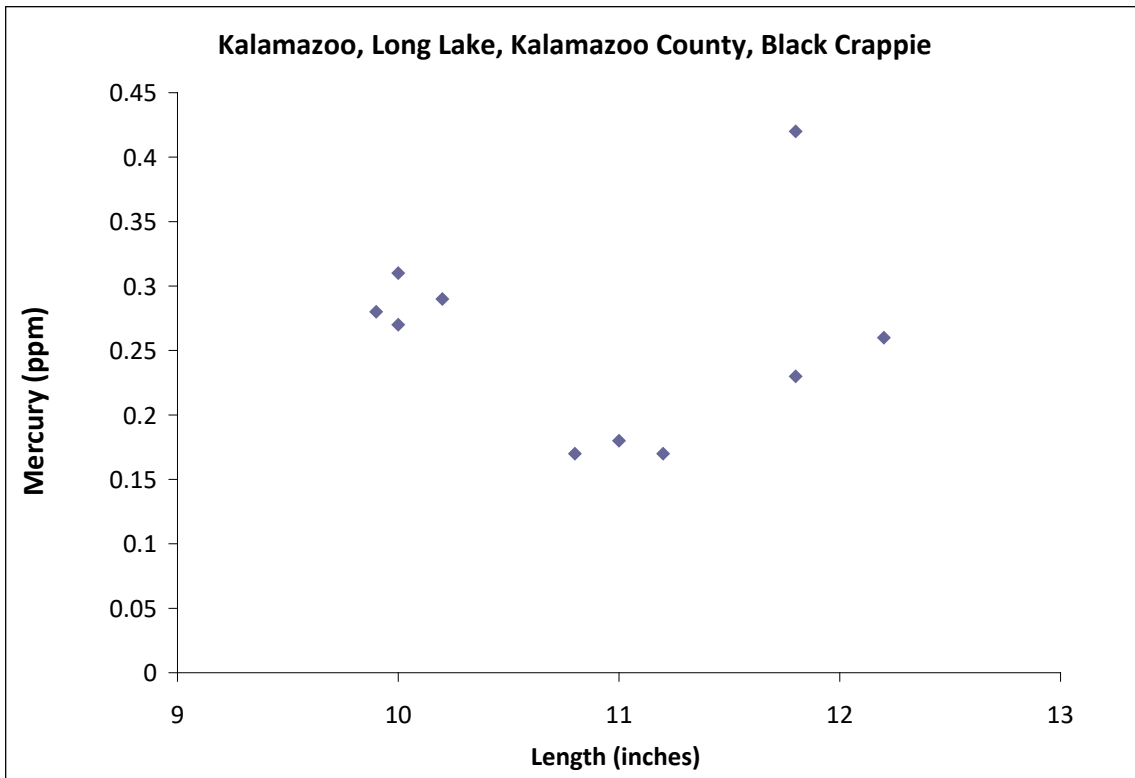
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	9.9	NA	9.9	12.2
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.26	0.17	0.42	0.31	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.000	0.004				

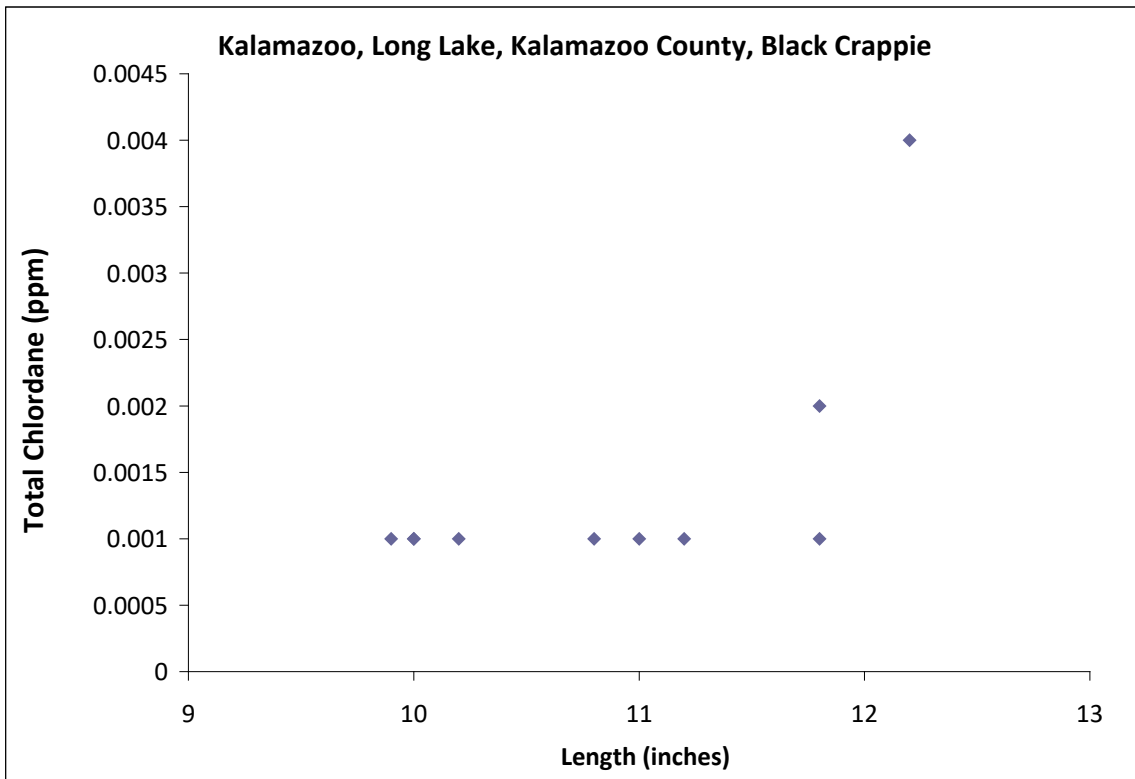
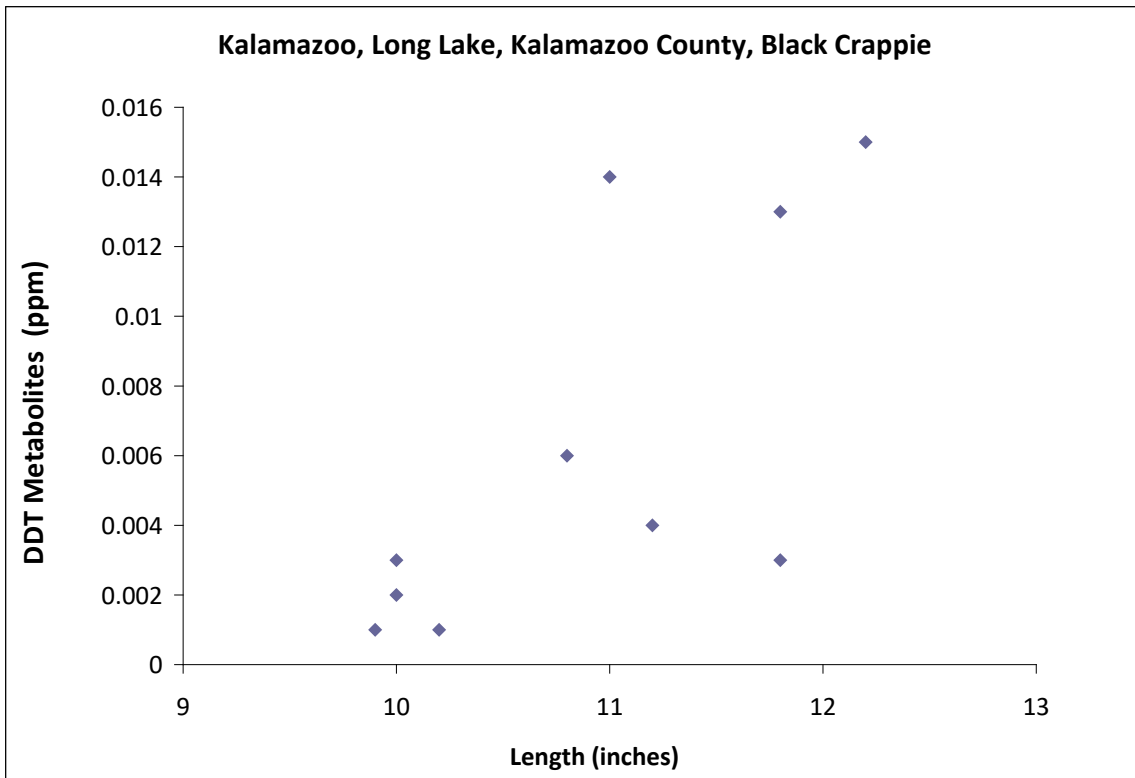
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	9.9	NA	9.9	12.2
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.002	0.001	0.004	0.000	16
DDT	10	0.006	0.001	0.015	0.010	16
Chlordane	10	0.001	0.001	0.004	0.000	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.193	0.193				
DDT	0.500	0.559				
Chlordane	0.427	0.465				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Women and children should not eat more than one meal per month of Long Lake black crappie greater than 14 inches in length.

Recommendation: No one should eat more than 2 meals per month of Long Lake crappie due to mercury.





Brown Bullhead

Long Lake

Kalamazoo County

Hg Analysis:

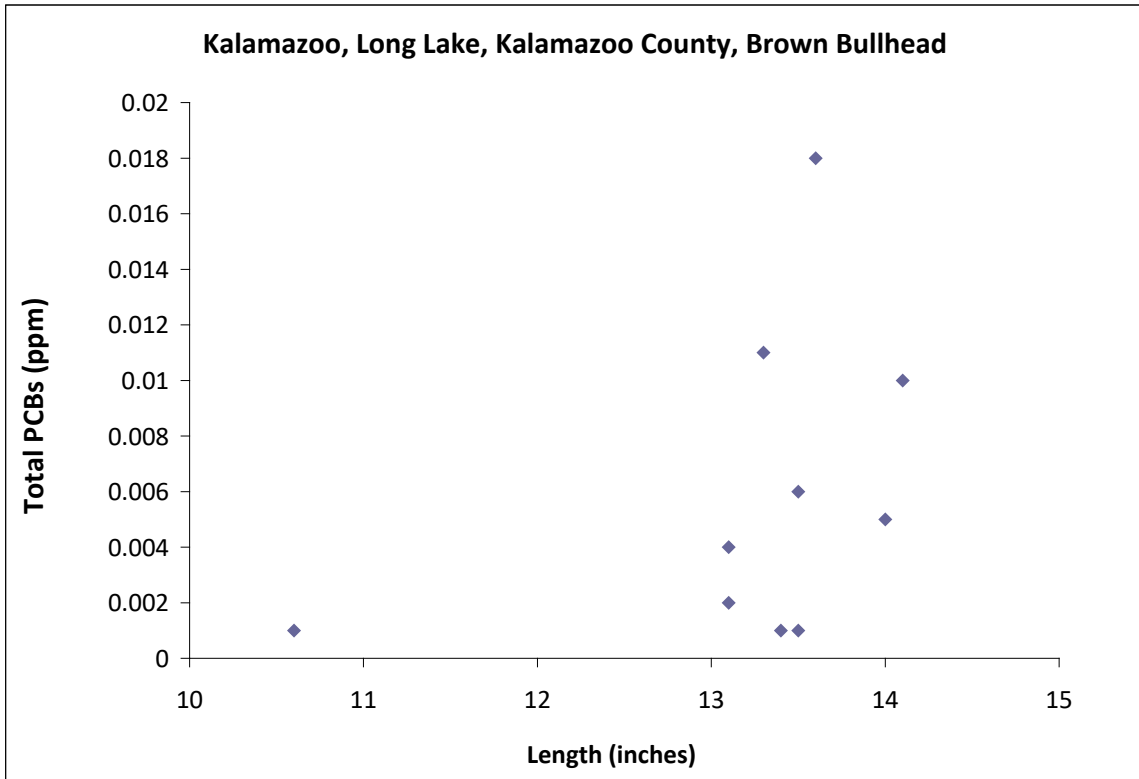
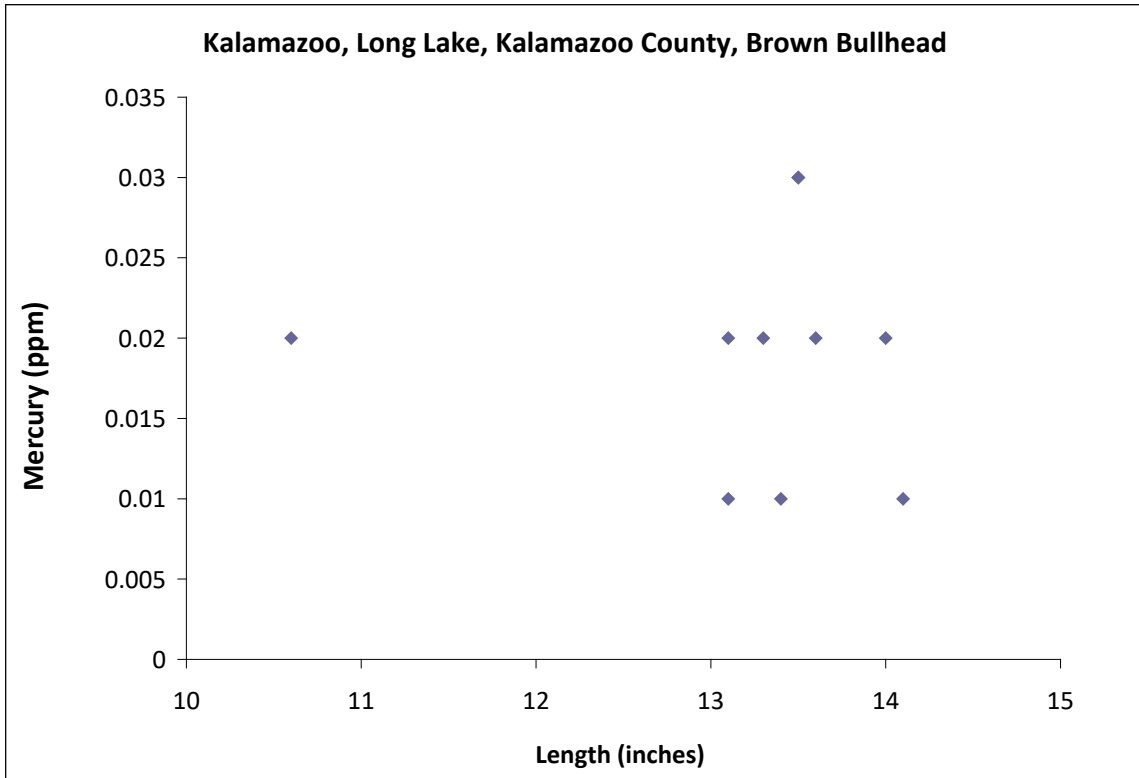
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	10.6	NA	10.6	14.1
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.02	0.01	0.03	0.02	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.003	0.013				

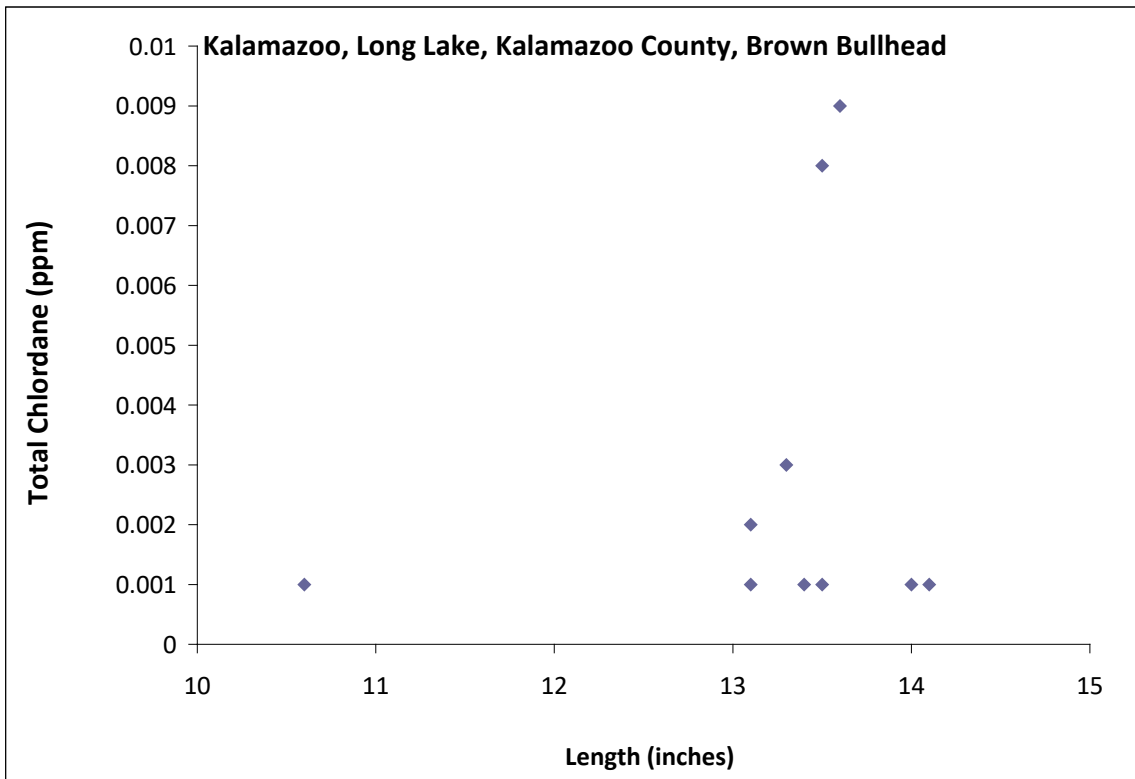
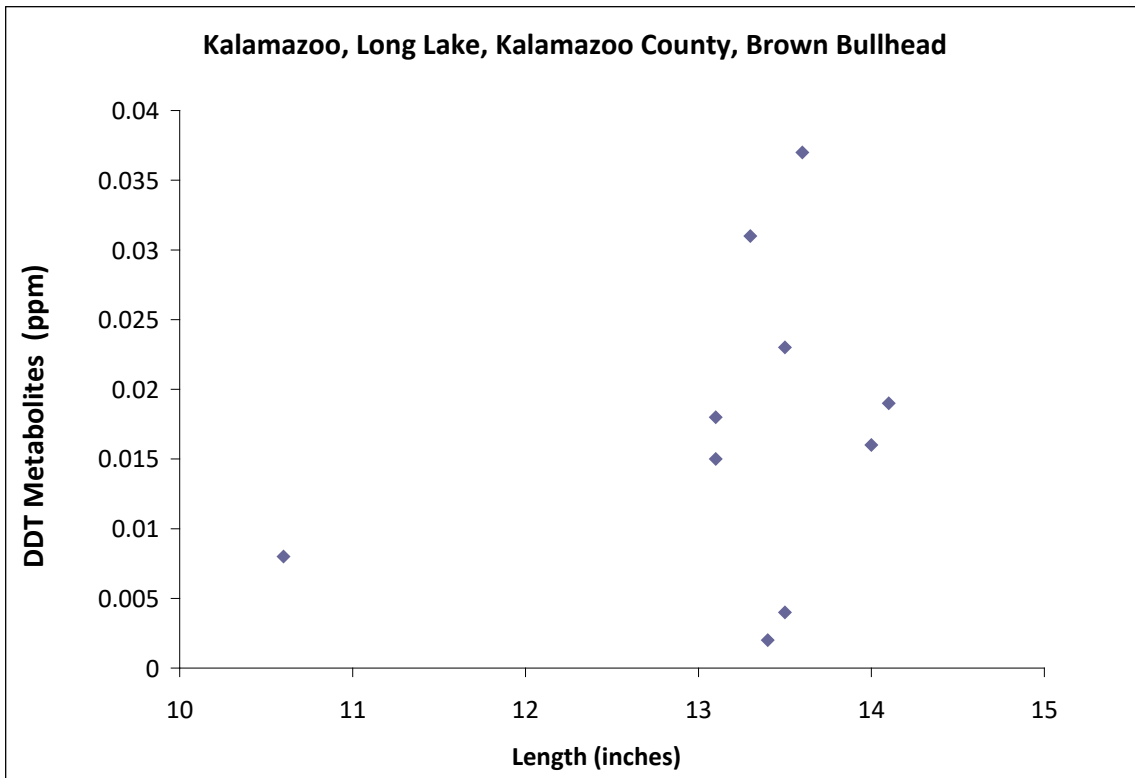
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	10.6	NA	10.6	14.1
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.006	0.001	0.018	0.010	16
DDT	10	0.017	0.002	0.037	0.030	16
Chlordane	10	0.003	0.001	0.009	0.010	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.153	0.257				
DDT	0.086	0.043				
Chlordane	0.034	0.033				
Toxaphene	--	--				
Final meal category based on UCL:						16

Existing Advisory: There are no current consumption advisories for Long Lake brown bullhead.

Recommendation: People can eat 16 meals per month of Long Lake bullhead. No consumption advisory is needed for Long Lake bullhead.





Bluegill

Markin Glen Pond

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2018	20	5.7	na	5.7	8.1
Datasets available: 2016, 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.11	0.06	0.22	0.12	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.144	0.136				

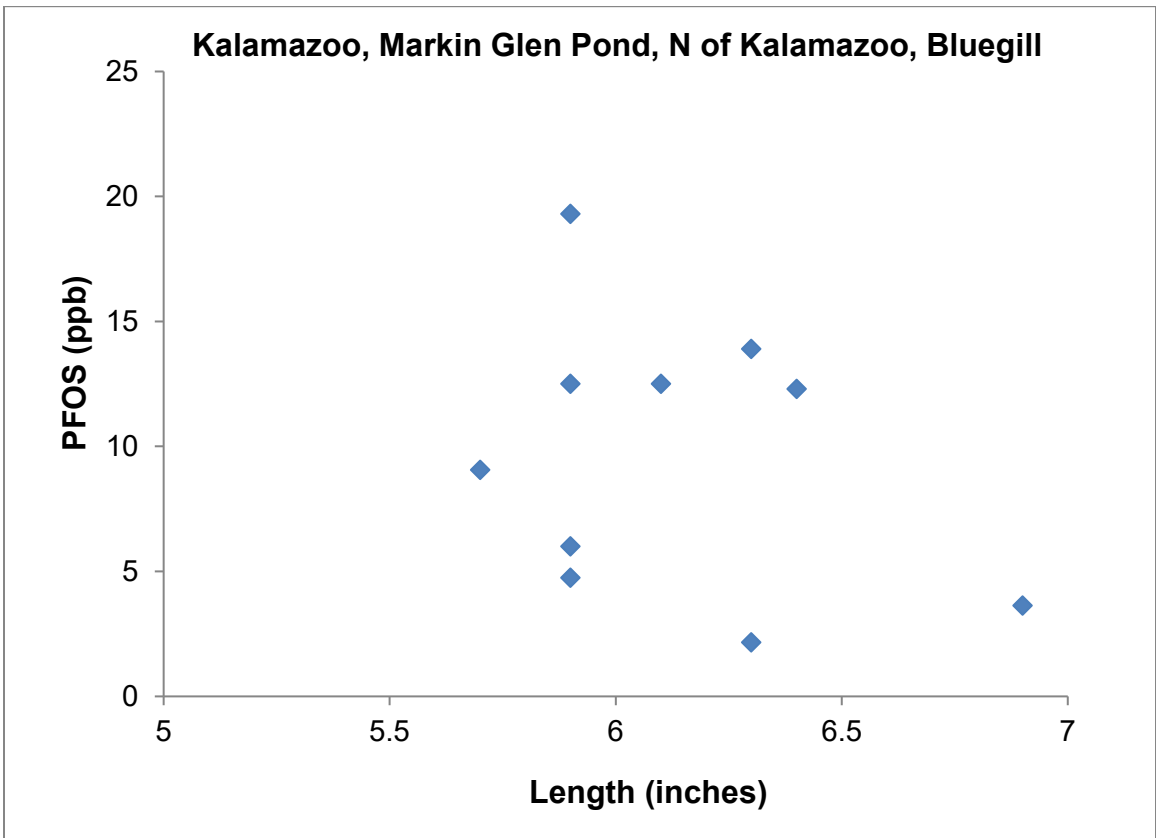
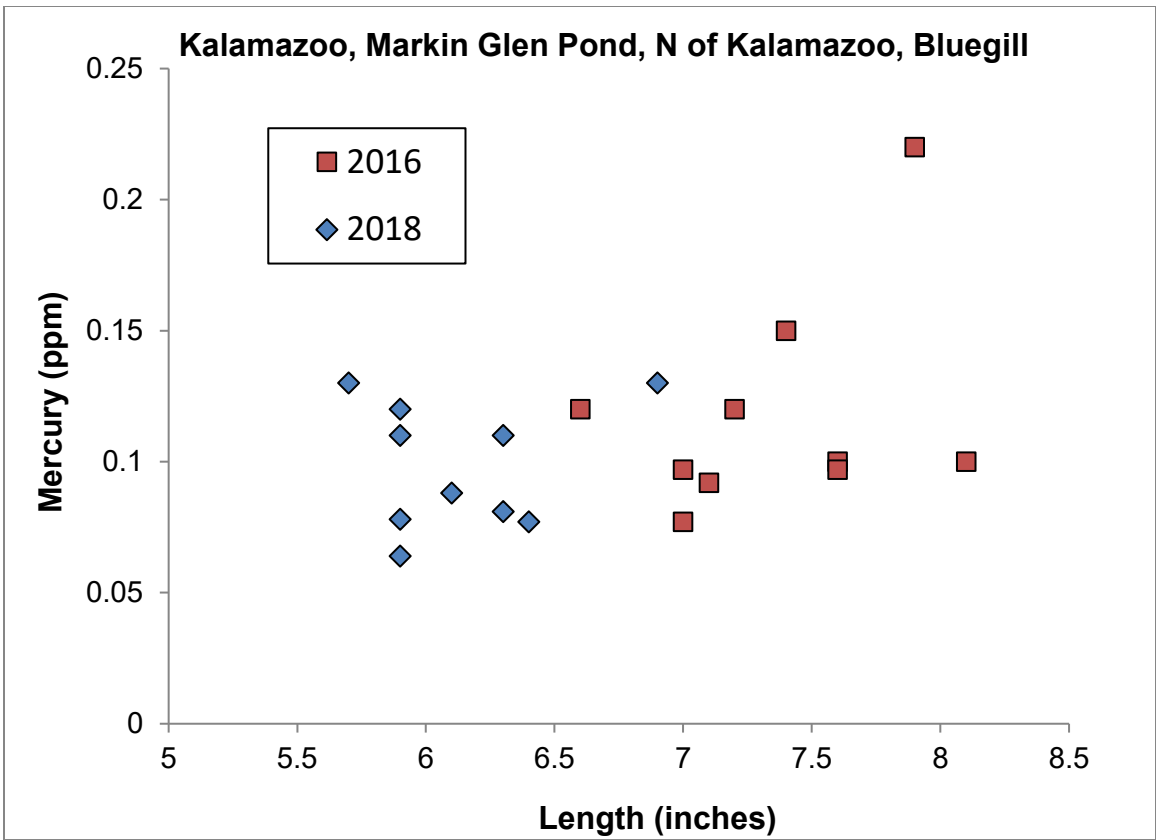
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2016	10	6.6	na	6.6	8.1
2018	2018	10	5.7		5.7	6.9
Datasets available: 2016 (chlorinated organics); 2018 (PFOS)						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	< 0.001	< 0.001	--	16
DDT	10	ND	< 0.001	< 0.001	--	16
Chlordane	10	ND	< 0.001	< 0.001	--	--
Toxaphene	10	ND	< 0.05	< 0.05	--	--
PFOS	10	10 ppb	2 ppb	19 ppb	13 ppb	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.091	0.133	Final meal category based on UCL:			8

Existing MDHHS Advisory: No one should eat more than 4 meals per month of Markin Glen Pond bluegill or sunfish of any size due to mercury.

Recommendation: No one should eat more than 8 meals per month of Markin Glen Pond bluegill or sunfish of any size due to mercury and PFOS.

Note: The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.



Carp

**Portage Creek
Monarch Pond**

Kalamazoo County

Hg Analysis:

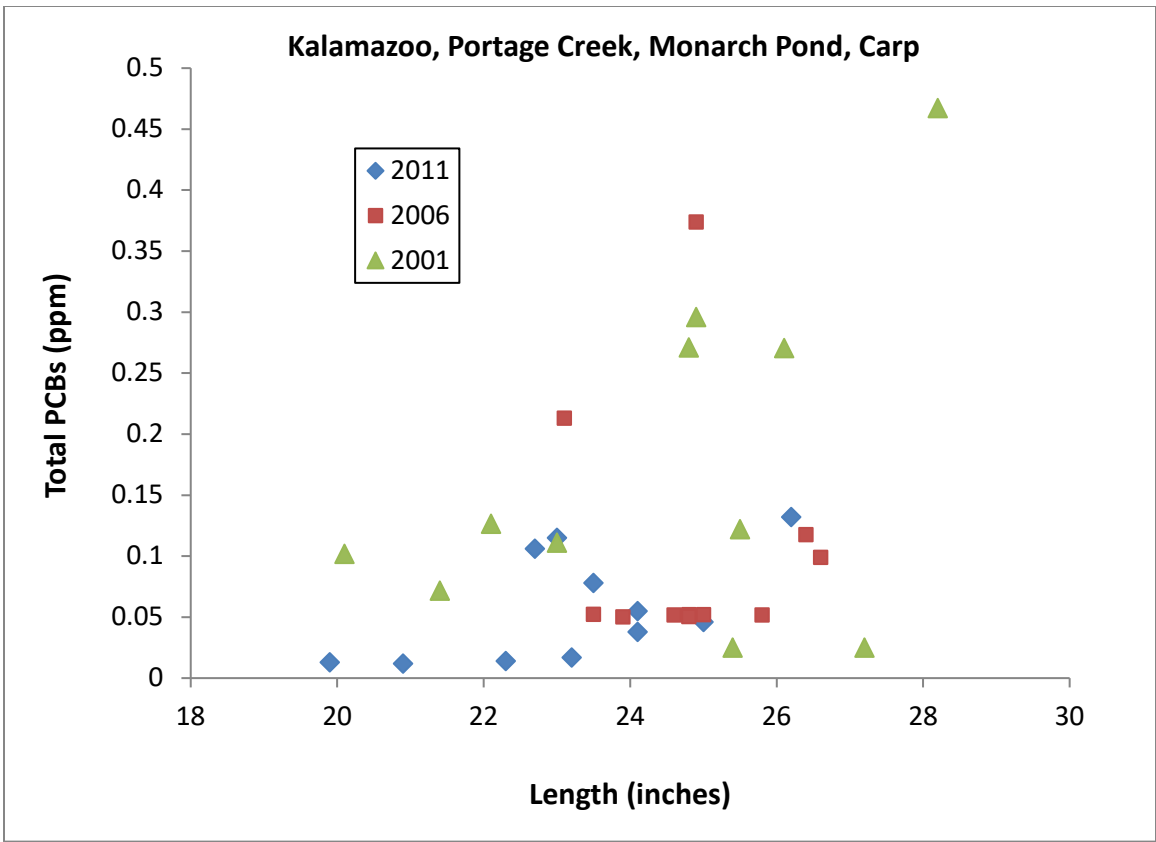
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2011	33	19.9	na	19.9	28.2
Datasets available: 2001, 2006, 2011						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	33	0.11	0.01	0.47	0.15	1
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.149	0.150				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: No one should eat more than 1 meal per month of carp from Portage Creek upstream of the Monarch Mill Dam due to PCBs.

Recommendation: No change.



Brown Trout

**Portage Creek^
Bryant Mill Pond / d-s Monarch Dam**

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
2000	2000	1	8.2	10	8.2	8.2
Datasets available: 2000						
Chemical	Sample Size	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.05	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat any brown trout from Portage Creek downstream of the Monarch Dam as part of an “all other species” advisory due to PCBs.

Recommendation: Dataset is insufficient to determine a guideline.^

^Note: This stretch of Portage Creek had a legacy point-source release of PCBs and empties into the Kalamazoo River between the Morrow Pond Dam and Allegan Dam, which is also contaminated with PCBs. A waterbody-wide advisory (“All Other Species”) is applied to this segment of Portage Creek.

Carp

**Portage Creek
Bryant Mill Pond / d-s Monarch Dam**

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

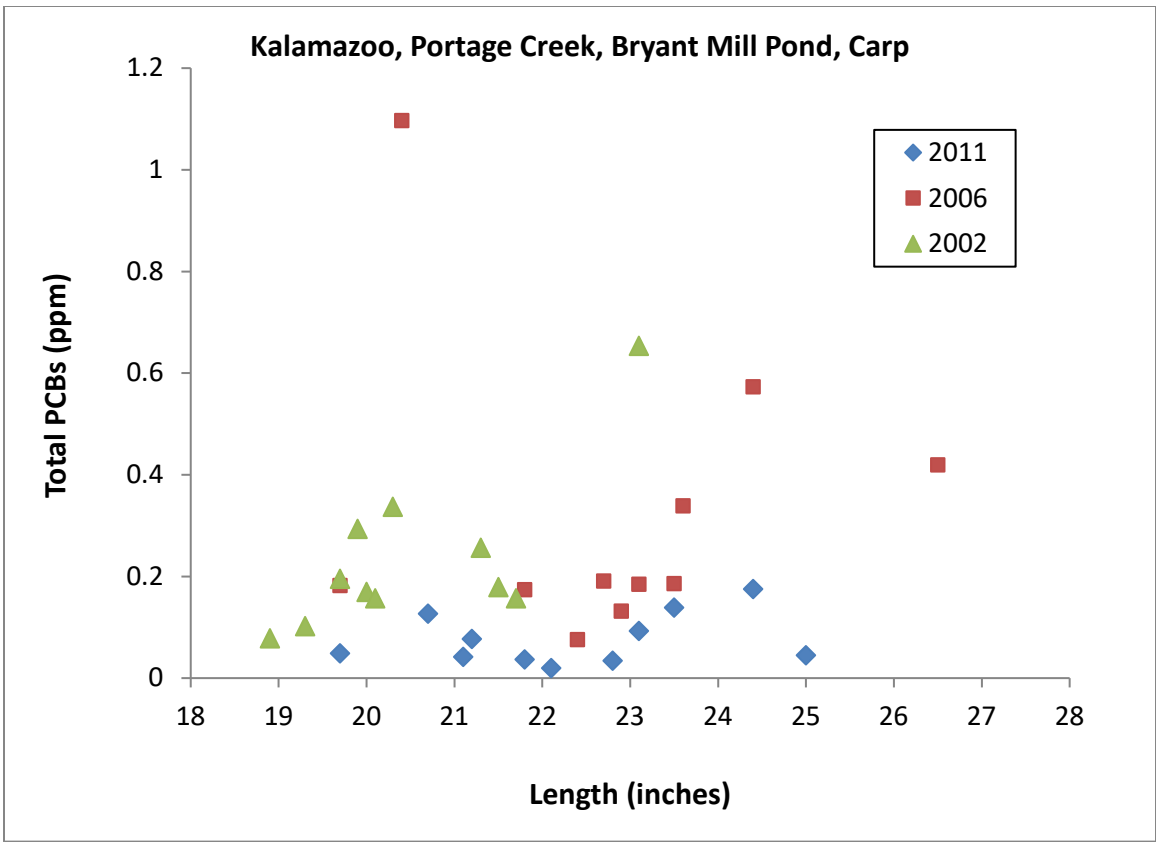
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2011	33	18.9	na	18.9	26.5
Datasets available: 1985,'86,'87,2000,'01,'02,'06, '11						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	33	0.21	0.02	1.10	0.29	0.5
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.010	0.012				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						0.5*

Existing Advisory: Sensitive populations should not eat these fish. Healthy adults should limit consumption of carp from Portage Creek downstream of Monarch Dam to no more than 1 or 2 meals per year due to PCBs.

Recommendation: No change. *Another year of data similar to 2011 data is necessary to relax this advisory.

Note: This stretch of Portage Creek had a legacy point-source release of PCBs and empties into the Kalamazoo River between the Morrow Pond Dam and Allegan Dam, which is also contaminated with PCBs. A waterbody-wide advisory (“All Other Species”) is applied to this segment of Portage Creek.



White Sucker

**Portage Creek^
Bryant Mill Pond / d-s Monarch Dam**

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

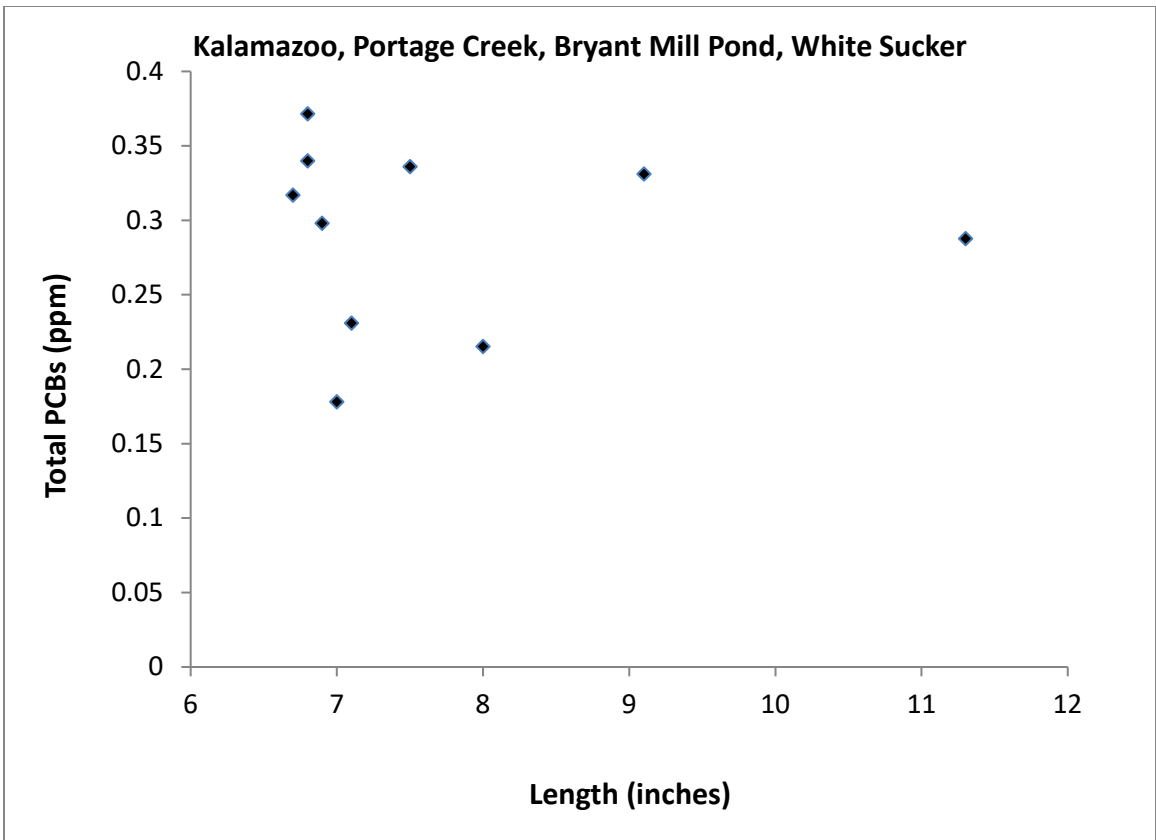
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	6.7	na	6.7	11.3
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.29	0.18	0.37	0.34	0.5
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.001	0.000				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						0.5

Existing Advisory: Women and children should not eat any white sucker from Portage Creek downstream of the Monarch Dam as part of an “all other species” advisory due to PCBs.

Recommendation: No one should eat more than 6 meals per year of sucker from Portage Creek downstream of Monarch Dam due to PCBs.

^Note: This stretch of Portage Creek had a legacy point-source release of PCBs and empties into the Kalamazoo River between the Morrow Pond Dam and Allegan Dam, which is also contaminated with PCBs. A waterbody-wide advisory (“All Other Species”) is applied to this segment of Portage Creek.



Largemouth Bass

Ruppert Lake

Kalamazoo County

Hg Analysis:

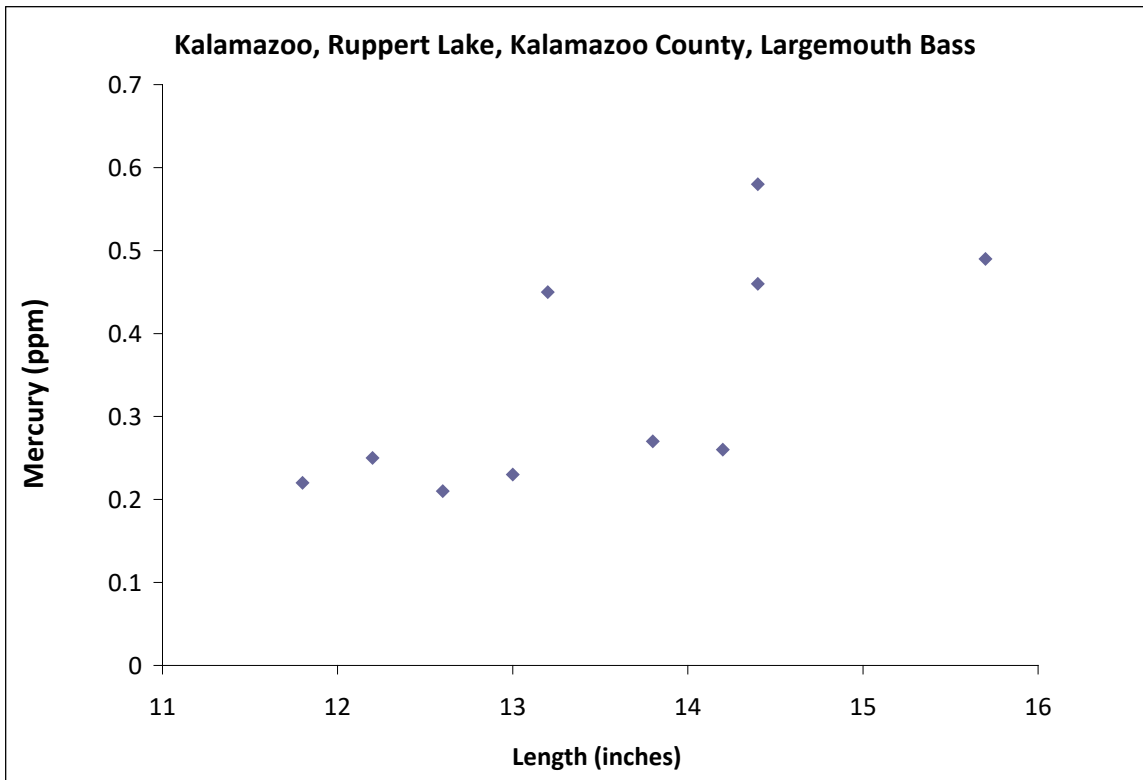
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	10	11.8	14	13.8	15.7
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.41	0.26	0.58	0.59	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.497	0.526				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	na	--	--	--	--
DDT	0	na	--	--	--	--
Chlordane	0	na	--	--	--	--
Toxaphene	0	na	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Ruppert Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Ruppert Lake largemouth or smallmouth bass less than 18 inches, or 6 meals per year greater than 18 inches due to mercury.



Brown Trout

Spring Brook

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	10	8.1	8	8.1	10.5
Datasets available: 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.04	0.04	0.05	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	10	8.1	8	8.1	10.5
Datasets available: 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	0.03	0.02	0.03	--	--
DDT	2*	0.01	0.004	0.02	--	--
Chlordane	2*	0.004	0.003	0.005	--	--
Toxaphene	2*	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

* - 10 fish were analyzed as 2 composite samples

Existing Advisory: Spring Brook brown trout are not covered by an advisory.

Recommendation: Dataset is insufficient to determine a guideline.

Bluegill

West Lake

Kalamazoo County

Hg Analysis:

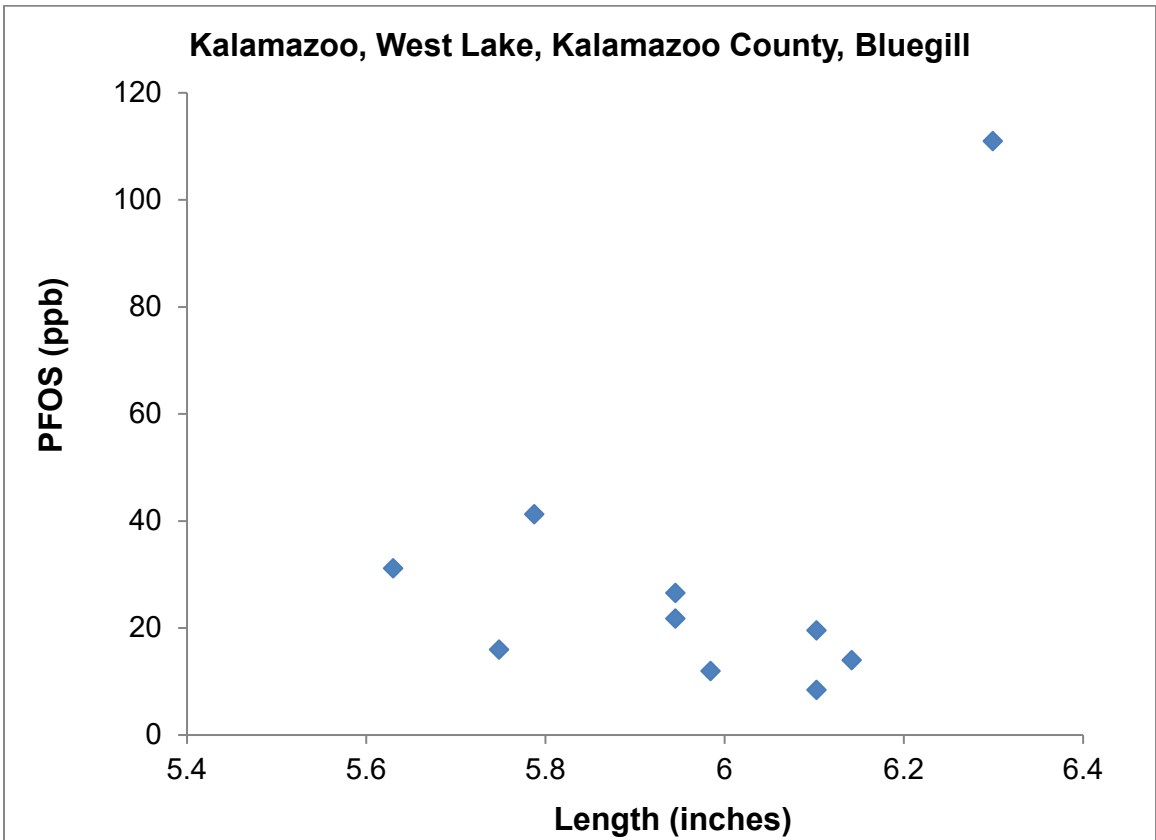
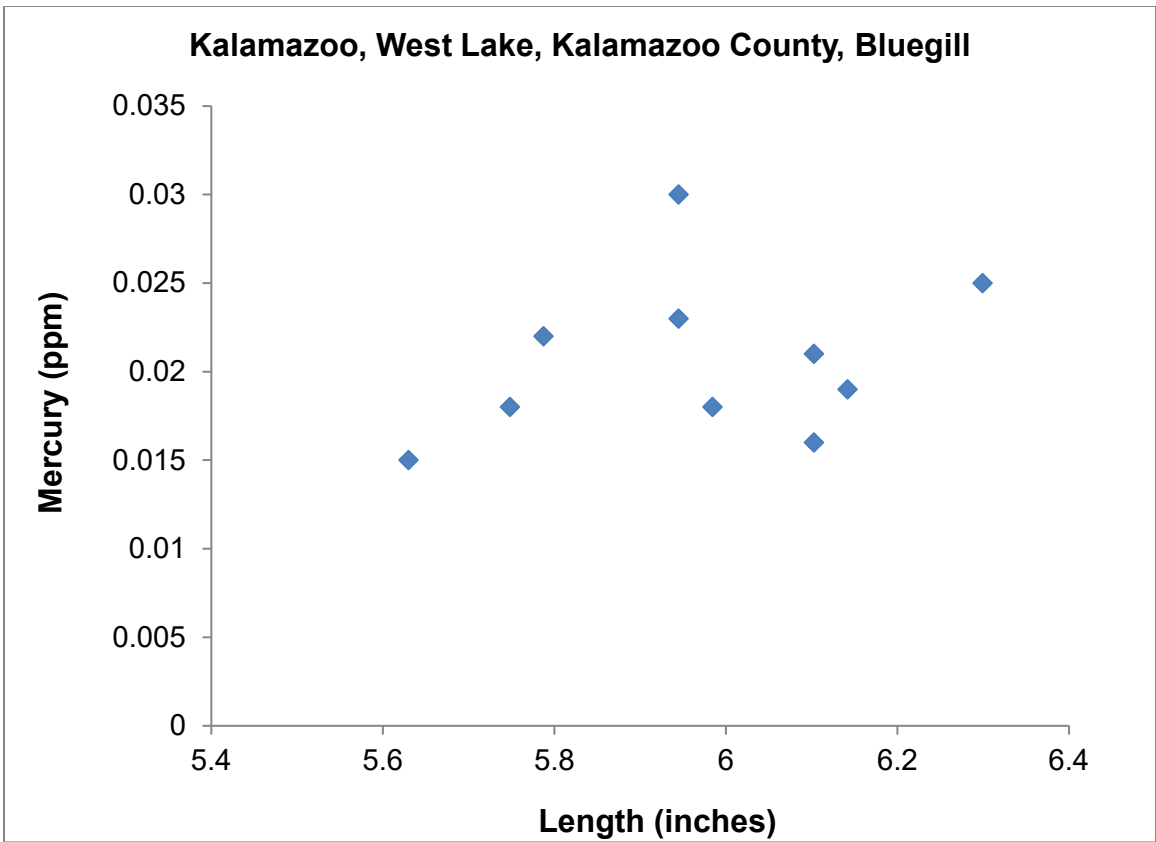
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	5.6	NA	5.6	6.3
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.021	0.015	0.030	0.024	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.092	0.114				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	5.6	NA	5.6	6.3
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	30.2 ppb	8.5 ppb	111 ppb	51.7 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.137	0.011				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Bluegill and sunfish from West Lake in Kalamazoo County are currently covered under the statewide advice for mercury. No one should eat more than 8 meals per month of these species.

Recommendation: No one should eat more than 2 meals per month of bluegill or sunfish from West Lake in Kalamazoo County due to PFOS.



Largemouth Bass

West Lake

Kalamazoo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	6	12.8	14.0	12.8*	15.4
Datasets available: 2020						
Chemical	Sample Size (All*)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.295	0.150	0.440	0.428	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.675	0.620				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	6	12.8	14.0	12.8*	15.4
Datasets available: 2020						
Chemical	Sample Size (All*)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	0.001	<0.001	0.002	0.002	16
DDT	6	0.004	0.003	0.004	0.004	16
Chlordane	6	0.001	<0.001	0.001	0.001	16
Toxaphene	6	ND	--	--	--	--
PFOS	6	16.6 ppb	12.1 ppb	28.5 ppb	22.9 ppb	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.790 [^]	0.790 [^]				
DDT	0.059	0.059				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.110	0.120				
Final meal category based on UCL:						2

* Only 3 of the 6 fish collected were of legal size. Therefore, all fish were used in this assessment.

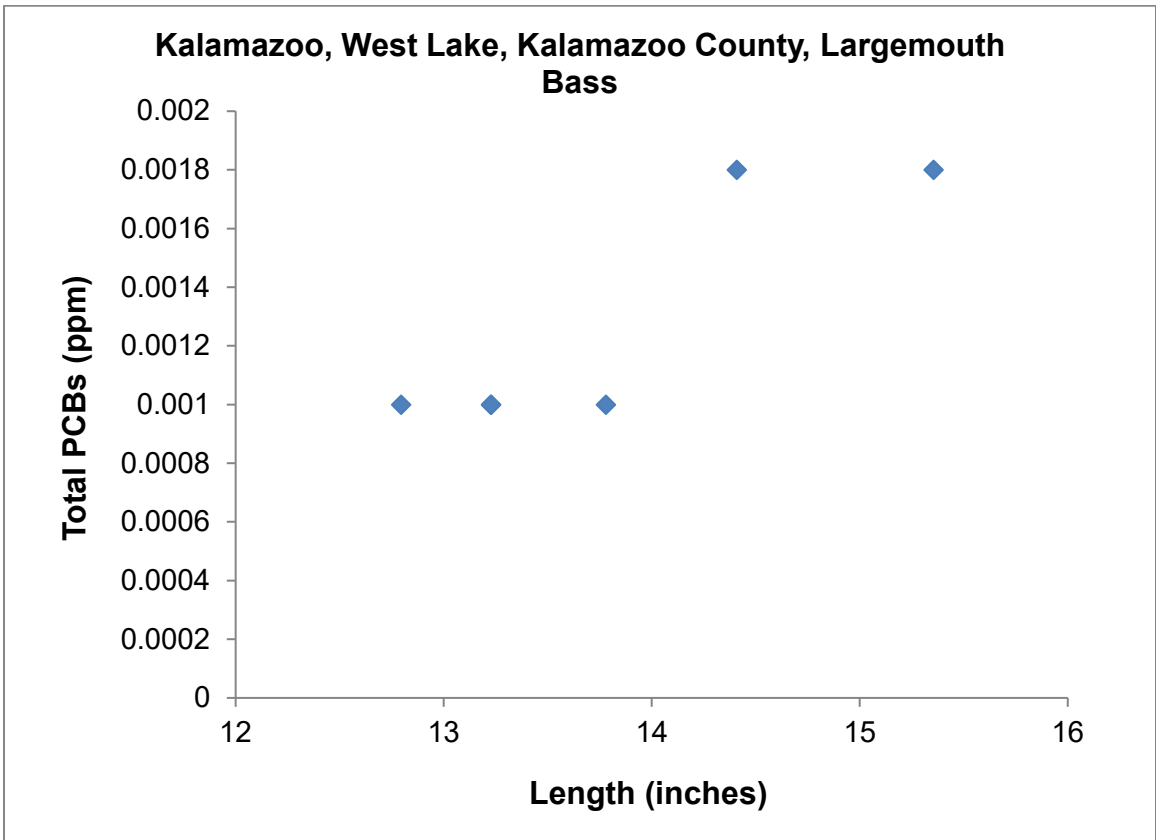
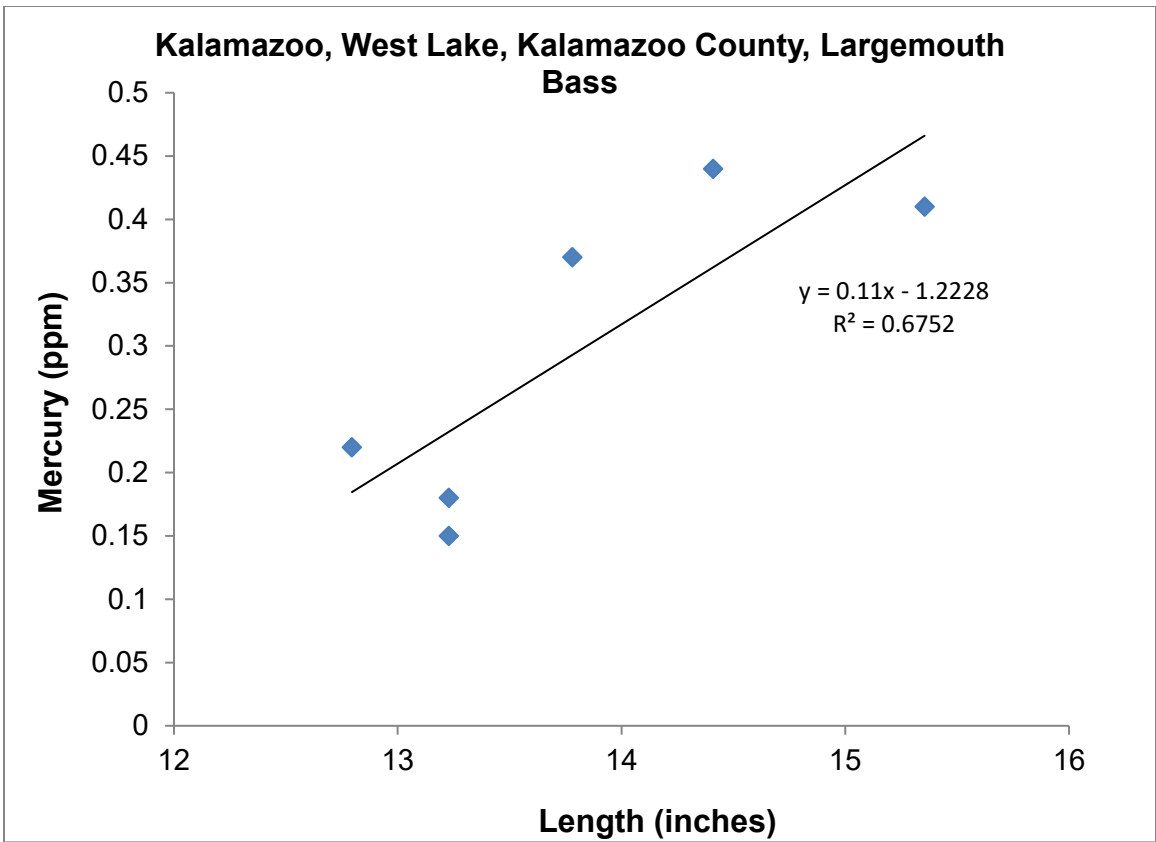
[^] While PCBs had a significant correlation with fish size, four of the six fish had non-detectable (<0.001 ppm) concentrations. Therefore, no regression was used in this assessment for PCBs.

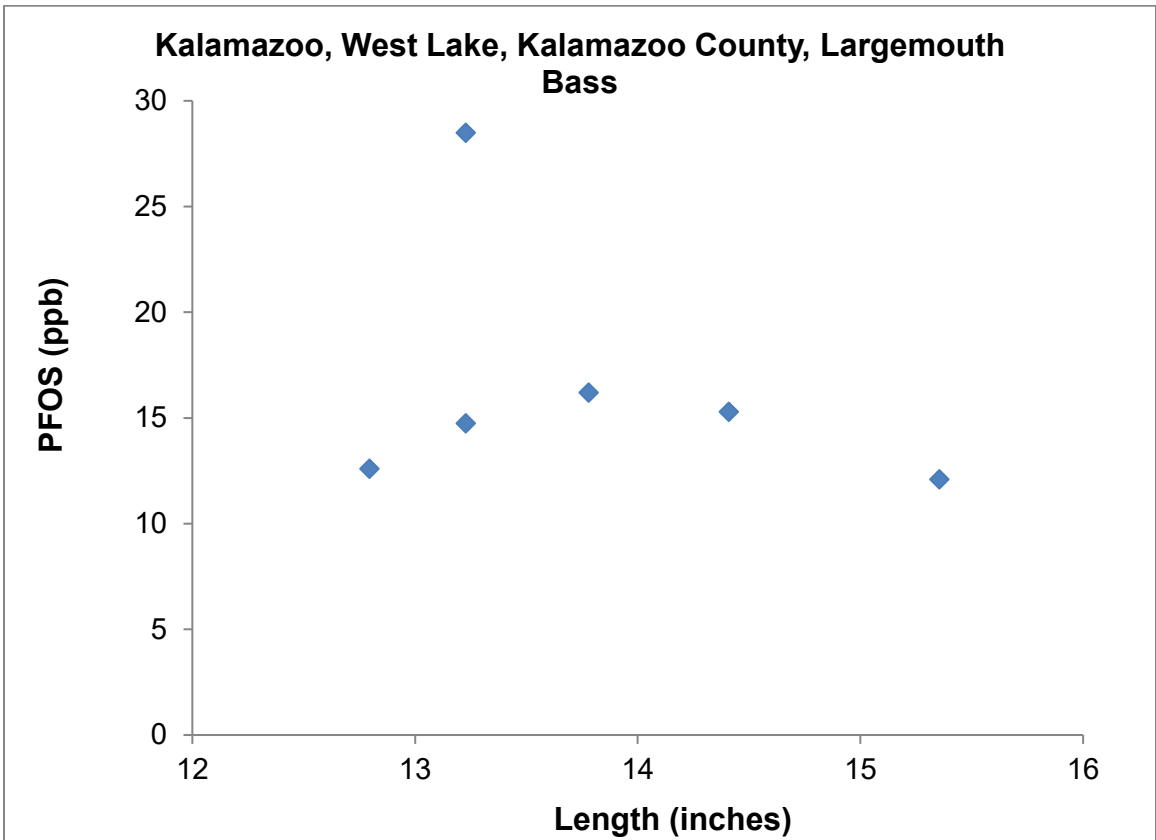
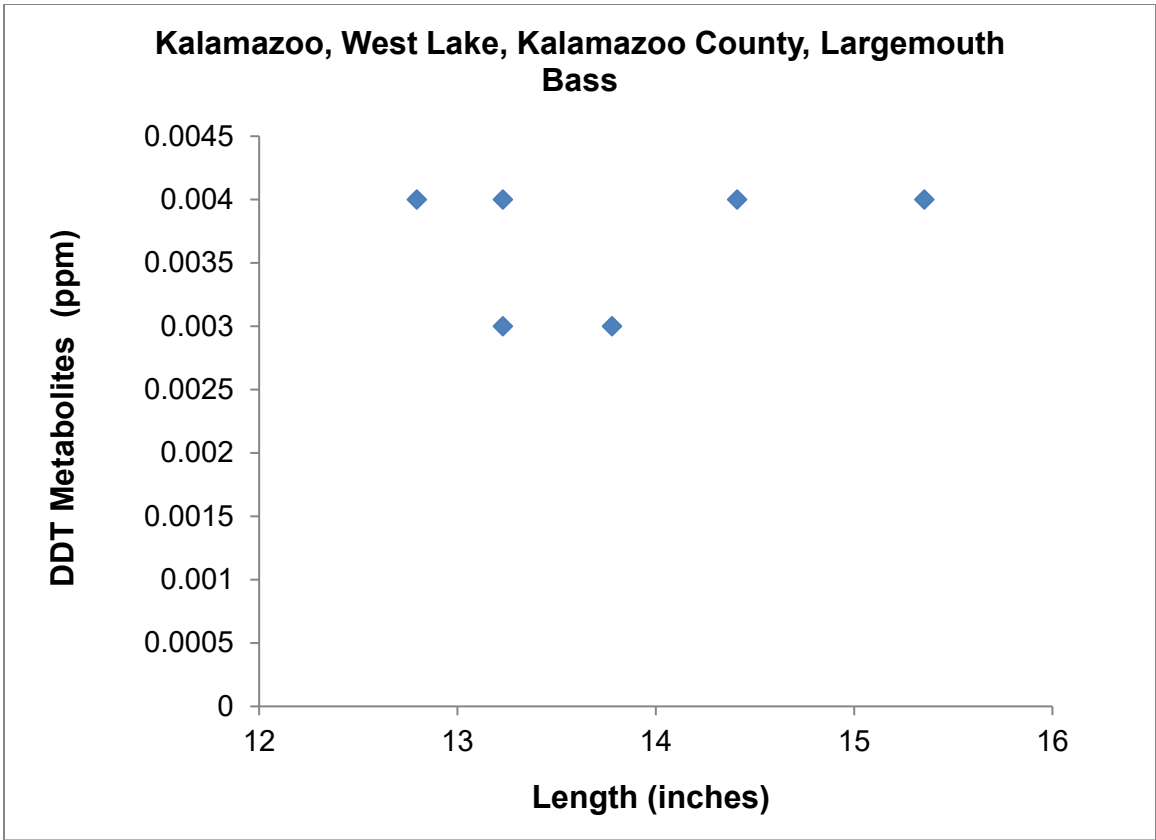
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
12	0.097	8
14	0.317	2
16	0.537	1
18	0.757	1
20	0.977	1
<i>Shaded area denotes extrapolated estimates</i>		

Existing MDHHS Advisory: Largemouth and smallmouth bass from West Lake in Kalamazoo County are currently covered under the statewide mercury advisory. No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches or no more than 1 meal per month of these species larger than 18 inches.

Recommendation: No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches from West Lake in Kalamazoo County or no more than 1 meal per month of these species larger than 18 inches from this water body due to mercury. Statewide length break applied as the size range of the dataset was limited. PFOS causes a less restrictive guideline.

Note: The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.





Kalamazoo River
(Including Pine and Portage Creeks)
Allegan, Calhoun, and Kalamazoo Counties

Bluegill

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

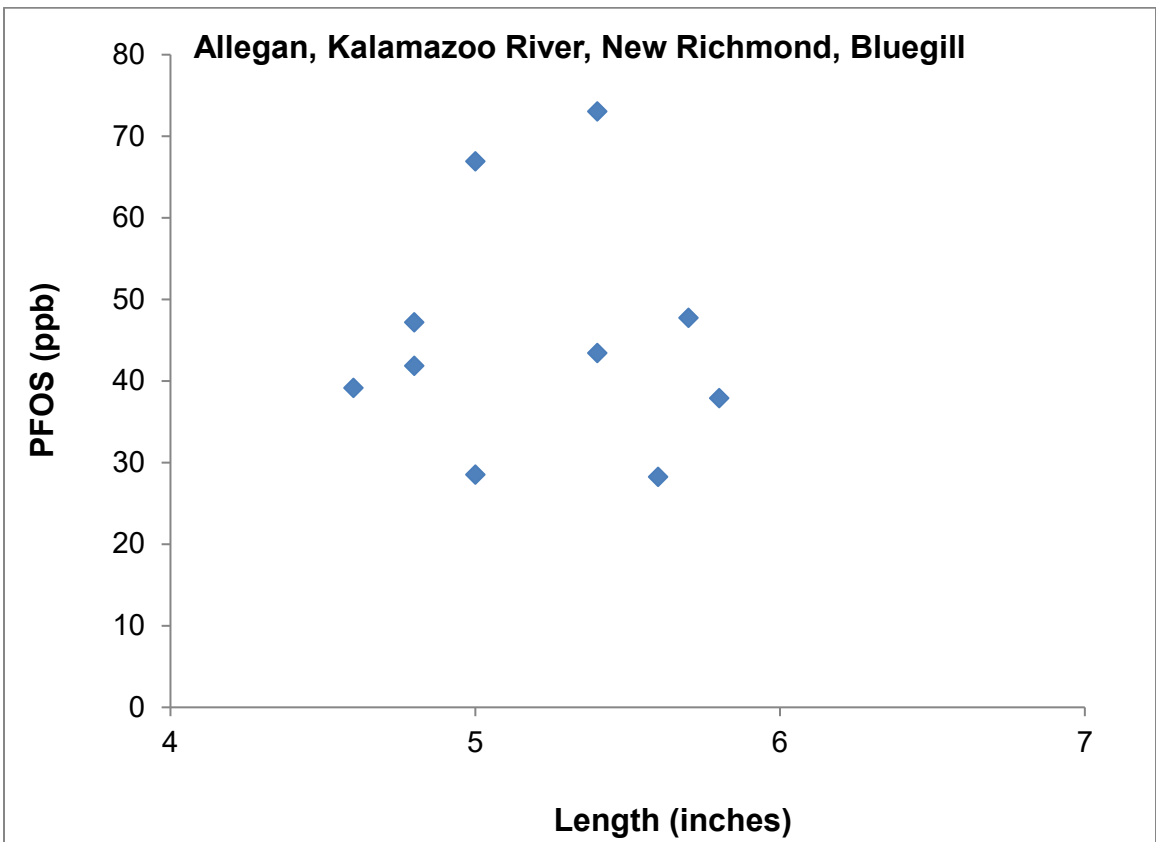
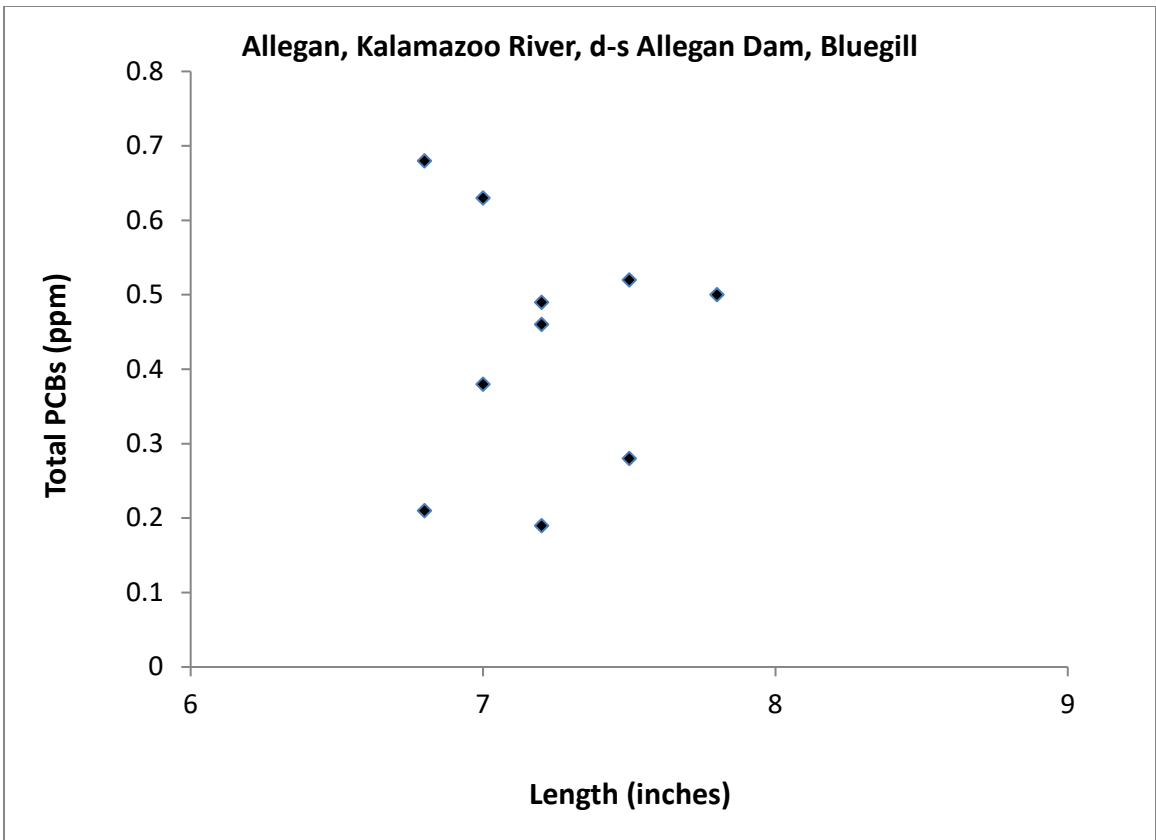
Range of Years Used*		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	2013	10	6.8	na	6.8	7.8
Datasets available: 1987, 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.43	0.19	0.68	0.55	Limited
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	45 ppb	28 ppb	73 ppb	56 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.001	0.003				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.001	0.003	Final meal category based on UCL:		Limited*	

* - PCB analyzed in 1987; PFOS analyzed in 2013

Existing Advisory: Sensitive populations should not eat these fish. Healthy adults should limit consumption of bluegill and other sunfish from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs.

Recommendation: No change is recommended. PFOS would cause an advisory.

* Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



Brown Trout

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	15	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

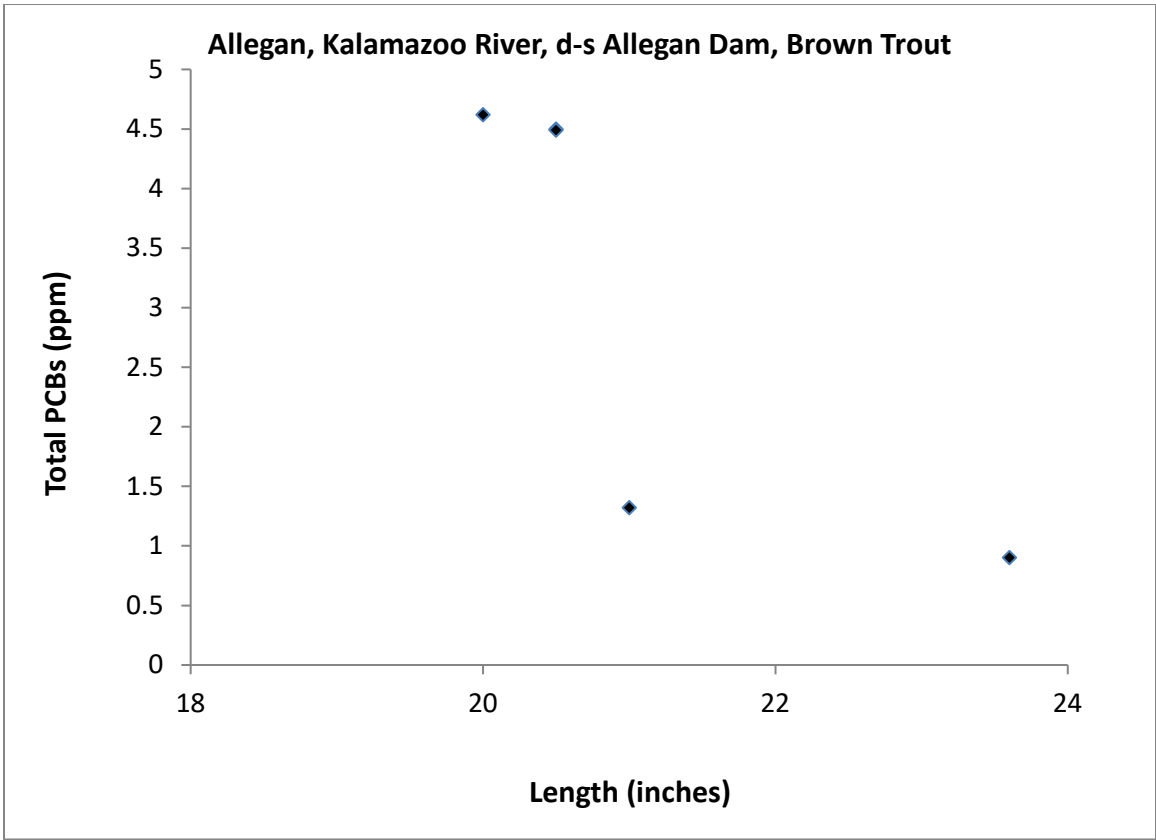
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1999	5	20.0	15	20.0	23.6
Datasets available: 1987, 1999						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	3.17	0.90	4.62	5.50	0
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.648†	0.728†				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						0*

† - regressions have negative slope

Existing Advisory: Women and children should not eat more than 1 meal per month of brown trout from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: No one should eat these fish due to PCBs. * The quality of this dataset is limited due to the age of the data and sample size. However, this reach of river is downstream of a severely contaminated area with ongoing sediment remediation work and new data are necessary to re-evaluate this guideline. Management determination used to set this guideline.



Carp

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2016	10	17.3	na	17.3	27.5
Datasets available: 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.31	0.16	0.48	0.38	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.036	0.028				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2016	54	15.1	na	15.1	31
Datasets available: 1984, '85, '86, '87, '93, '99, '01, '06, '11, '13, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	54	1.1	0.13	4.709	1.341	Limited
DDT	10	0.05	0.006	0.123	0.084	16
Chlordane	10	0.008	0.001	0.020	0.013	--
Toxaphene	10	ND	< 0.05	< 0.05	--	--
TEQ*	10	9 ppt	4 ppt	25 ppt	13.872 ppt	0.5
PFOS [^]	10	28 ppb	14 ppb	50 ppb	38 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.011	0.001				
DDT	0.063	0.069				
Chlordane	0.060	0.090				
Toxaphene	--	--				
TEQ*	0.001	0.004				
PFOS [^]	0.425	0.433				
Final meal category based on UCL:						Limited[†]

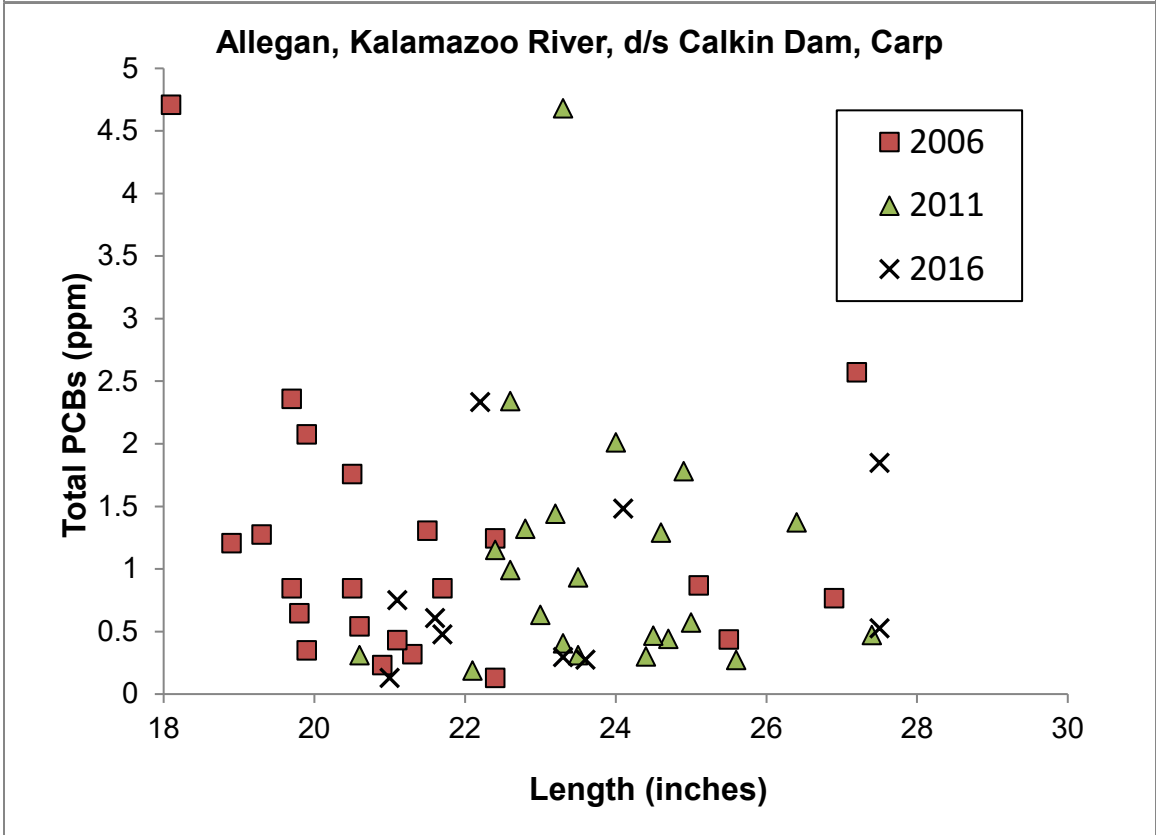
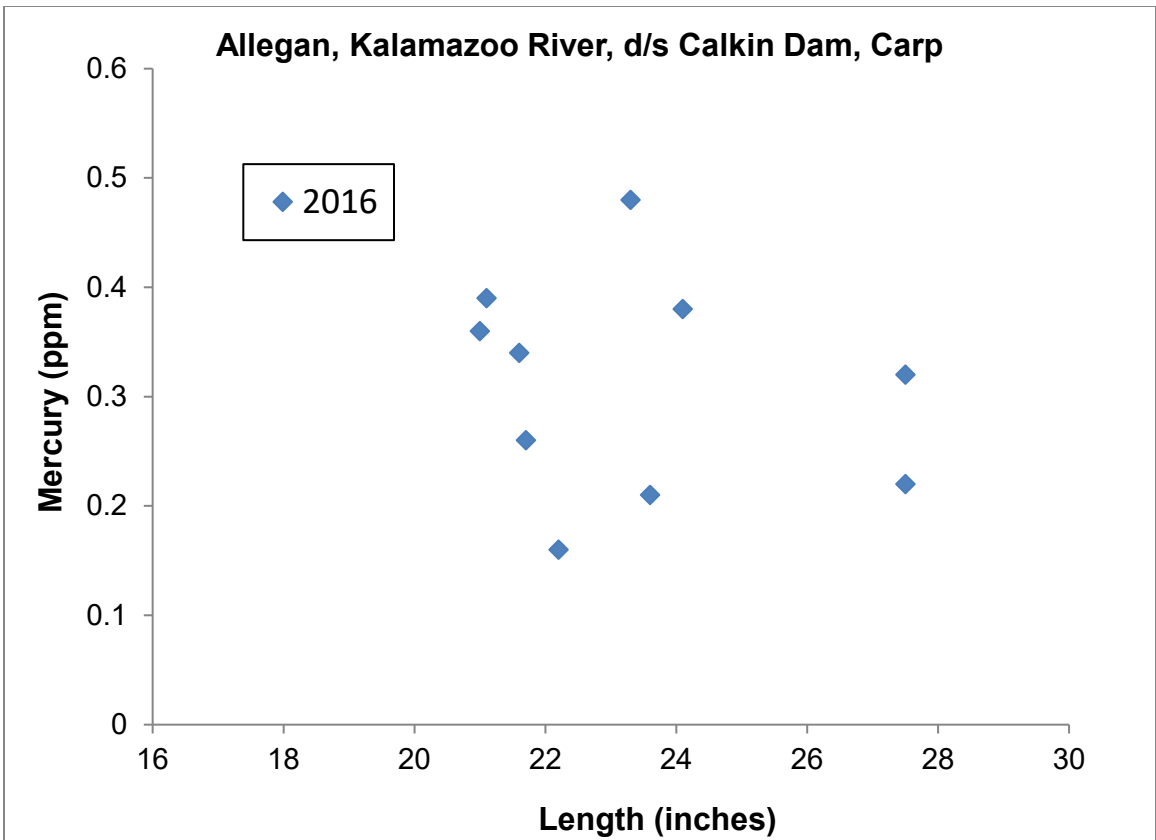
* - WHO 2005 TEFs; dl-PCBs included

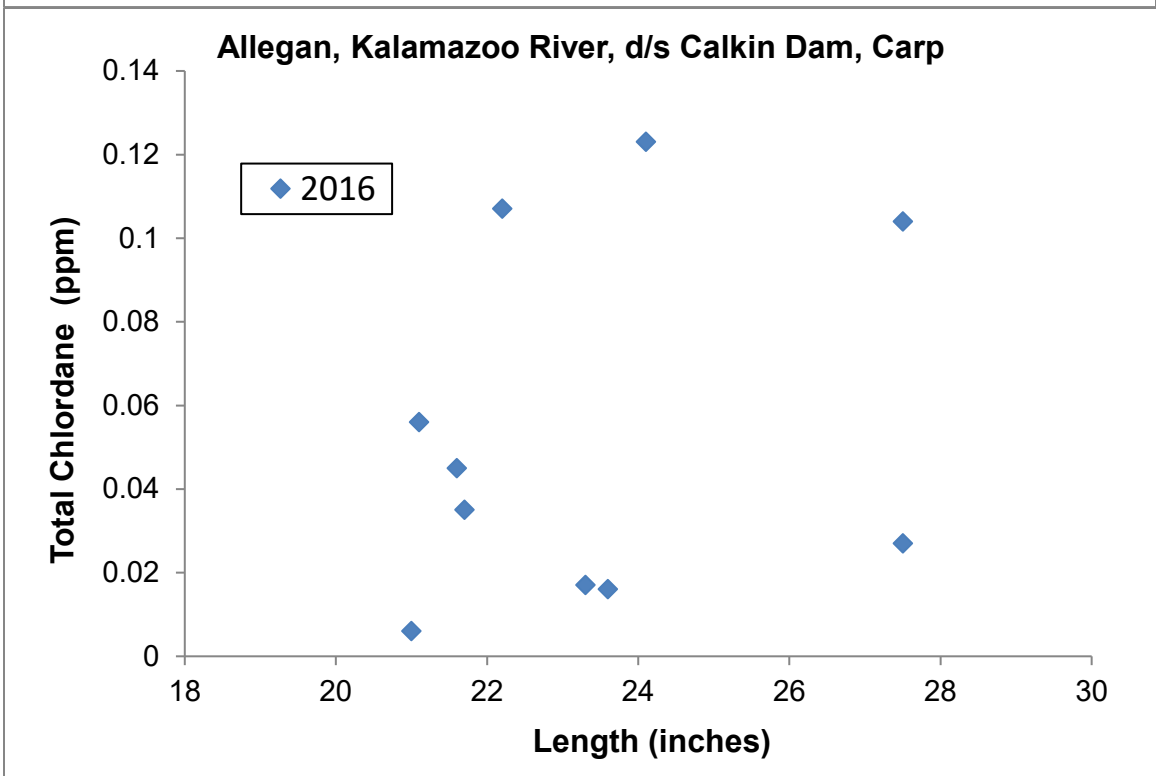
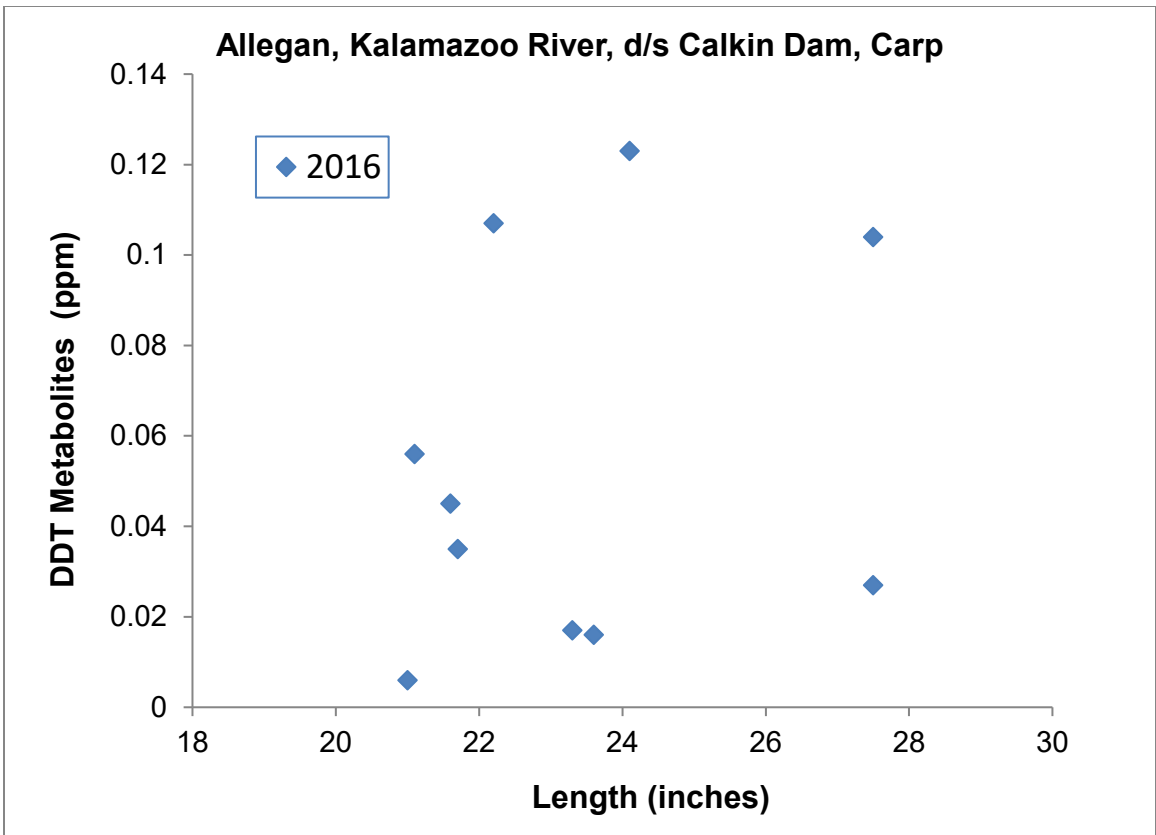
[^] - PFOS analyzed in 2013; no other analysis

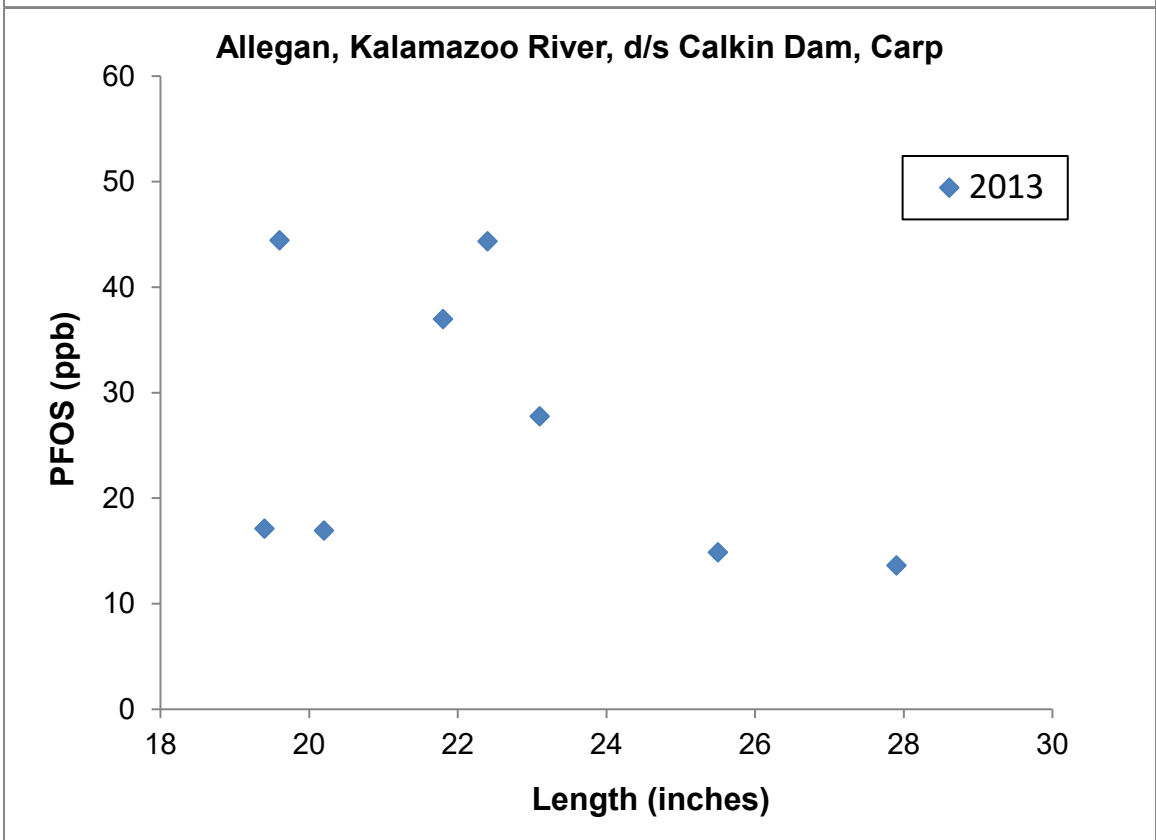
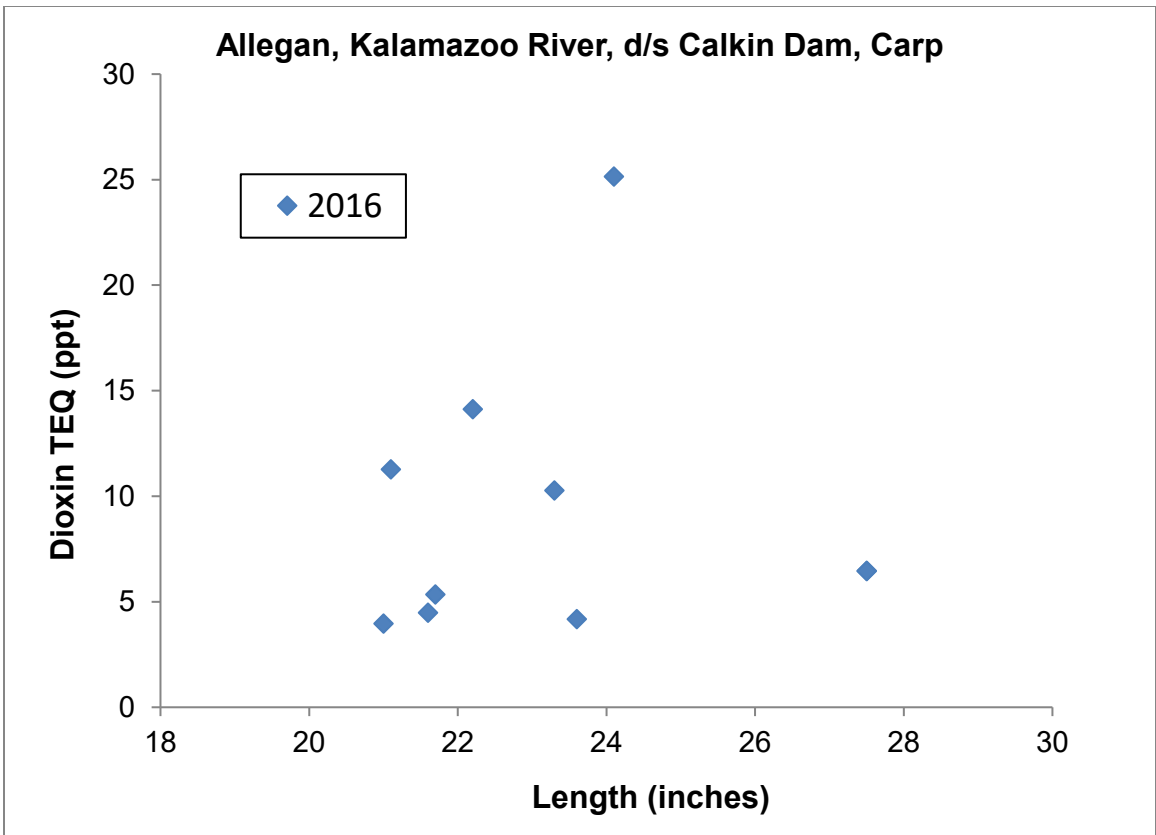
Existing MDHHS Advisory: No one should eat carp from Kalamazoo River downstream of the Allegan Dam due to PCBs and dioxins.

Recommendation: No change in the advisory is recommended. Management determination used to set this guideline. Mercury and PFOS would cause advisories.

†Remediation efforts are ongoing and PCBs source material remains in the area.







Black Crappie

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

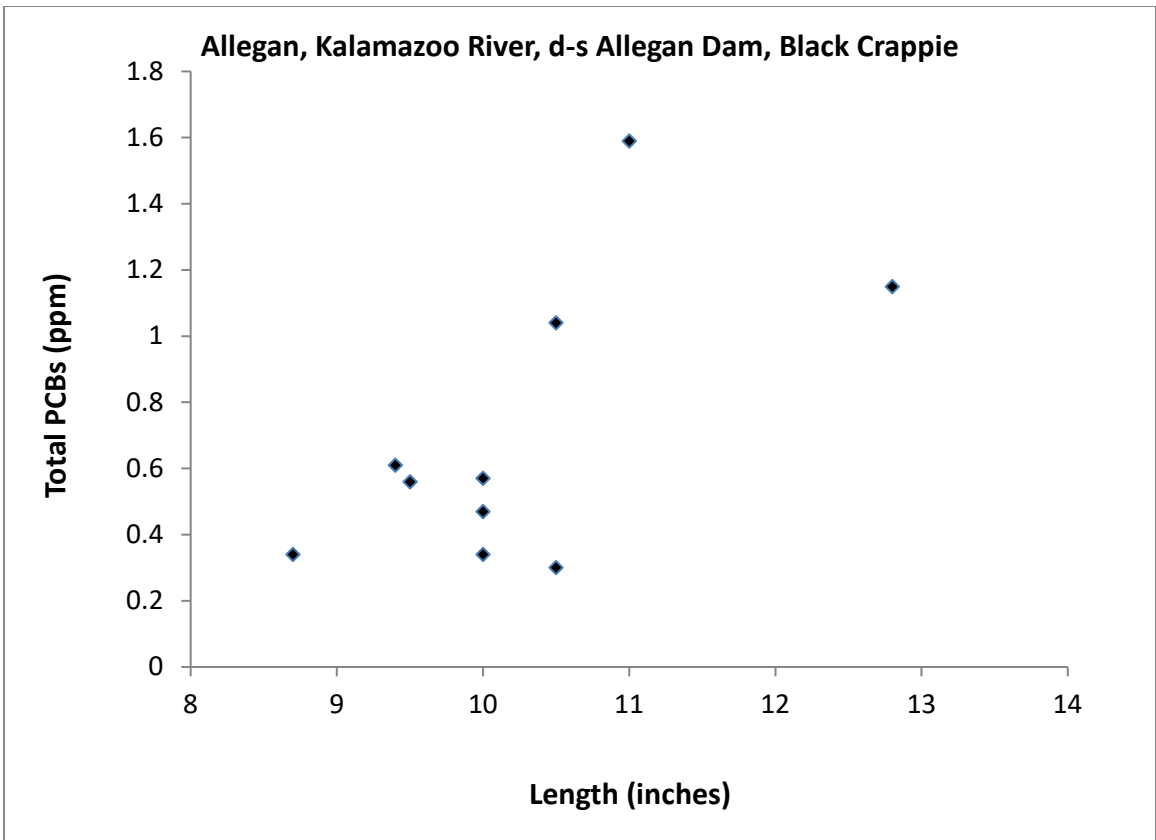
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	8.7	na	8.7	12.8
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.70	0.30	1.59	1.00	Limited
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.411	0.383				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of crappie from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of crappie (black or white) from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. * Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



**Channel & Flathead
Catfish**

Kalamazoo River

Allegan County

Allegan Dam to River Mouth

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2016	10	13.1	12/15*	13.1	19.5	
Datasets available: 2016							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	10	0.18	0.12	0.30	0.22	4	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.347	0.322					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2001	2016	27	13.1	12/15*	13.1	33.5	
Datasets available: 1987, 1999, 2001, 2011, 2016							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	27	1.0	0.11	3.8	1.4	Limited	
DDT	10	0.04	0.02	0.06	0.04	16	
Chlordane	10	0.006	0.002	0.009	0.008	--	
Toxaphene	10	ND	< 0.05	< 0.05	--	--	
TEQ**	10	9 ppt	3 ppt	13 ppt	11 ppt	0.5	
PFOS	10	13 ppb	6 ppb	26 ppb	17 ppb	8	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.357	0.374					
DDT	0.319	0.373					
Chlordane	0.446	0.452					
Toxaphene	--	--					
TEQ**	0.404	0.437					
PFOS	0.030	0.098					
Final meal category based on UCL:							Limited[†]

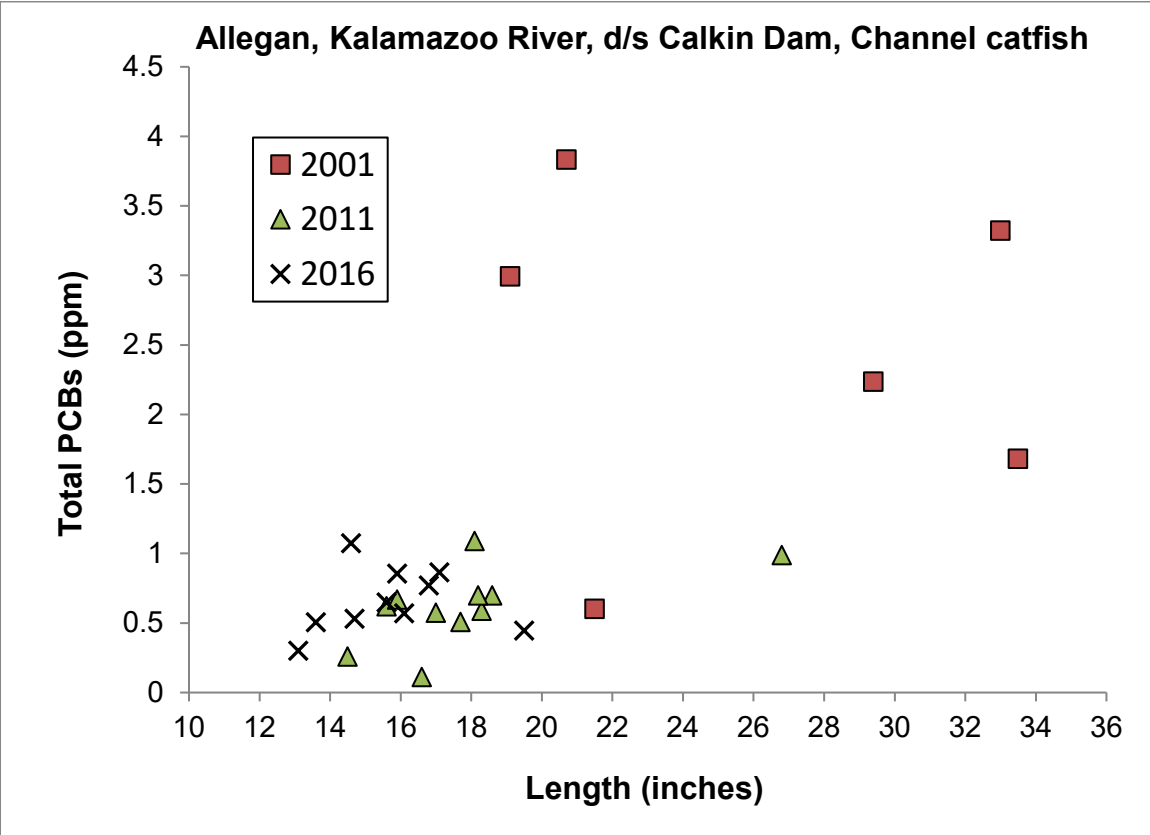
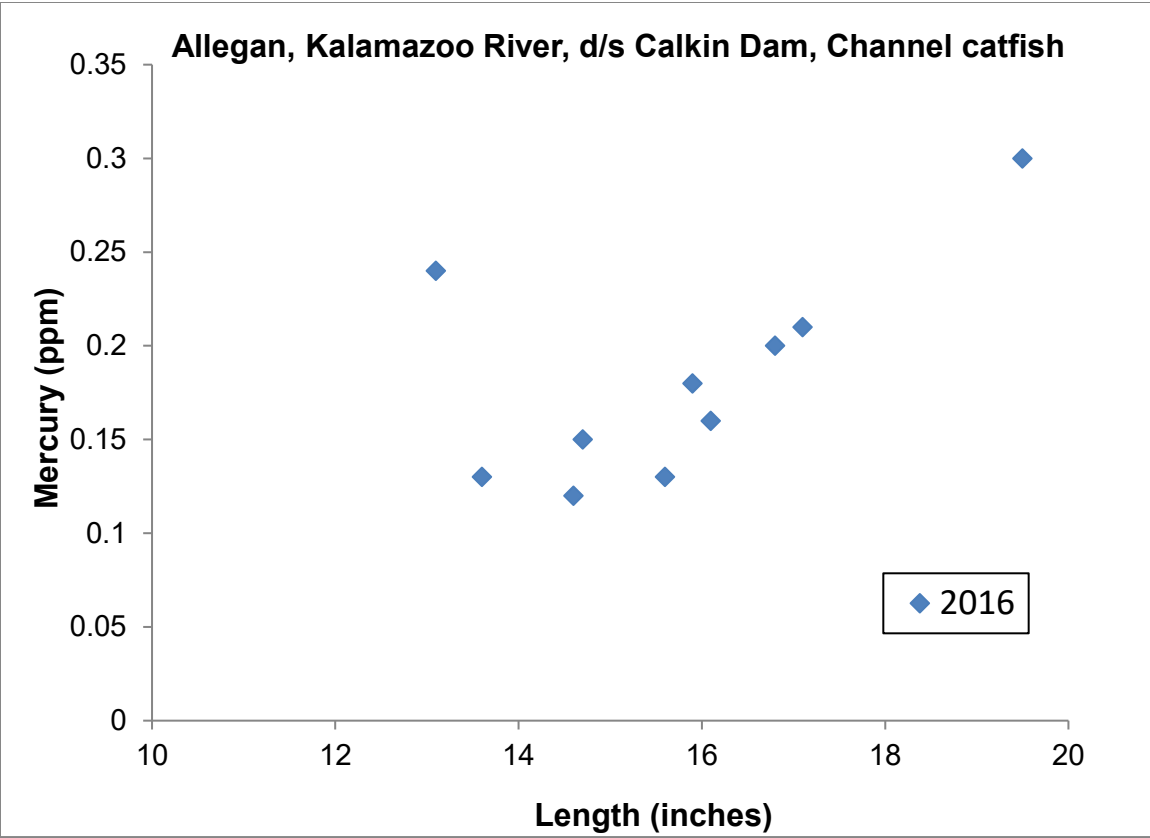
** - WHO 2005 TEFs; dl-PCBs included

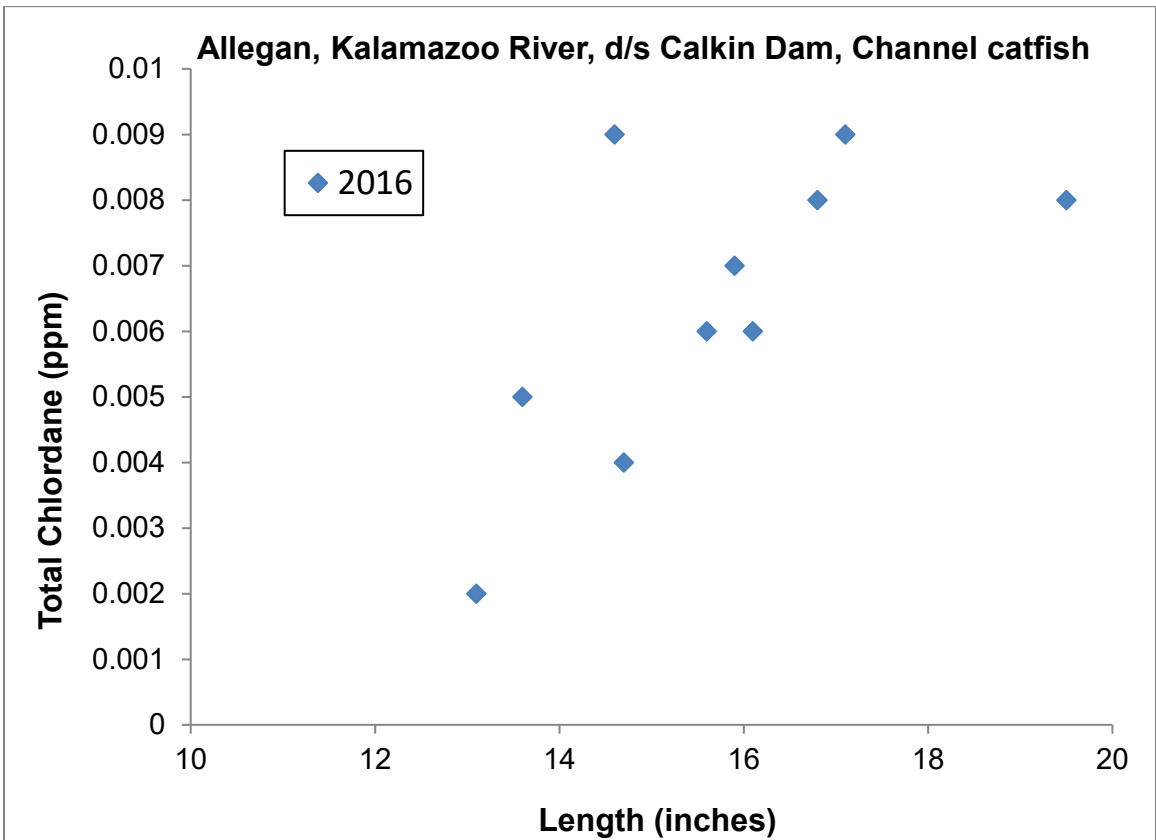
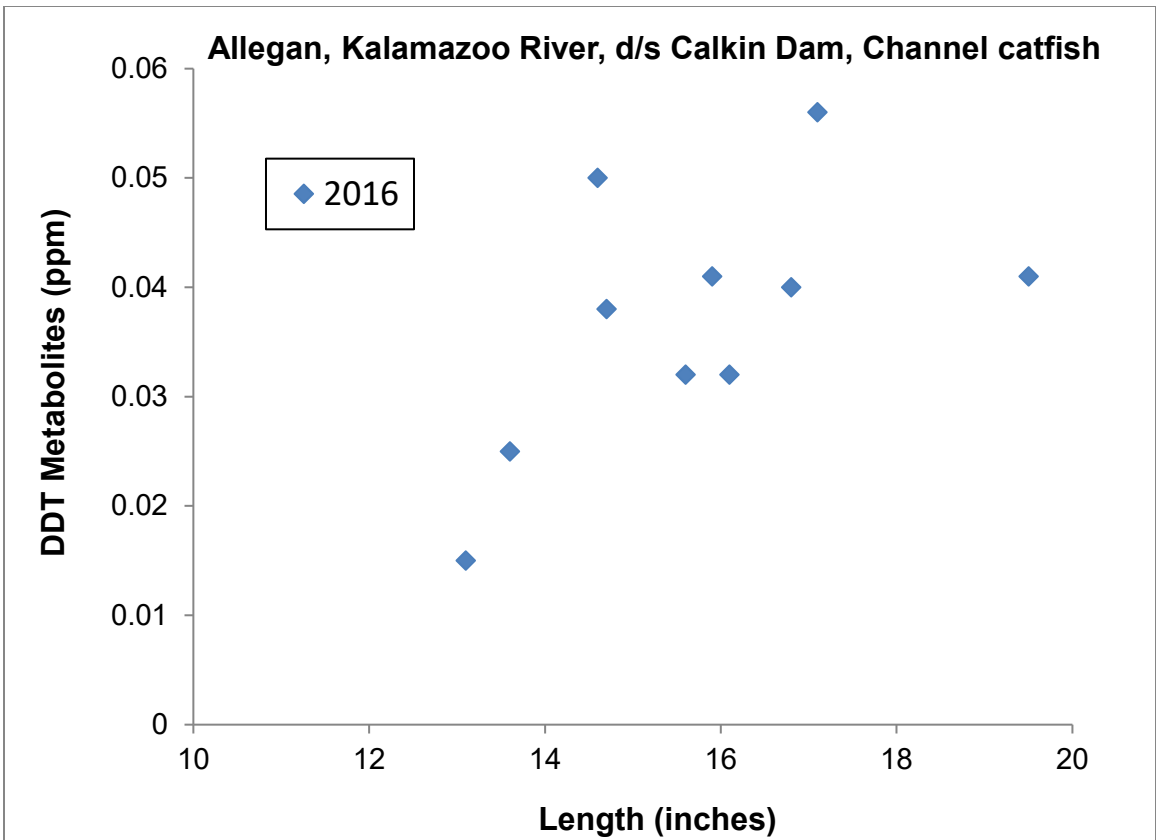
Existing MDHHS Advisory: No one should eat catfish from the Kalamazoo River downstream of the Lake Allegan Dam due to PCBs.

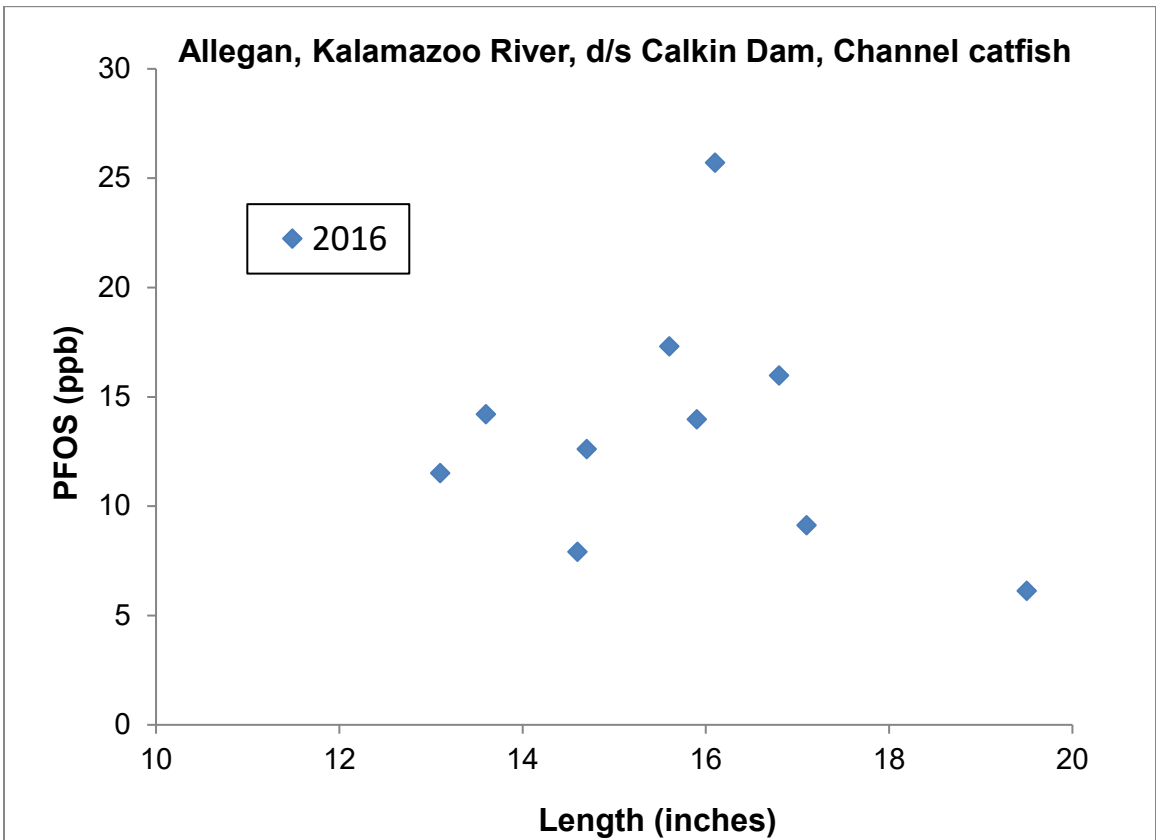
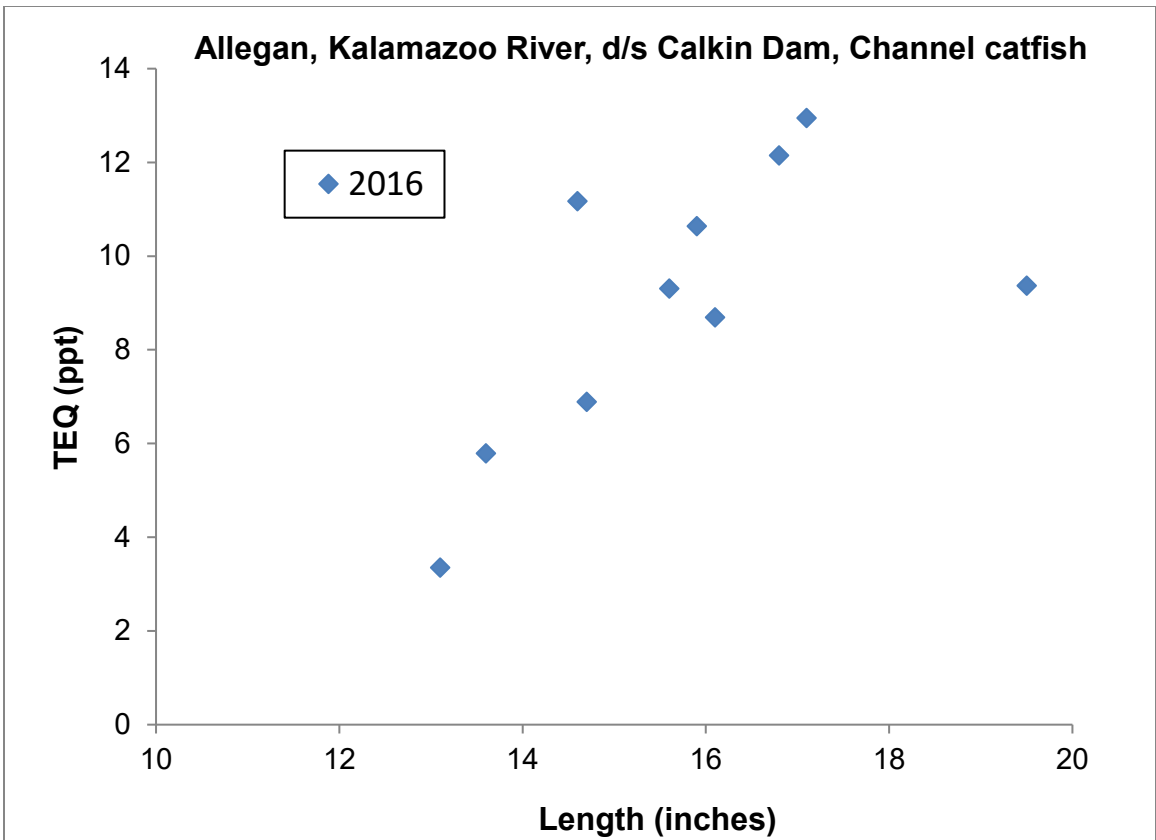
Recommendation: No change to the advisory is recommended. Management determination used to set this guideline. Dioxins, mercury, and PFOS would cause advisories.

[†]Remediation efforts are ongoing and PCBs source material remains in the area.

*- legal minimums: Channel catfish = 12 inches; flathead catfish = 15 inches; all fish analyzed were of legal size







Freshwater Drum

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	2	11.8	na	11.8	17.5
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	1.16	0.54	1.78	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat more than 1 meal per month of freshwater drum from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Dataset is insufficient to set a guideline. No one should freshwater drum from the Kalamazoo River between Allegan Dam and the river mouth due to PCB contamination. Given the PCB contamination in this river, species specific data are necessary to recommend consumption. Management determination used to set this guideline.

**Largemouth and
Smallmouth Bass**
Hg Analysis:

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2006	10	11.4	14	13.9	15.4
Datasets available: 2006						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.26	0.20	0.32	0.31	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.714	0.751				

Organics Analysis:

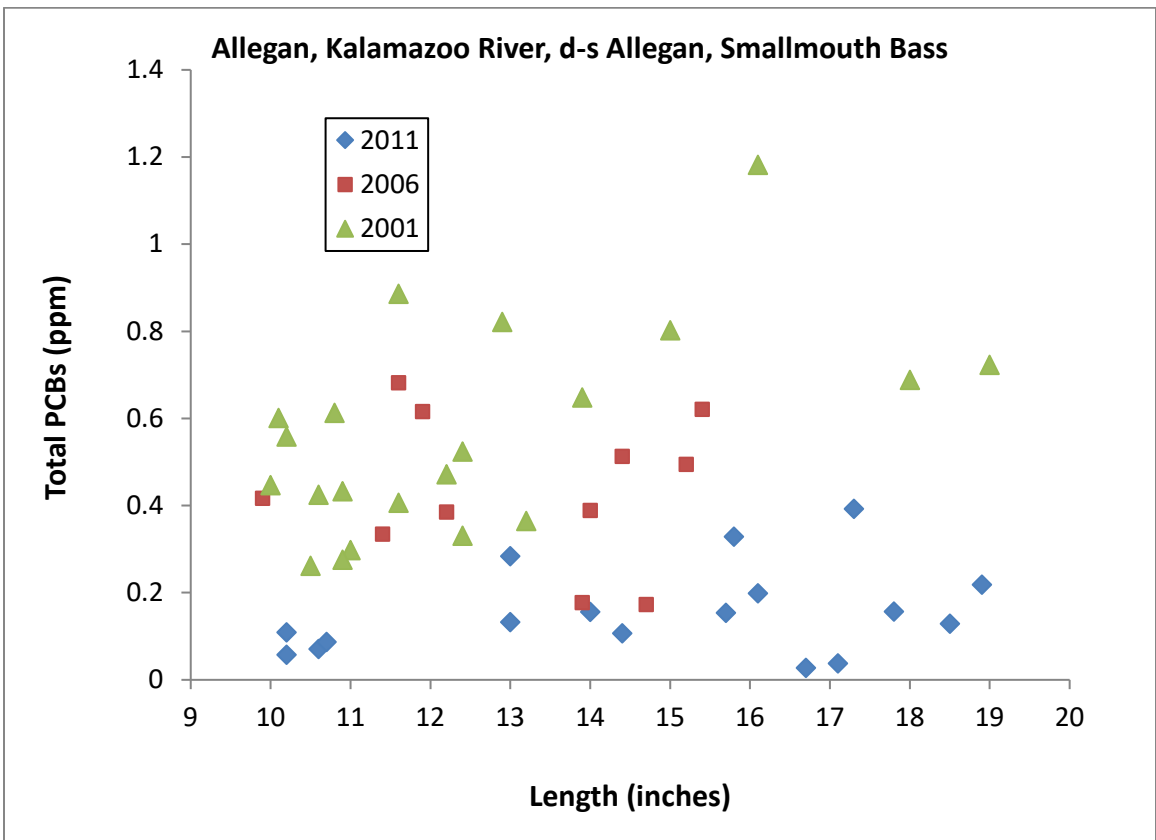
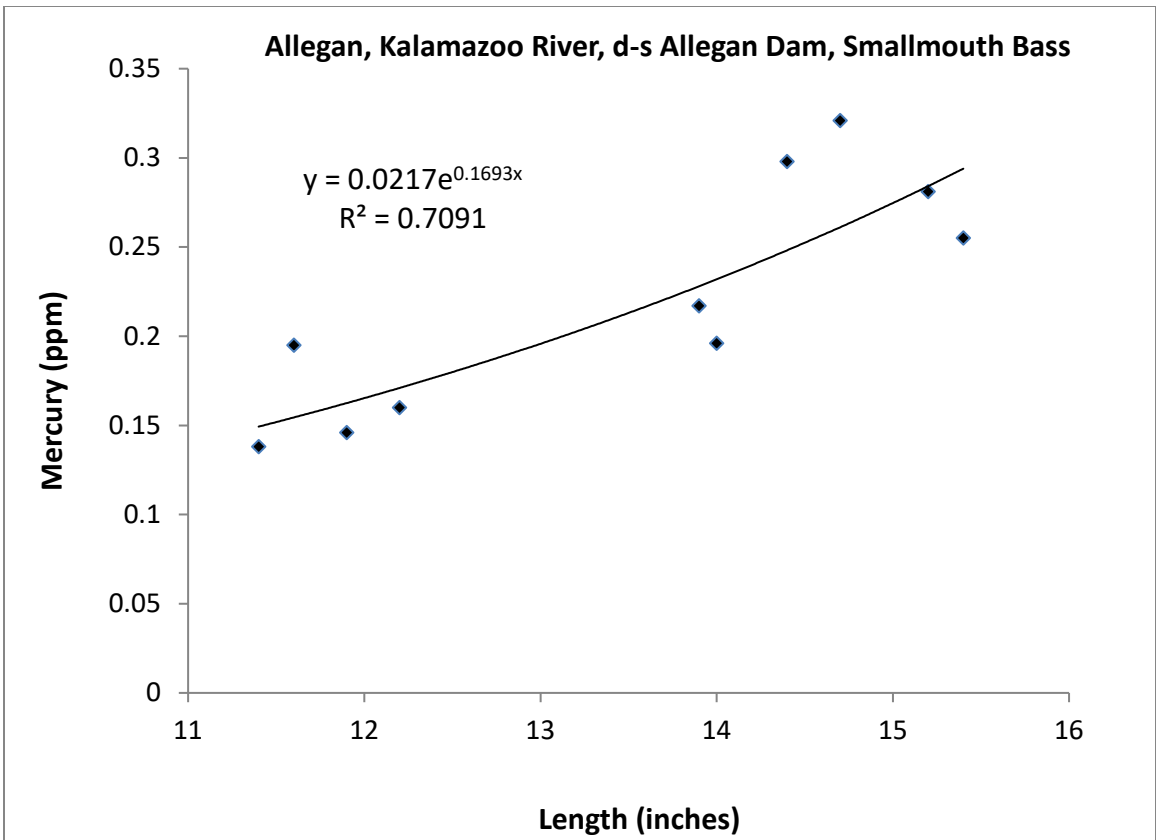
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2011	49	9.9	14	13.9	19
Datasets available: 1985, '86, '87, '99, '01, '06, '11						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	22	0.38	0.03	1.18	0.51	Limited
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS [^]	9	56 ppb	36 ppb	77 ppb	64 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.000	0.011				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.001	0.002	Final meal category based on UCL: Limited			

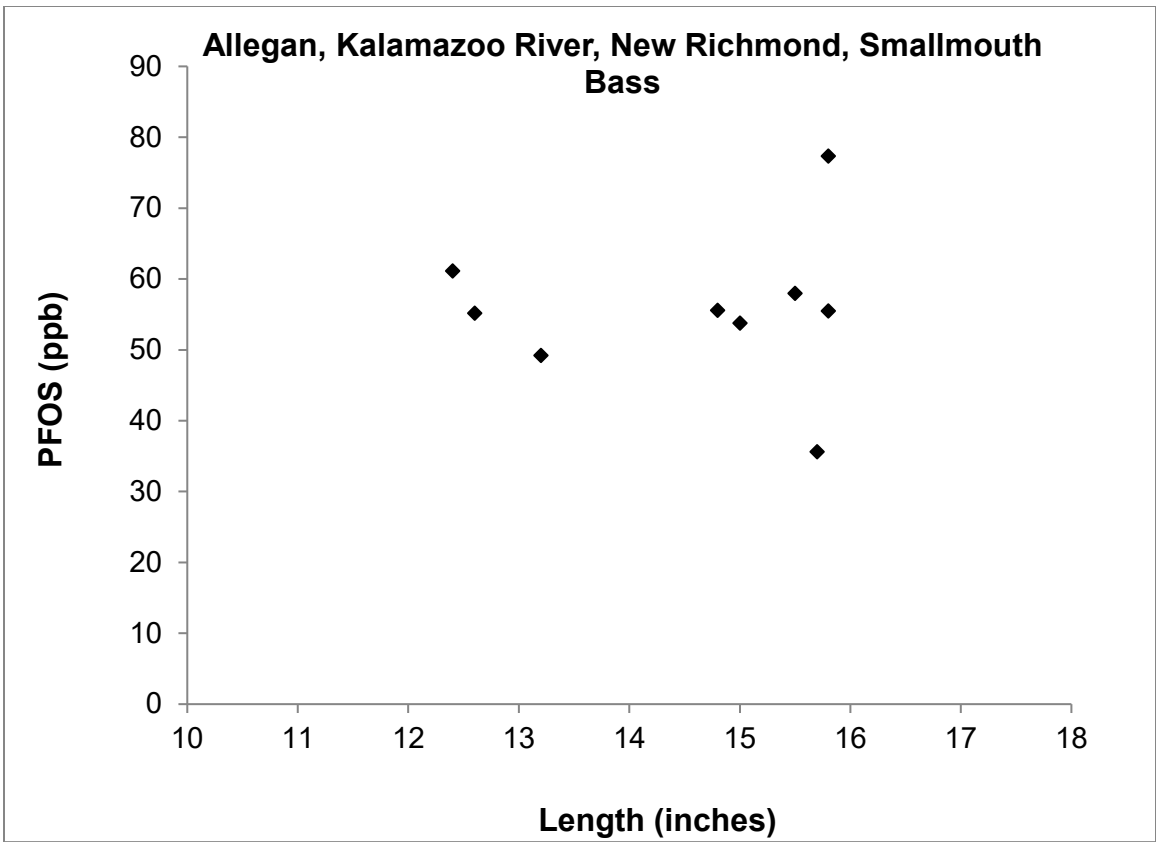
[^] - PFOS analyzed in 2013; no other analysis. 6 of 9 samples were of legal size, all used in evaluation.

Existing Advisory: Sensitive populations should not eat these fish. Healthy adults should limit consumption of largemouth and smallmouth bass from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. Mercury would cause an advisory.

Recommendation: No change is recommended. PFOS would cause an advisory.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
13	0.20	4
14	0.23	4
15	0.275	2
16	0.33	2
17	0.39	2
18	0.46	2
19	0.54	1
<i>Shaded area denotes extrapolated estimates</i>		





Northern Pike

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	24	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	20.5	24	23.5	36
Datasets available: 1987						
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	1.33	0.36	3.36	2.11	Limited
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.605*	0.419				

Final meal category based on UCL: Limited[†]

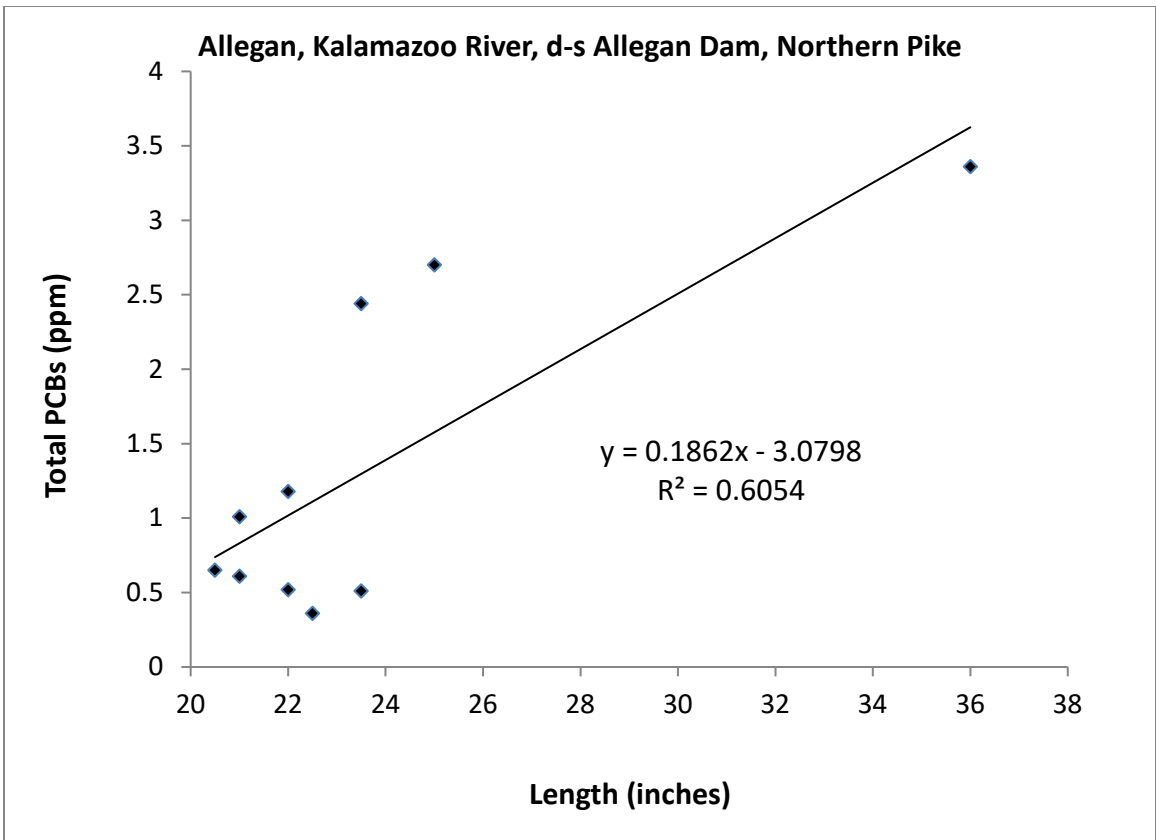
* - regression driven by 1 point

Existing Advisory: No one should eat northern pike from the Kalamazoo River downstream of Allegan Dam due to PCBs.

Recommendation: No one should eat northern pike from the Kalamazoo River between Allegan Dam and the river mouth due to PCB contamination. [†]Given the PCB contamination in this river, recent species specific data are necessary to recommend consumption. Dataset is limited due to the age of the data. Management determination used to set this guideline.

Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
22	1.02	Limited
24	1.39	Limited
26	1.76	Limited
28	2.13	Limited
30	2.51	Limited
32	2.88	0
34	3.25	0
36	3.62	0
38	4	0

Shaded area denotes extrapolated estimates



Rainbow Trout

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

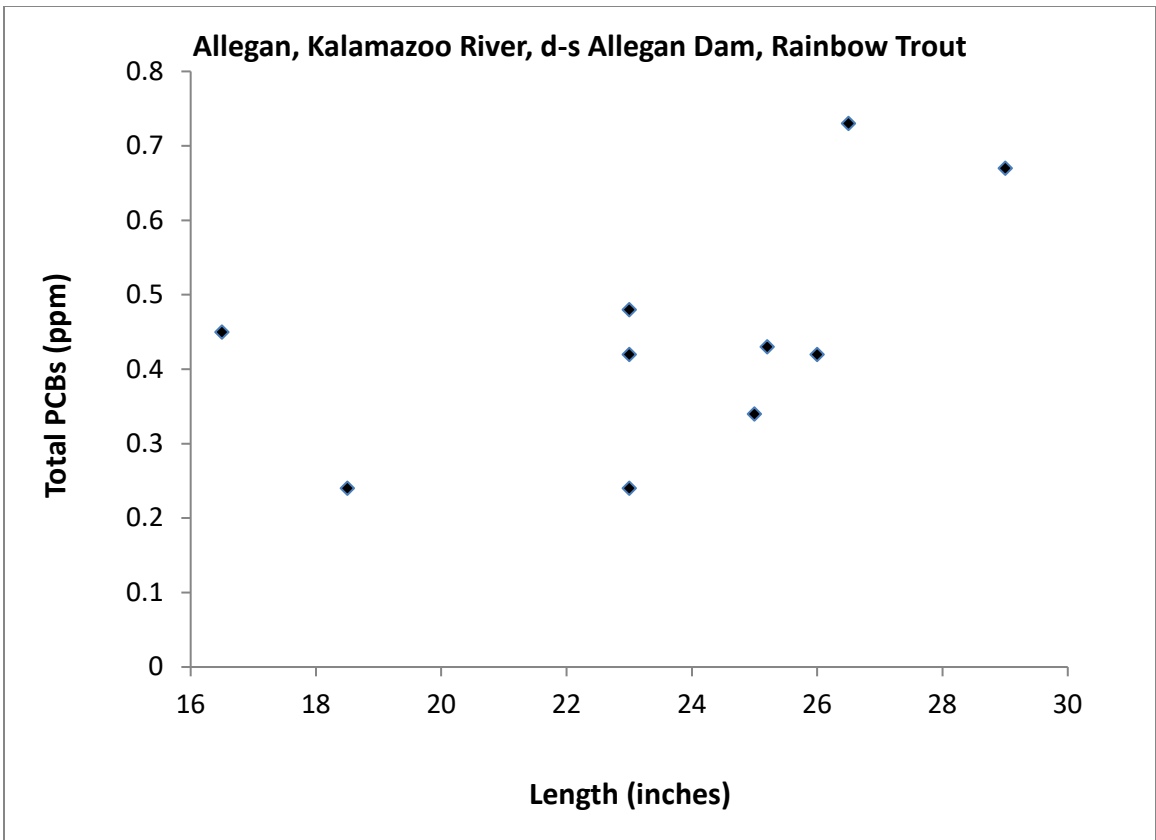
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	10	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	---	--	--	---
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	16.5	10	16.5	29
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.44	0.24	0.73	0.56	Limited
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.300	0.276				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of rainbow trout from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: No one should eat rainbow trout from the Kalamazoo River between Allegan Dam and the river mouth due to PCB contamination. *Given the PCB contamination in this river, recent species specific data are necessary to recommend consumption. Dataset is limited due to the age of the data. Management determination used to set this guideline.



Rock Bass

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

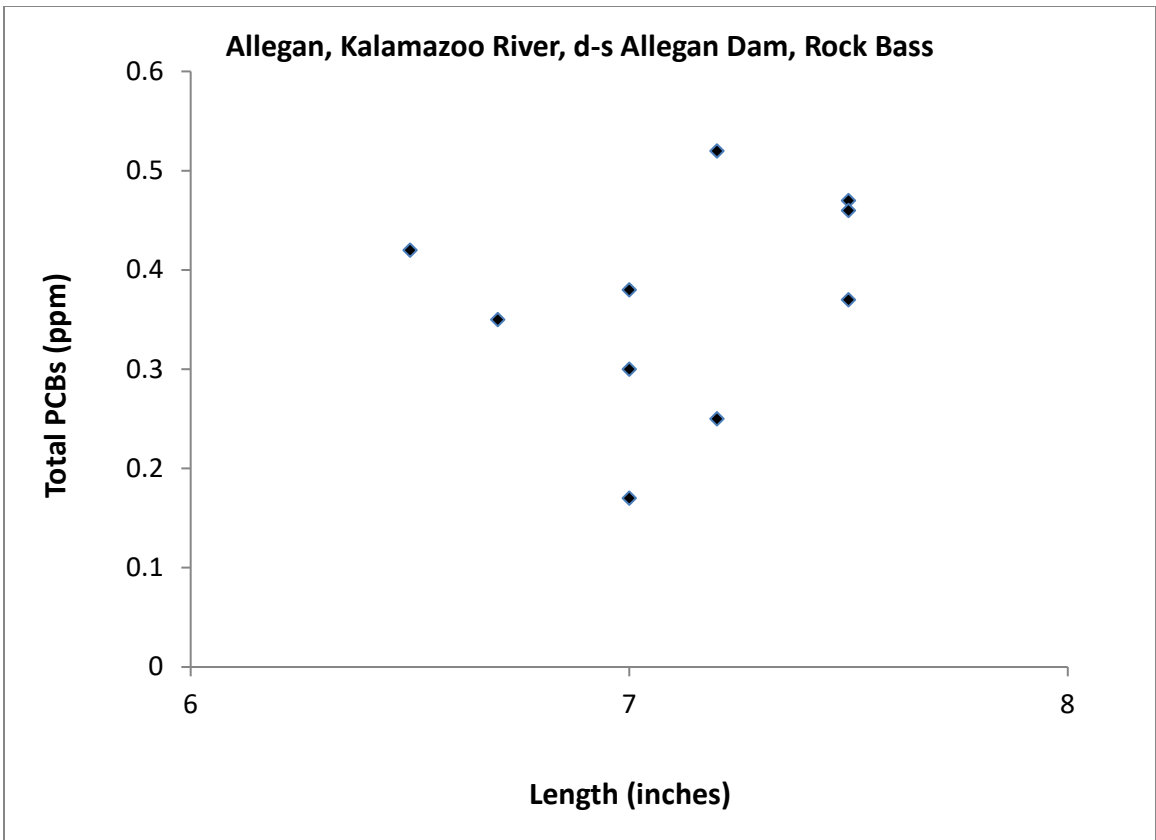
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	---	--	--	---
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	6.5	na	6.5	7.5
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.37	0.17	0.52	0.45	Limited
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.064	0.047				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of rock bass from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of rock bass from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. *Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



Walleye

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

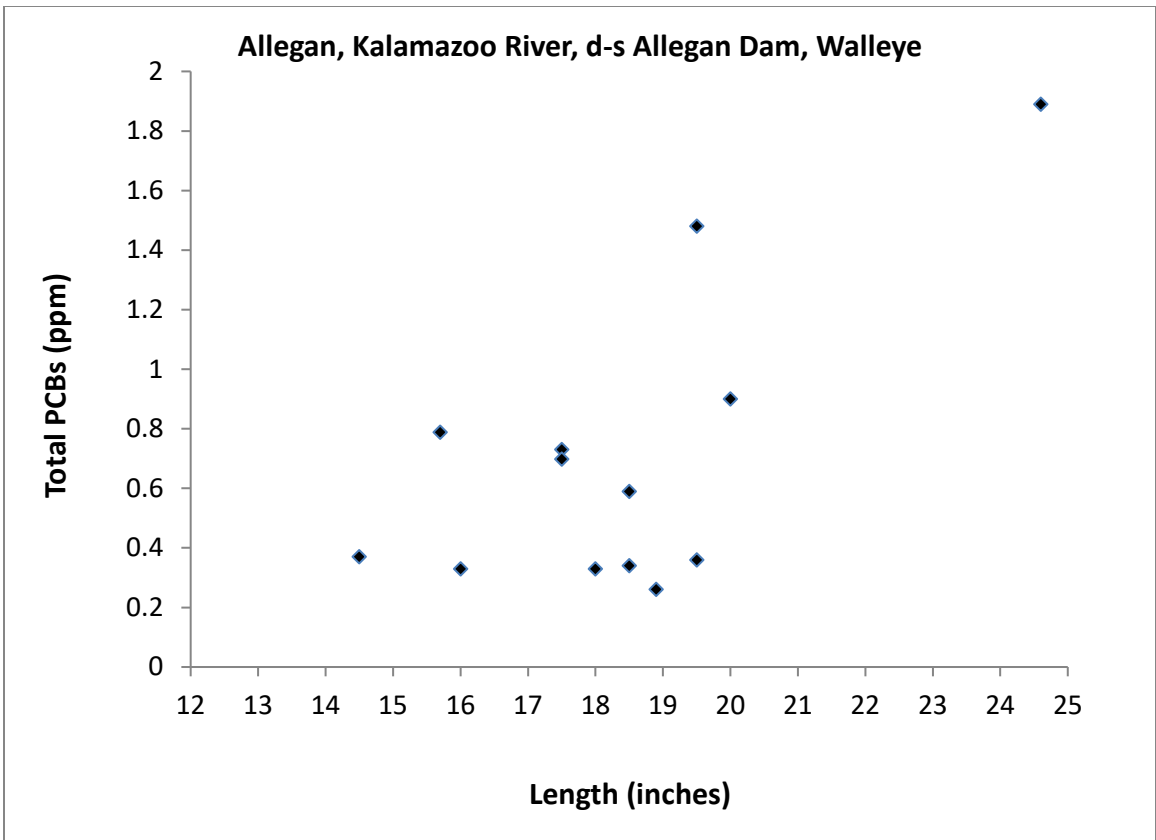
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	15	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	---	--	--	---
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1993	14	13.5	15	14.5	24.6
Datasets available: 1987, 1993						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	13	0.70	0.26	1.89	0.99	Limited
DDT	4	0.053	0.024	0.075	--	--
Chlordane	4	0.024	0.009	0.045	--	--
Toxaphene	4	ND	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.451	0.314				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of walleye from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of walleye from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. *Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



White Sucker

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

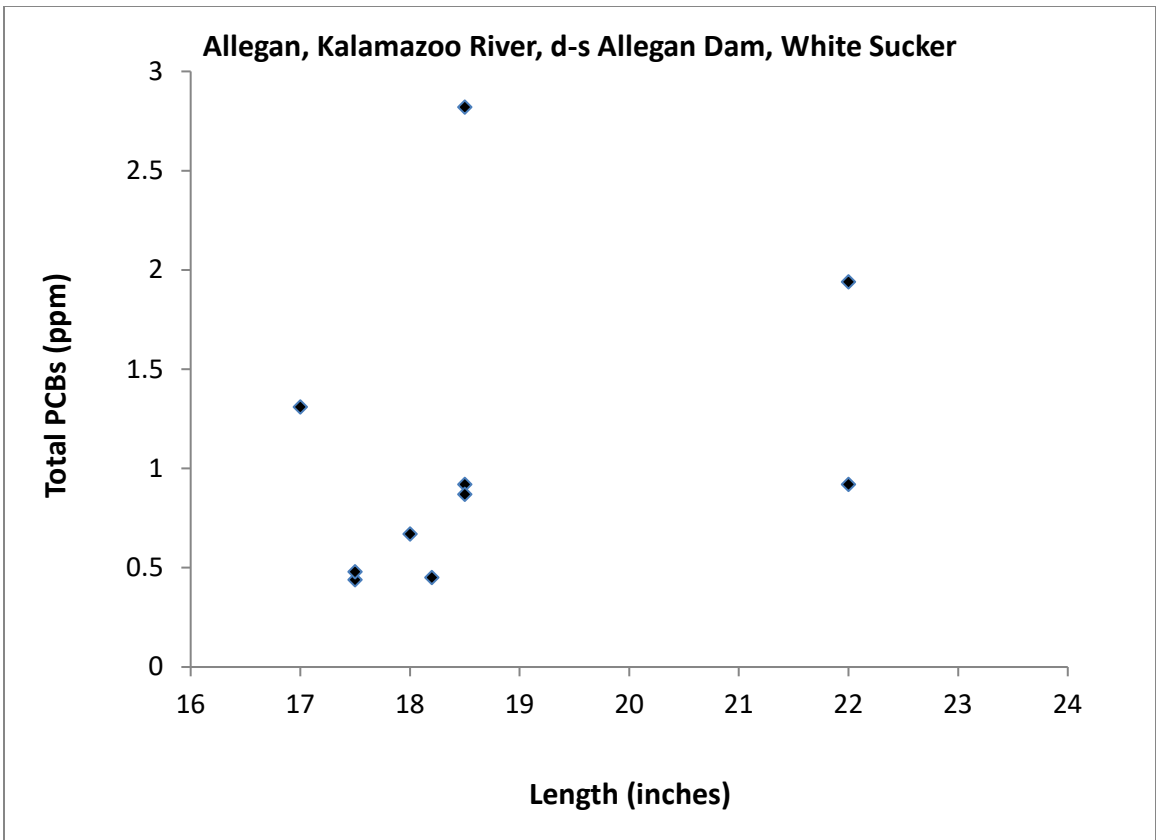
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	15	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	---	--	--	---
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	17	na	17.0	22.0
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	1.08	0.44	2.82	1.63	Limited
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.094	0.154				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of sucker from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of sucker from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. *Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



Yellow Perch

**Kalamazoo River
Allegan Dam to River Mouth**

Allegan County

Hg Analysis:

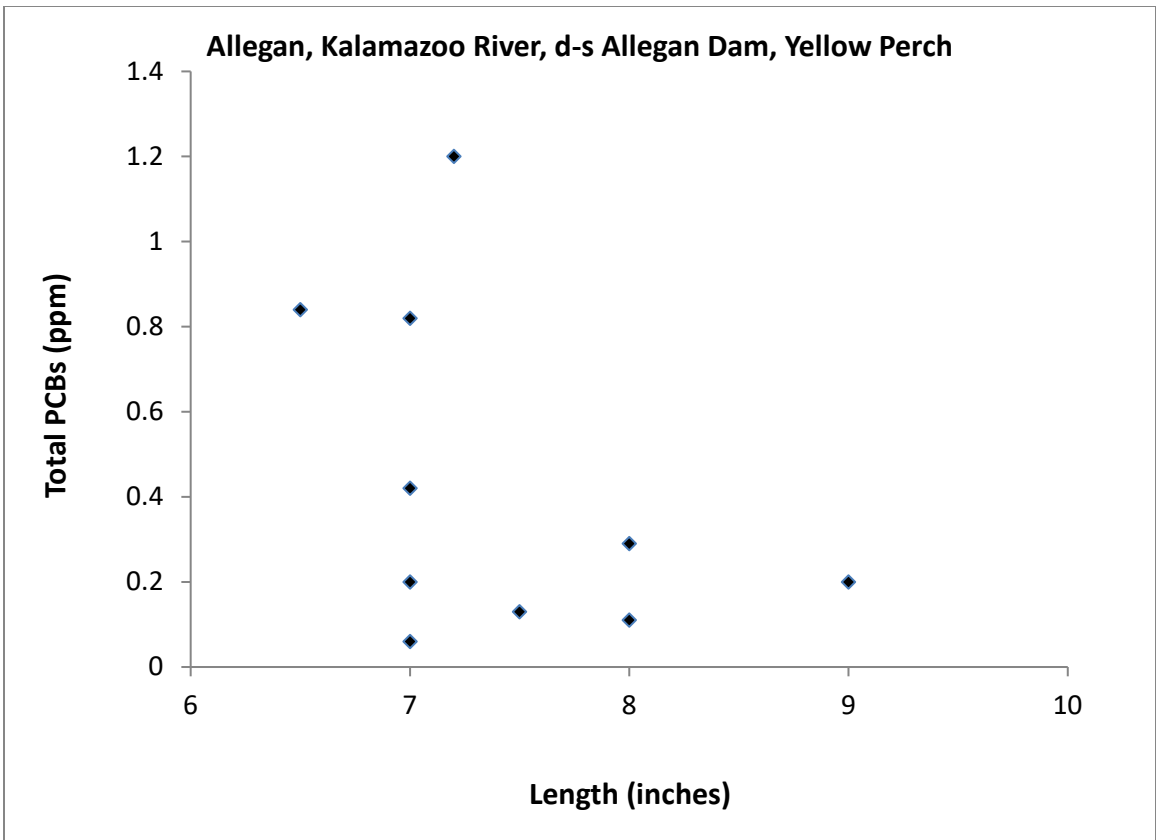
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	---	--	--	---
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	10	6.5	na	6.5	9.0
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.43	0.06	1.20	0.71	Limited
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.188	0.125				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: Women and children should not eat more than 1 meal per month of yellow perch from the Kalamazoo River between Allegan Dam and the river mouth as part of an “all other species” advisory due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of yellow perch from the Kalamazoo River downstream of the Allegan Dam to no more than 1 or 2 meals per year due to PCBs. *Dataset has limitations due to the age of the data. Based on the EGLE Fish Contaminant Monitoring Program, PCB concentrations ≥15 years old are normally expected to have declined when no point source is known, however, this reach of river is downstream of several PCB point sources and is a highly contaminated area with ongoing sediment remediation work, thus the limited consumption advice is retained. New data are needed to re-evaluate this guideline.



**Bluegill and
Pumpkinseed
Hg Analysis:**

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	19	3.7	na	3.7	8.3
Datasets available: 2010, 2011, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	19	0.03	0.02	0.07	0.04	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.338	0.331				

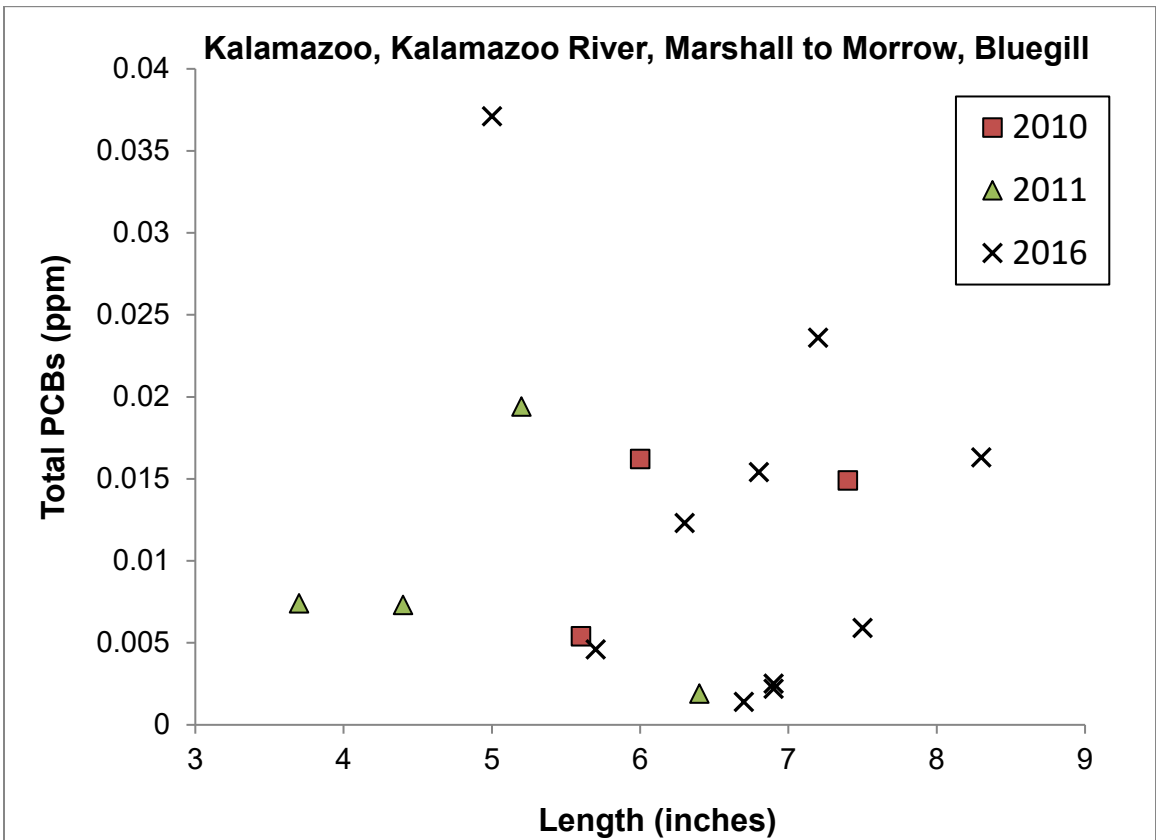
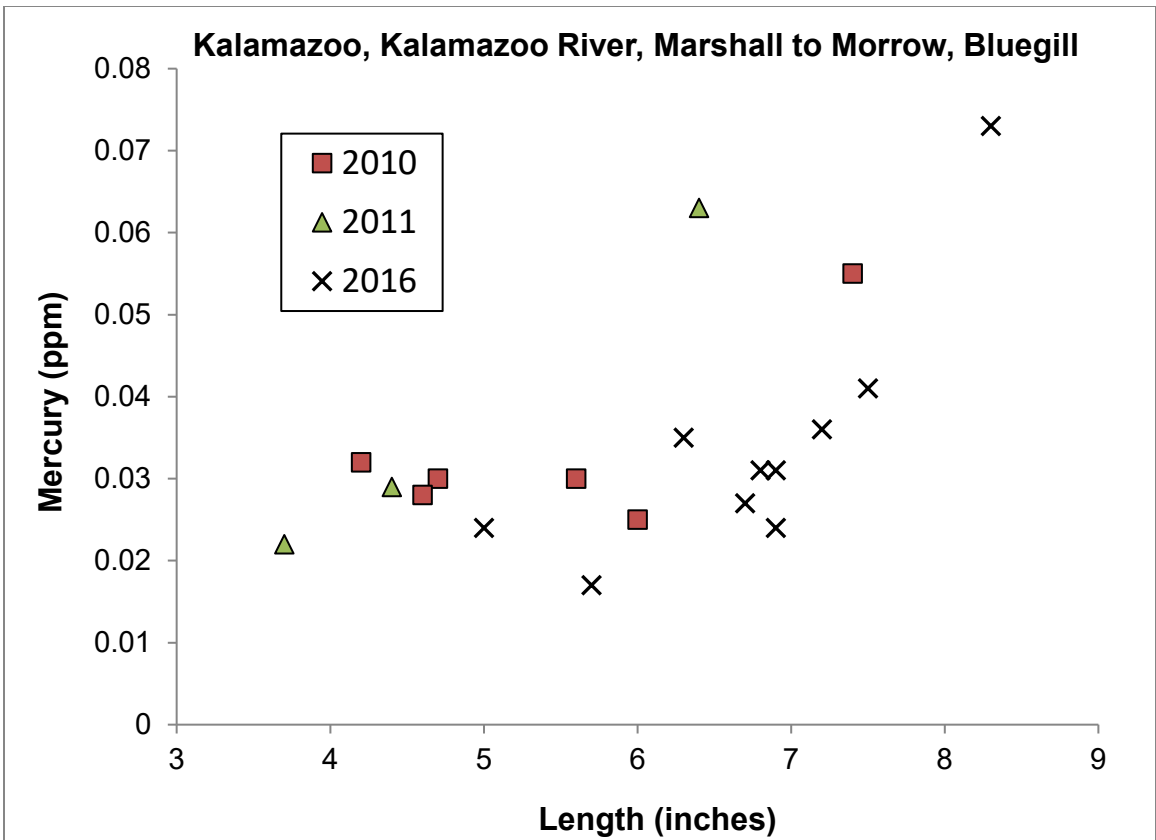
Organics Analysis:

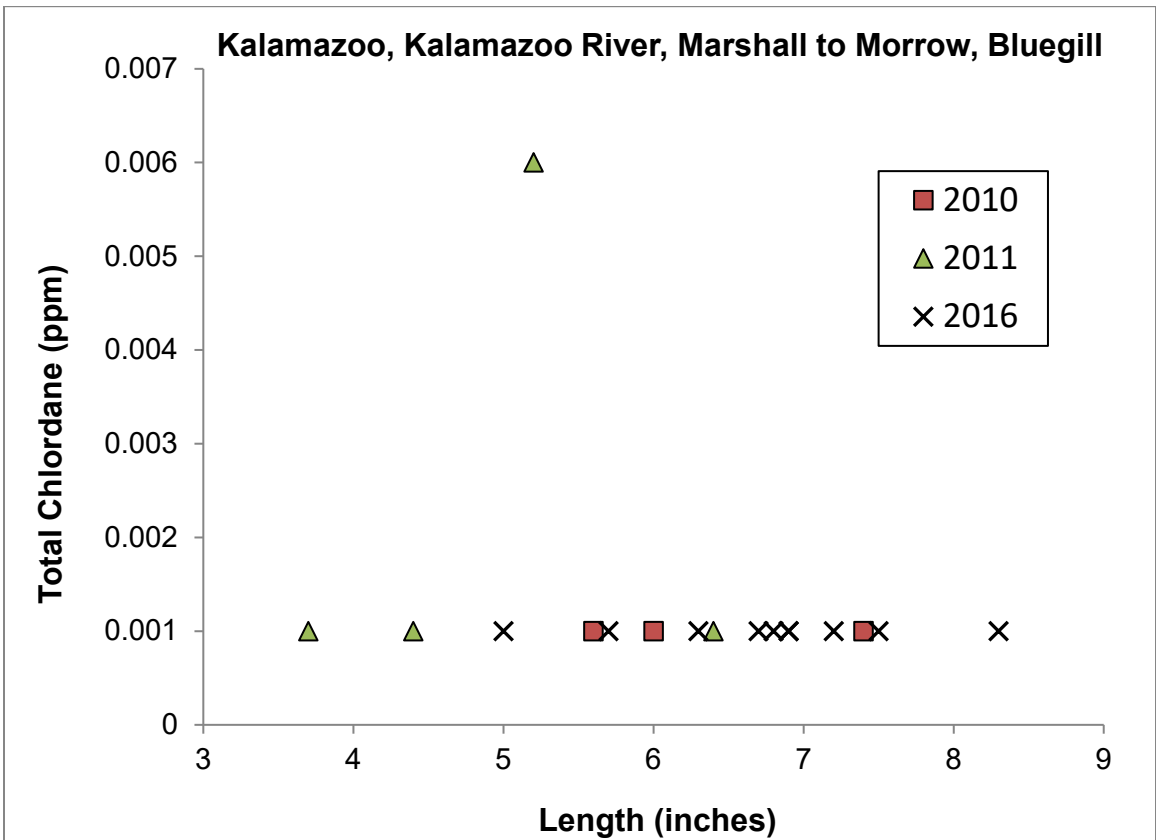
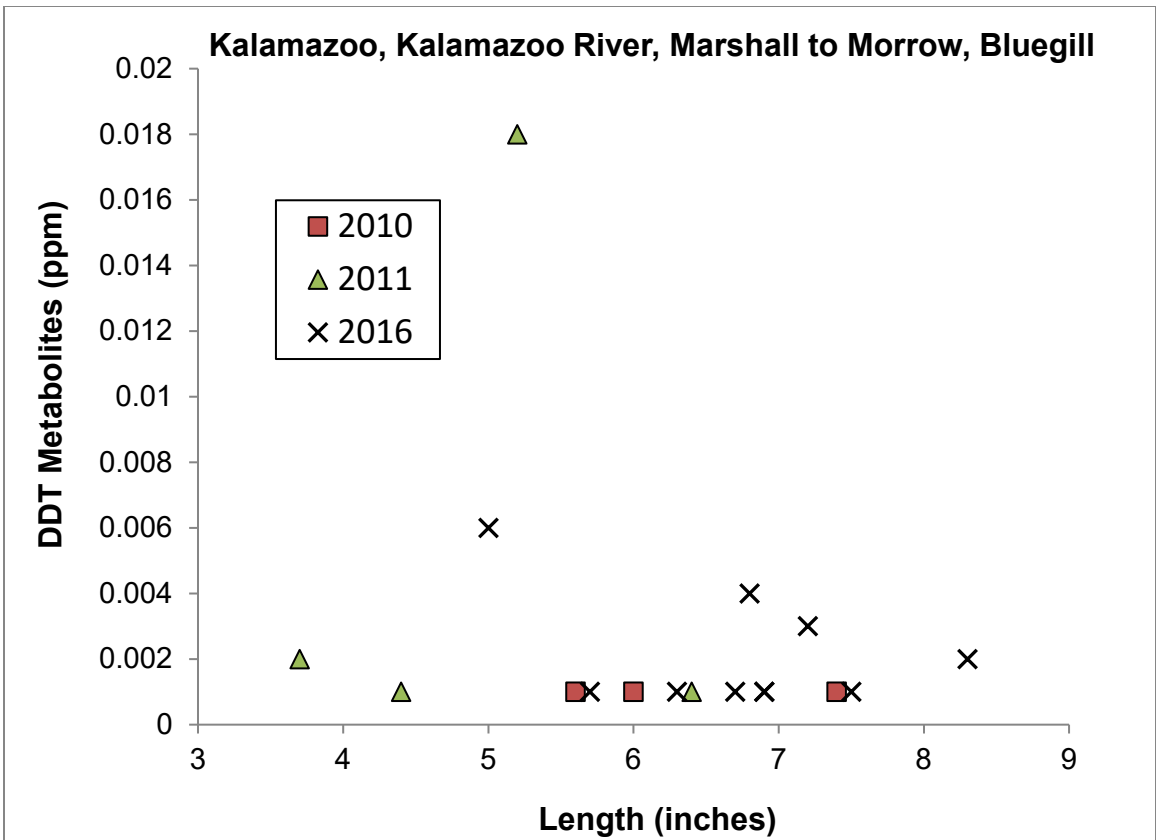
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	17	3.7	na	3.7	8.3
Datasets available: 2010, 2011, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	17	0.01	0.001	0.04	0.02	12
DDT	17	0.003	< 0.001	0.02	0.005	16
Chlordane	17	0.001	< 0.001	0.006	0.002	--
Toxaphene	17	ND	< 0.05	< 0.05	--	--
PFOS	10	16 ppb	9 ppb	25 ppb	20 ppb	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.005	0.007				
DDT	0.067	0.053				
Chlordane	0.050	0.040				
Toxaphene	--	--				
PFOS	0.045	0.021				
Final meal category based on UCL:						4

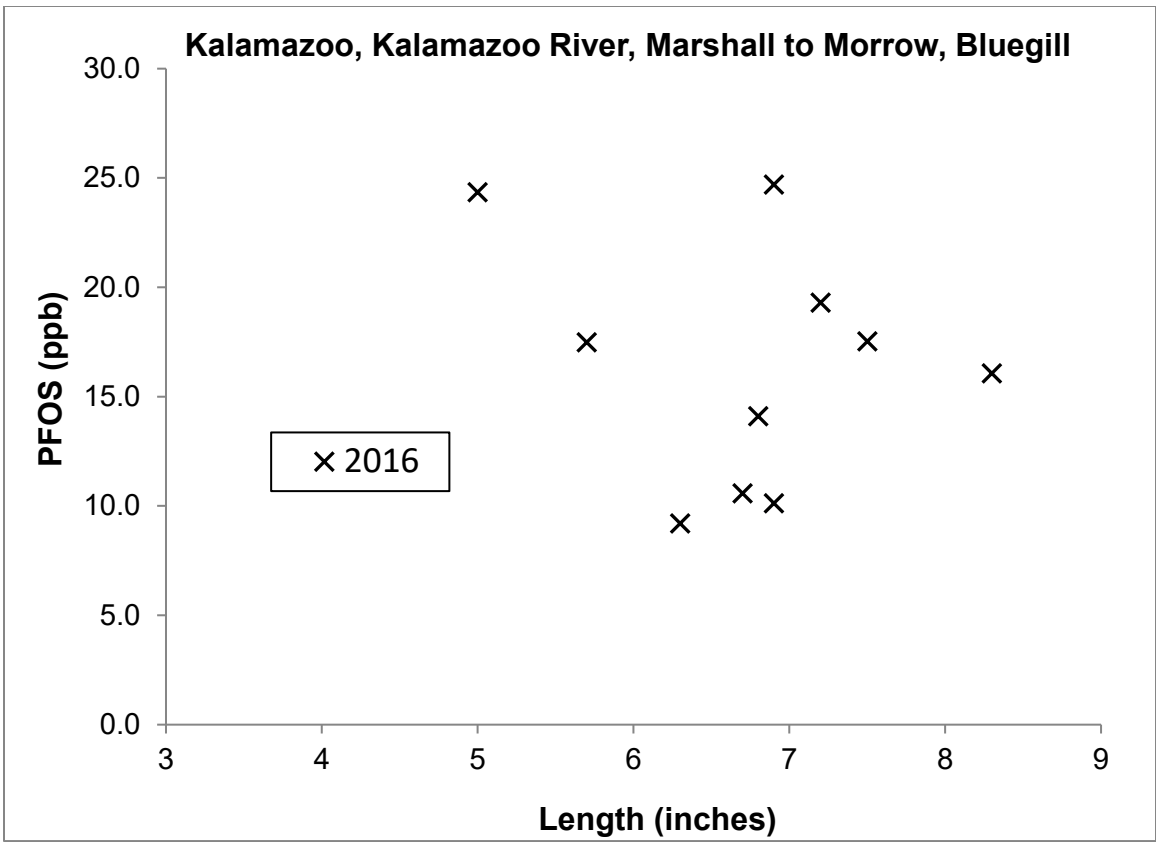
Existing MDHHS Advisory: No one should eat more than 12 meals per month of bluegill or other sunfish from the Kalamazoo River between Marshall Dam and Morrow Dam, including Morrow Pond, due to PCBs.

Recommendation: No one should eat more than 4 meals per month of bluegill of any size from the Kalamazoo River between the Marshall and Morrow Dams due to PFOS. PCBs would cause an advisory.

Note: The Ceresco Dam removal opened the Kalamazoo River from Morrow to Marshall Dams.







Carp

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	70	17.1	na	17.1	30.5
Datasets available: 2010, 2011, 2015, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	70	0.14	0.04	0.65	0.16	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.001	0.006				

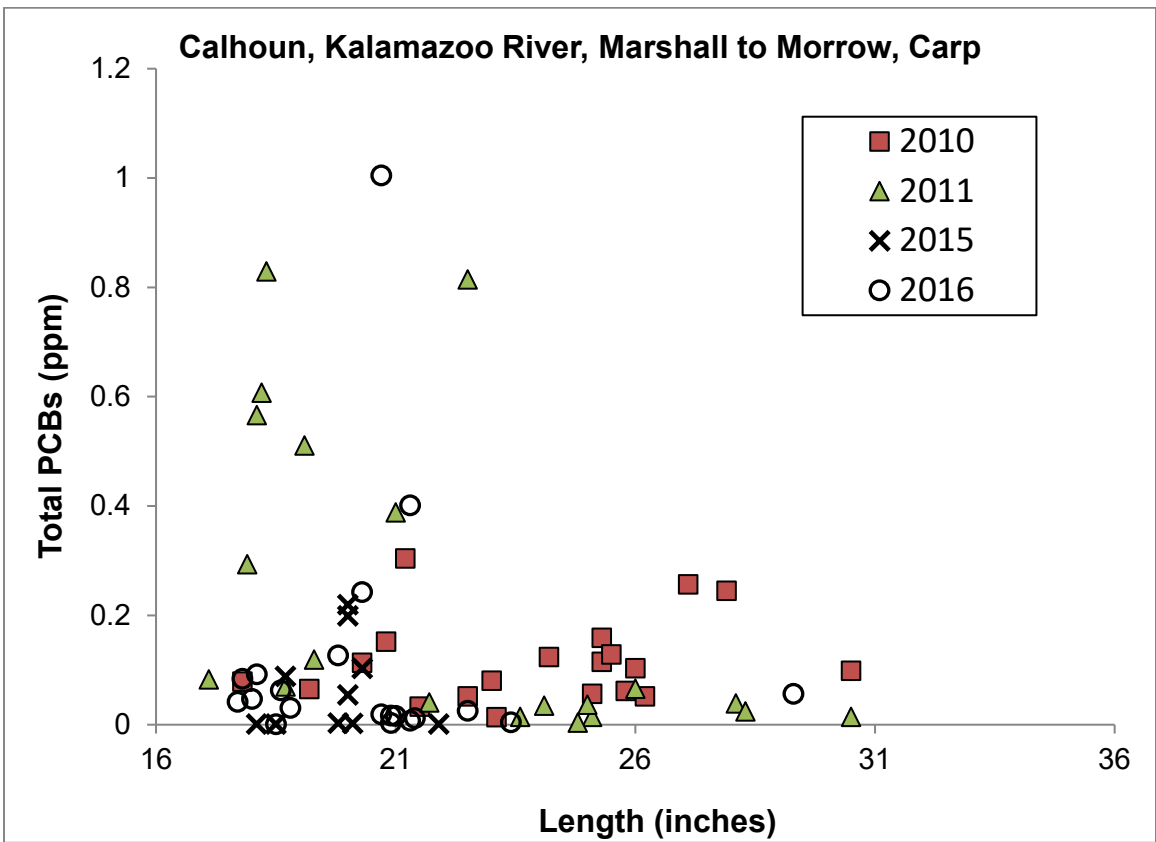
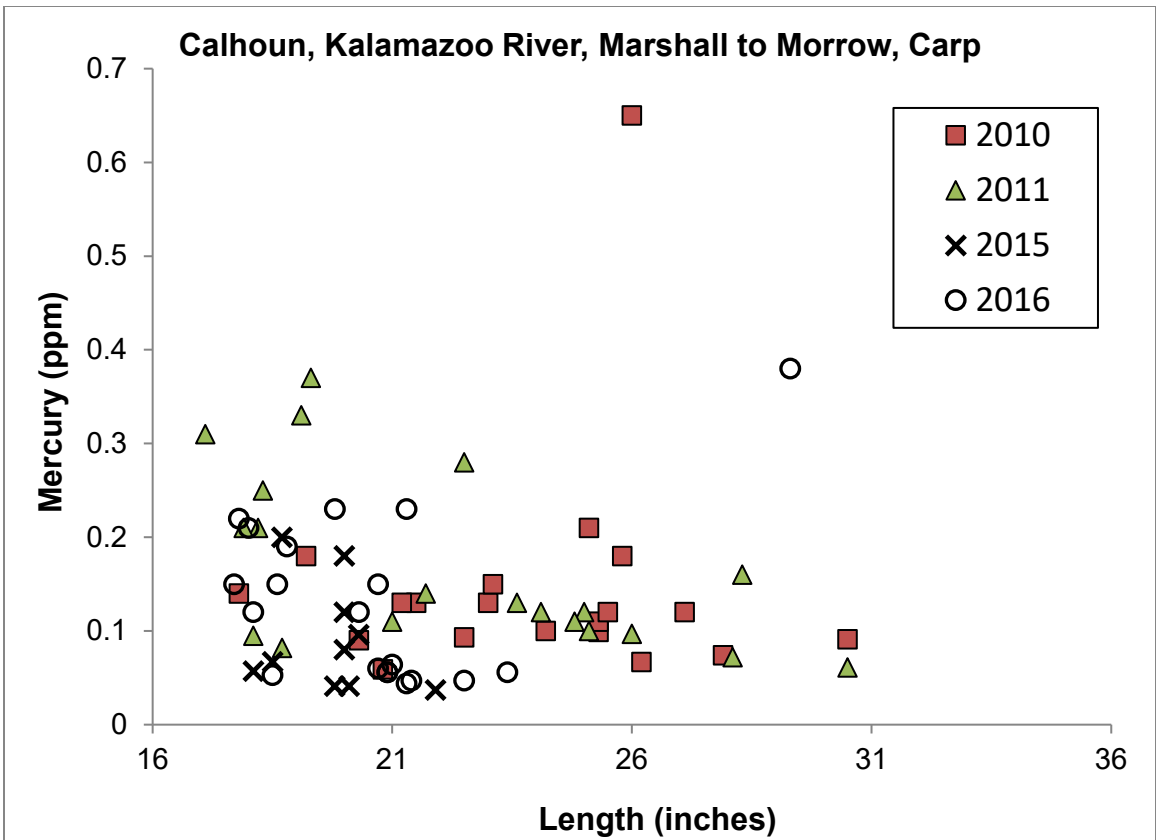
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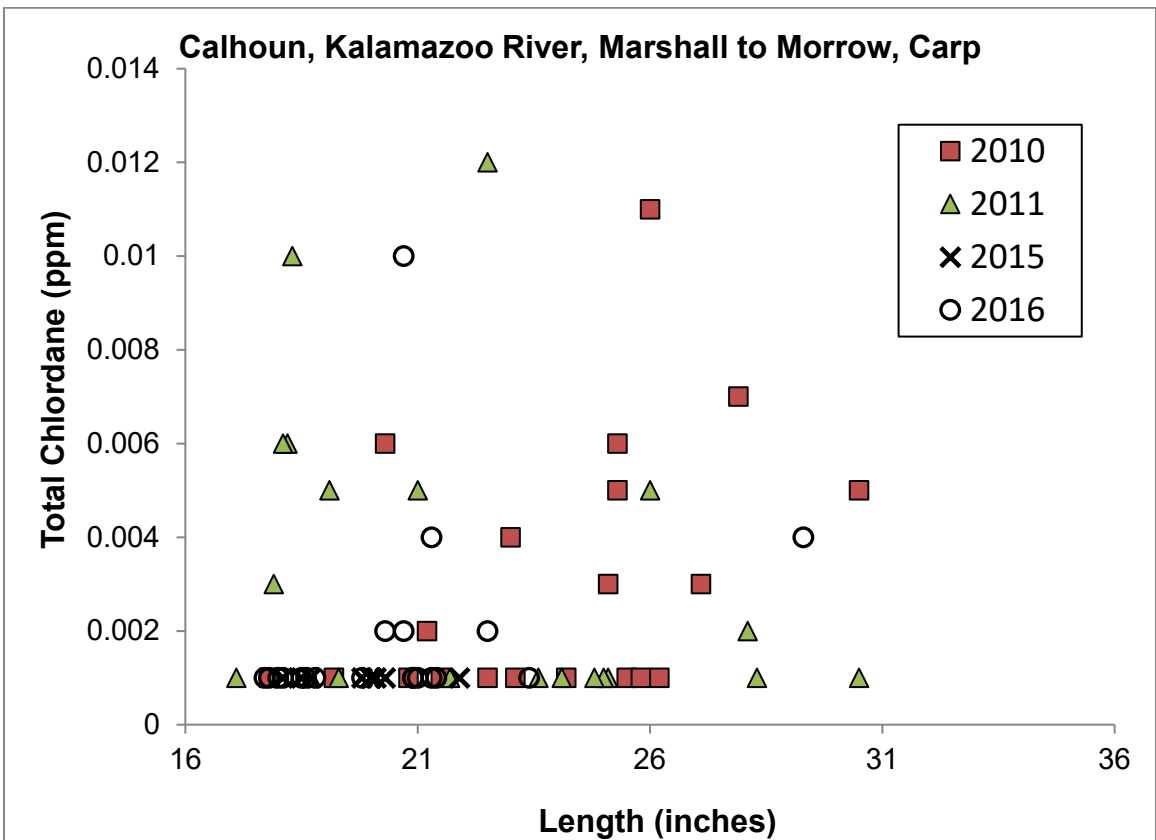
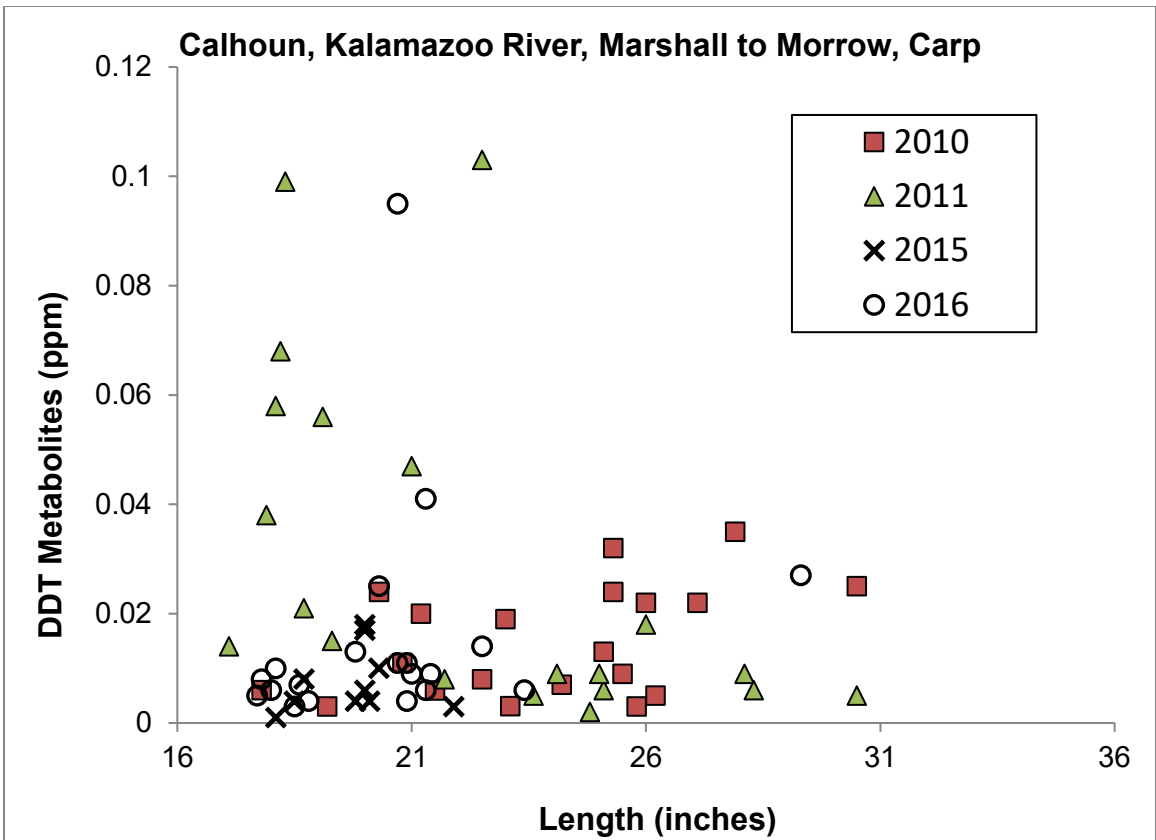
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	70	17.1	na	17.1	30.5
Datasets available: 1987, 1999, 2000, 2001, 2006, 2010, 2011, 2015, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	70	0.14	< 0.001	1.0	0.19	1
DDT	70	0.02	0.001	0.10	0.02	16
Chlordane	70	0.003	< 0.001	0.01	0.003	--
Toxaphene	70	ND	< 0.05	< 0.05	--	--
TEQ	20	8 ppt	0.7 ppt	28 ppt	11 ppt	0.5
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.033	0.001				
DDT	0.009	0.000				
Chlordane	0.023	0.043				
Toxaphene	0.000	0.002				
TEQ	0.097	0.156				
Final meal category based on UCL:						0.5

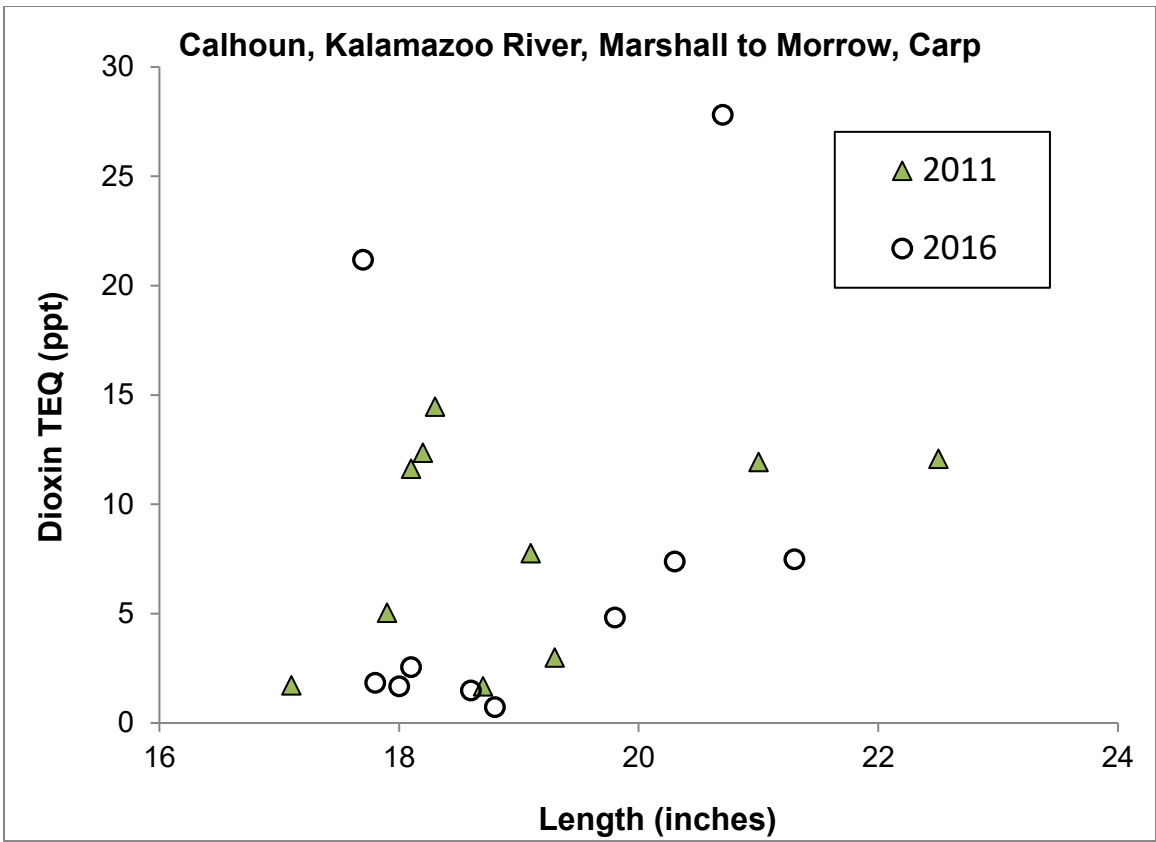
Existing MDHHS Advisory: No one should eat more than 6 meals per year of carp from the Kalamazoo River between the Marshall and Morrow Dams, including Morrow Pond, due to PCBs and dioxin. Mercury would cause an advisory.

Recommendation: No one should eat more than 6 meals per year of carp from the Kalamazoo River between the Marshall and Morrow Dams, including Morrow Pond, due to PCBs and dioxins. An additional year of data is needed to remove PCBs as a driving contaminant. Mercury would cause an advisory.

Note: The Ceresco Dam removal opened the Kalamazoo River from Morrow to Marshall Dams.







Channel Catfish

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	1	21.5	12	21.5	21.5
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.34	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: No one should eat more than 6 meals per year of catfish from the Kalamazoo River between the Ceresco Dam and Morrow Dam, including Morrow Pond. This was a management determination based on the chemical levels in carp.

Recommendation: There are insufficient data available to develop specific advice for catfish from this reach of the Kalamazoo River. Since catfish generally have contaminant loads similar to carp from the same water, no one should eat more than 6 meals per year of catfish from the Kalamazoo River between Marshall and Morrow Dams, including Morrow Pond, due to PCBs and dioxin. This action was a management determination.

Note: Ceresco Dam removal opened river from Morrow to Marshall Dams.

**Largemouth and
Smallmouth Bass**

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2016	49	10.6	14	10.6	19.3
Datasets available: 2006, 2011, 2012, 2015, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	30	0.20	0.10	0.38	0.23	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.467	0.577				

Organics Analysis:

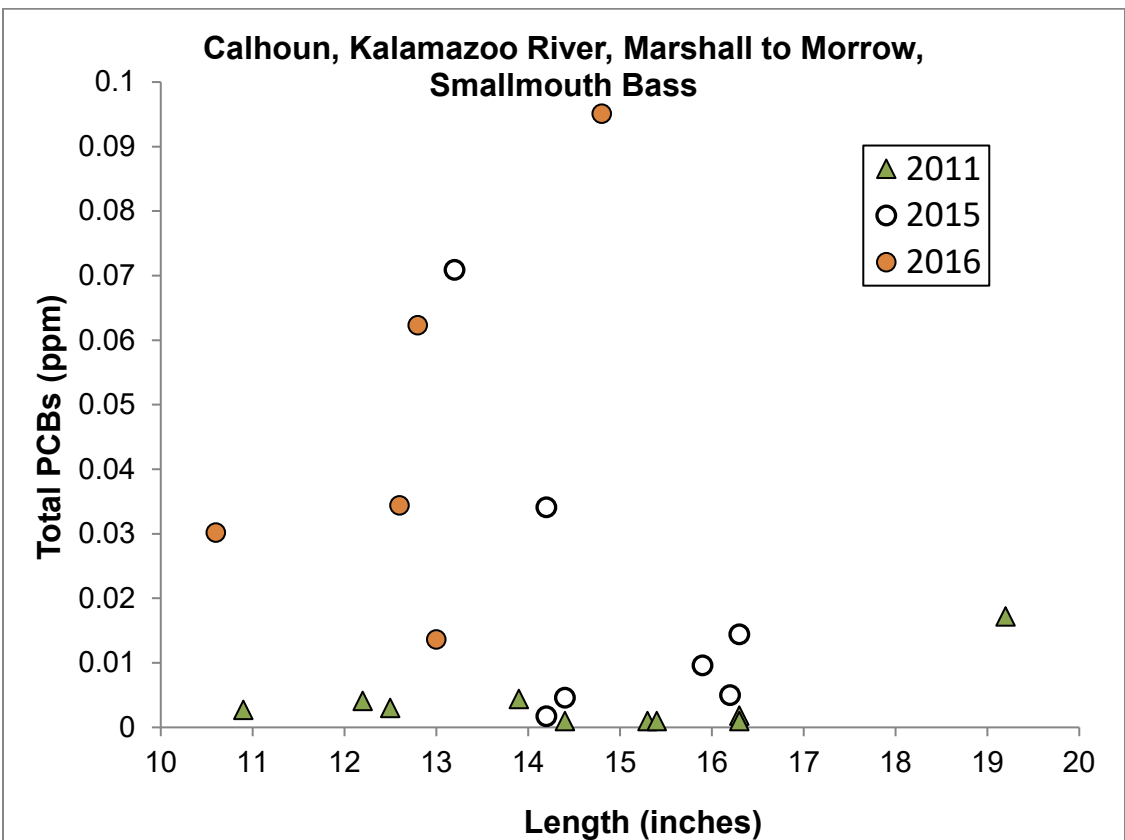
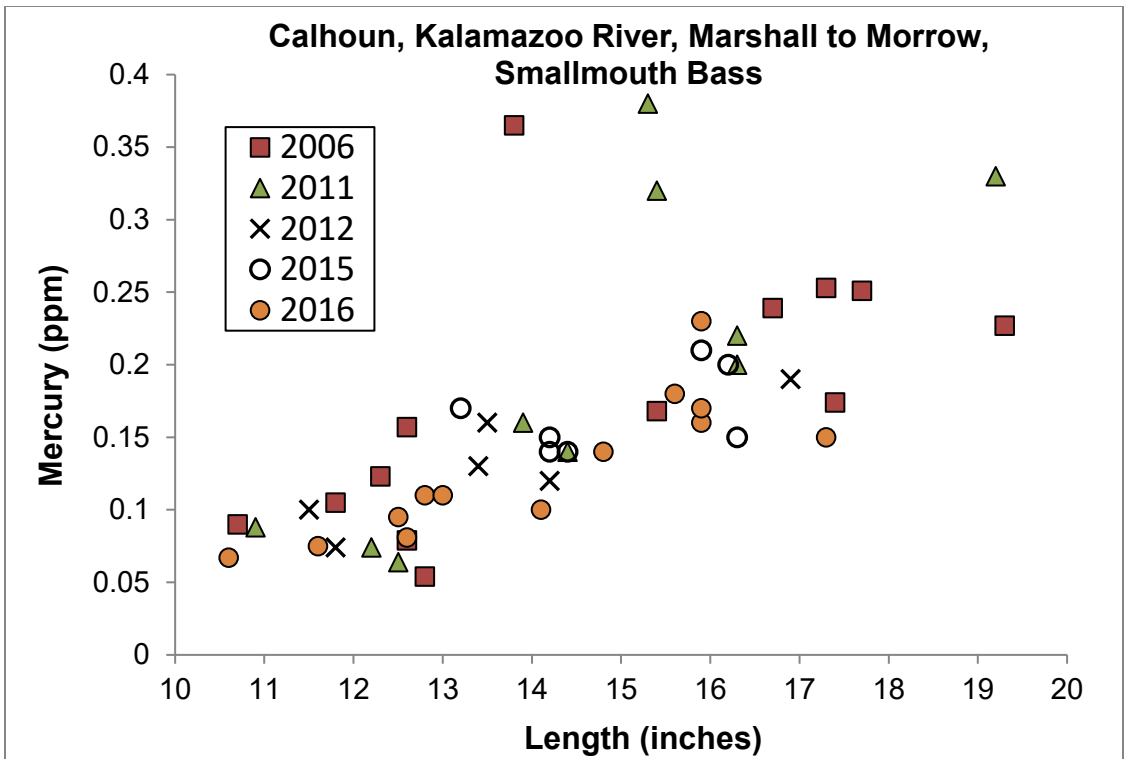
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2011	2016	22	10.6	14	10.6	19.2
Datasets available: 1987, 1999, 2000, 2001, 2006, 2011, 2012, 2015, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	14	0.014	< 0.001	0.10	0.03	8
DDT	14	0.003	< 0.001	0.008	0.005	16
Chlordane	14	ND	< 0.001	< 0.001	--	--
Toxaphene	14	ND	< 0.05	< 0.05	--	--
PFOS	5*	29 ppb	20 ppb	53 ppb	47 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.031	0.039				
DDT	0.022	0.000				
Chlordane						
Toxaphene						
PFOS	0.538	0.485				
Final meal category based on UCL:						2

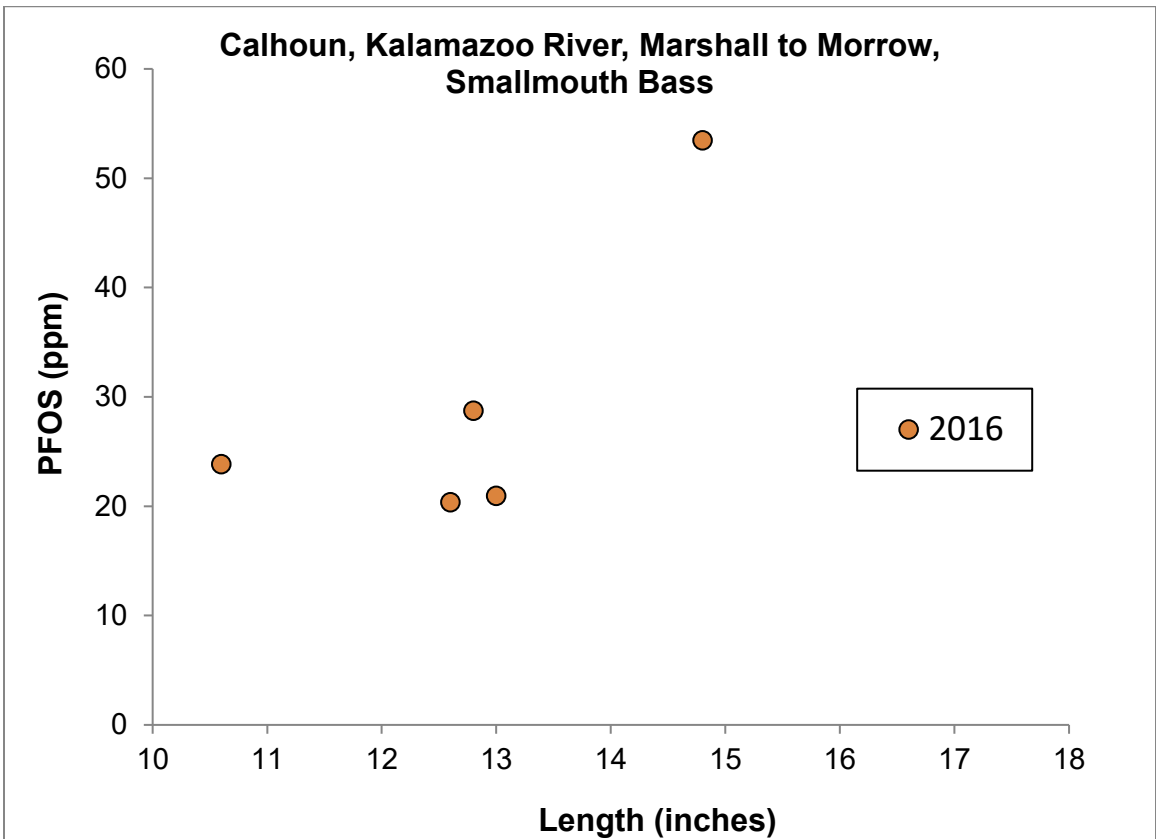
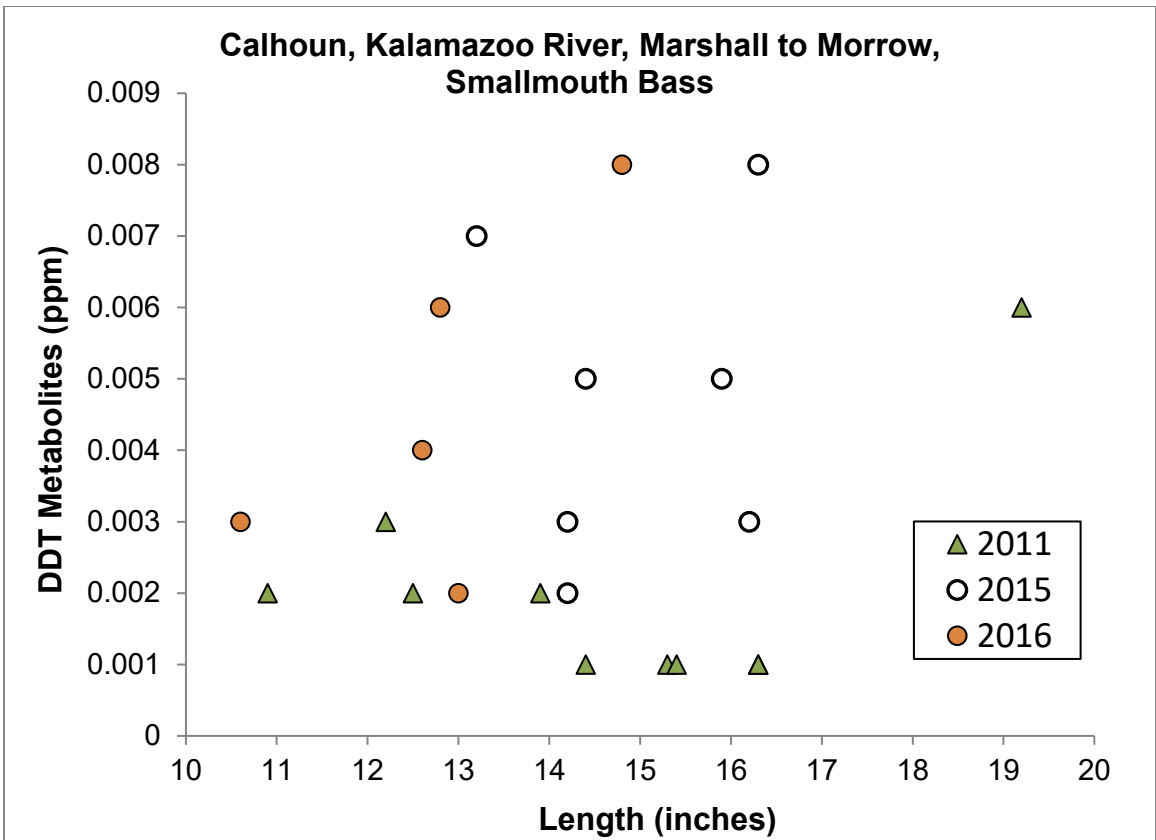
Existing MDHHS Advisory: No one should eat more than 1 meal per month of largemouth or smallmouth bass from the Kalamazoo River between the Marshall and Morrow Dams, including Morrow Pond, due to PCBs. Mercury would cause an advisory.

Recommendation: No change is recommended. Additional largemouth or smallmouth bass from this river reach should be analyzed for PCBs to evaluate whether the advisory can be relaxed. Additional samples of legal sized fish should be analyzed for PFOS.

* Note: All samples were used even though only one was of legal size. Data have consistently shown that PFOS concentrations are independent of fish length/age.

Note: The Ceresco Dam removal opened the Kalamazoo River from Morrow to Marshall Dams.





Rock Bass

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	38	4.4	na	4.4	8.2
Datasets available: 2010, 2011, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	38	0.07	0.02	0.20	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.207	0.318				

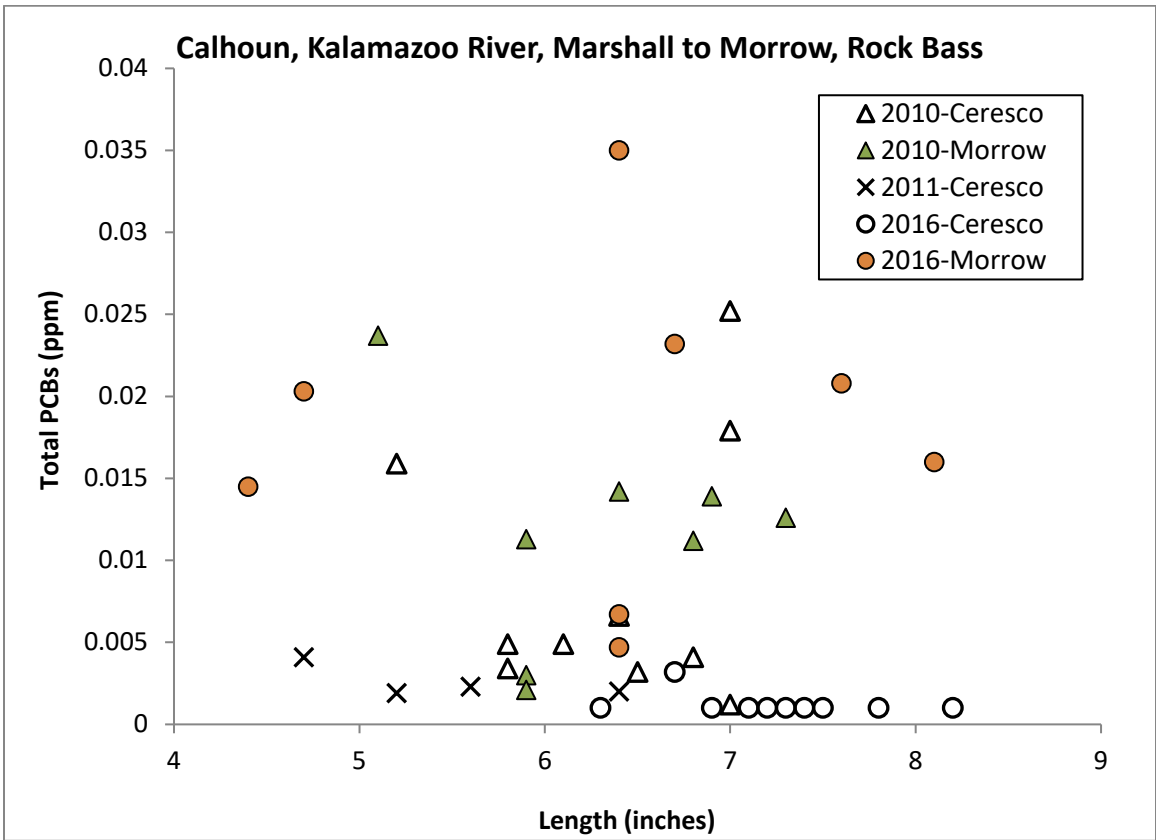
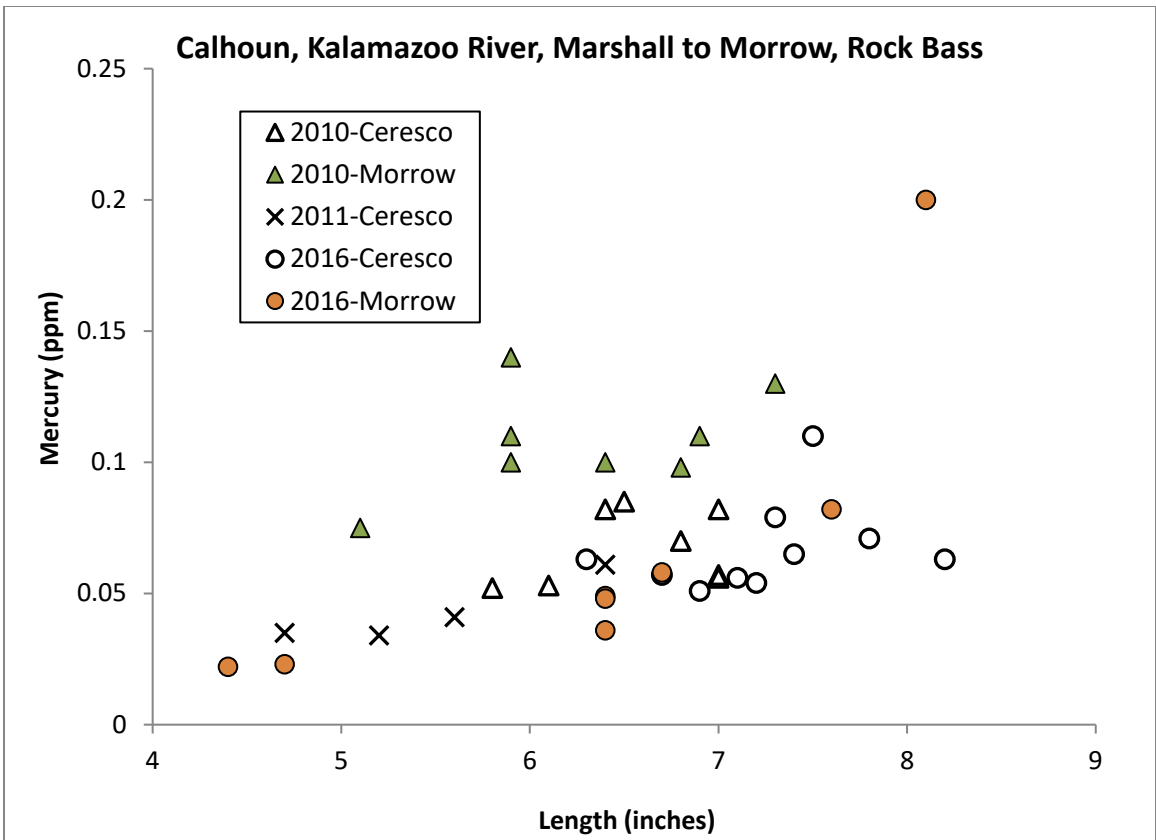
Organics Analysis:

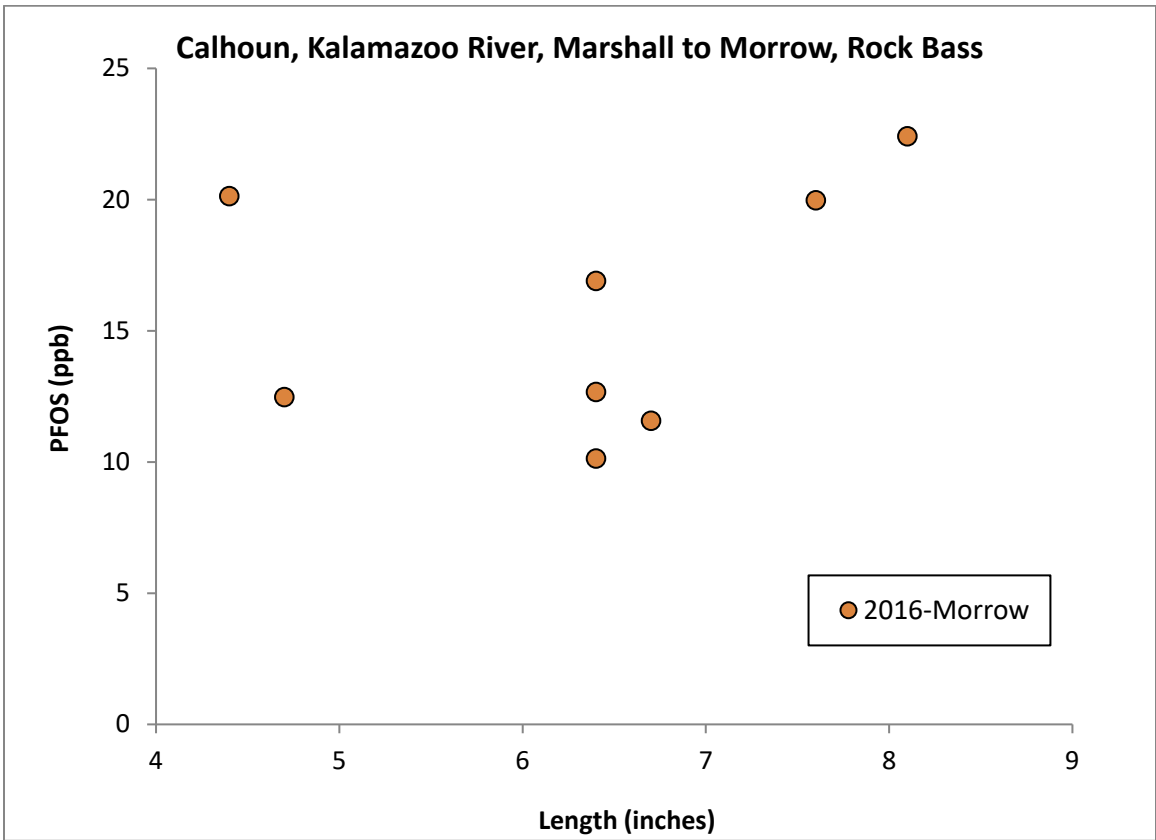
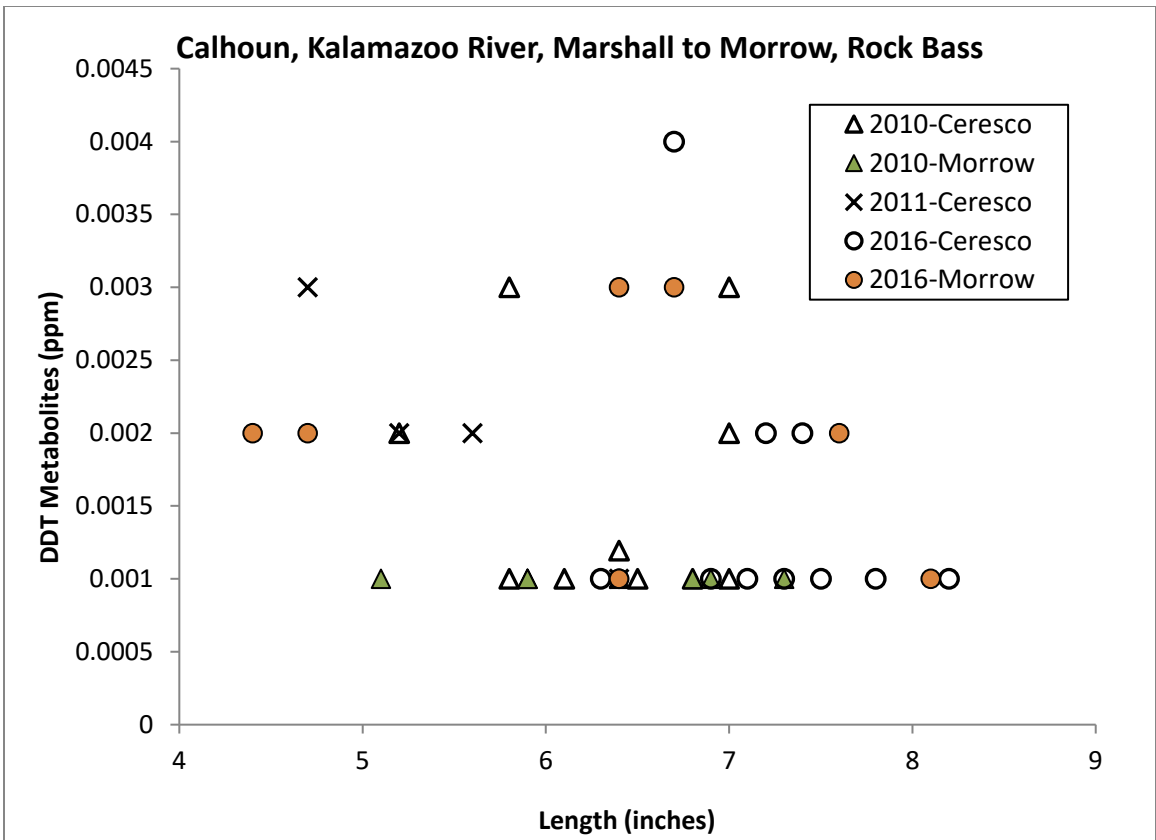
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2016	38	4.4	na	4.4	8.2
Datasets available: 2010, 2011, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	40	0.009	< 0.001	0.04	0.01	12
DDT	40	0.002	< 0.001	0.004	0.002	16
Chlordane	40	ND	< 0.001	< 0.001	--	--
Toxaphene	40	ND	< 0.05	< 0.05	--	--
PFOS	8	16 ppb	10 ppb	22 ppb	20 ppb	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.019	0.077				
DDT	0.054	0.072				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.084	0.066				
Final meal category based on UCL:						4

Existing MDHHS Advisory: No one should eat more than 12 meals per month of rock bass from the Kalamazoo River between the Marshall and Morrow Dams, including Morrow Pond, due to mercury.

Recommendation: No one should eat more than 4 meals per month of rock bass of any size from the Kalamazoo River between the Marshall and Morrow Dams, including Morrow Pond, due to PFOS. Mercury and PCBs would cause advisories.

Note: The Ceresco Dam removal opened the Kalamazoo River from Morrow to Marshall Dams.





Walleye

**Kalamazoo River
Marshall Dam to Morrow Dam**

**Calhoun and
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1993	1993	3	18.1	15	18.1	20.1
Datasets available: 1993						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	0.228	0.168	0.330	--	--
DDT	3	0.049	0.046	0.053	--	--
Chlordane	3	0.006	0.004	0.008	--	--
Toxaphene	3	ND	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Morrow Impoundment walleye were covered by the statewide guidelines.

Recommendation: No change. There are insufficient data available to develop specific advice for Kalamazoo River from Marshall to Morrow Dams, including Morrow Pond walleye. The statewide consumption guidelines recommend that no one eat more than 1 meal per month of walleye over 20 inches in length or more than 2 meals per month of legal size walleye under 20 inches in length.

Note: Datasheet was updated to reflect Ceresco Dam removal opened river from Morrow to Marshall Dams.

Black Crappie

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	1	11.2	na	11.2	11.2
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.40	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat any fish from the Kalamazoo River downstream of Morrow Dam due to PCBs.

Recommendation: There are insufficient data available to develop specific advice for crappie from this reach of the Kalamazoo River. The no consumption advice should be retained based on the results for other species. Management determination used to set this guideline.

Bluegill/Pumpkinseed

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

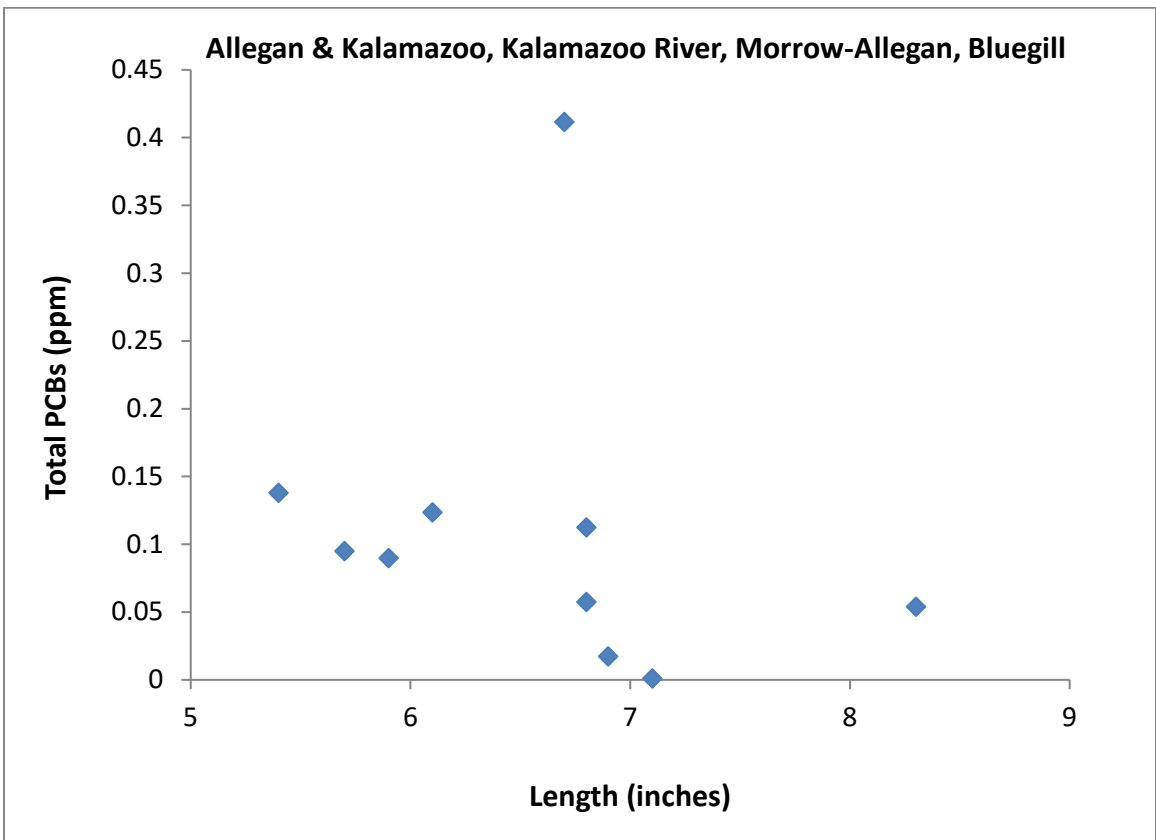
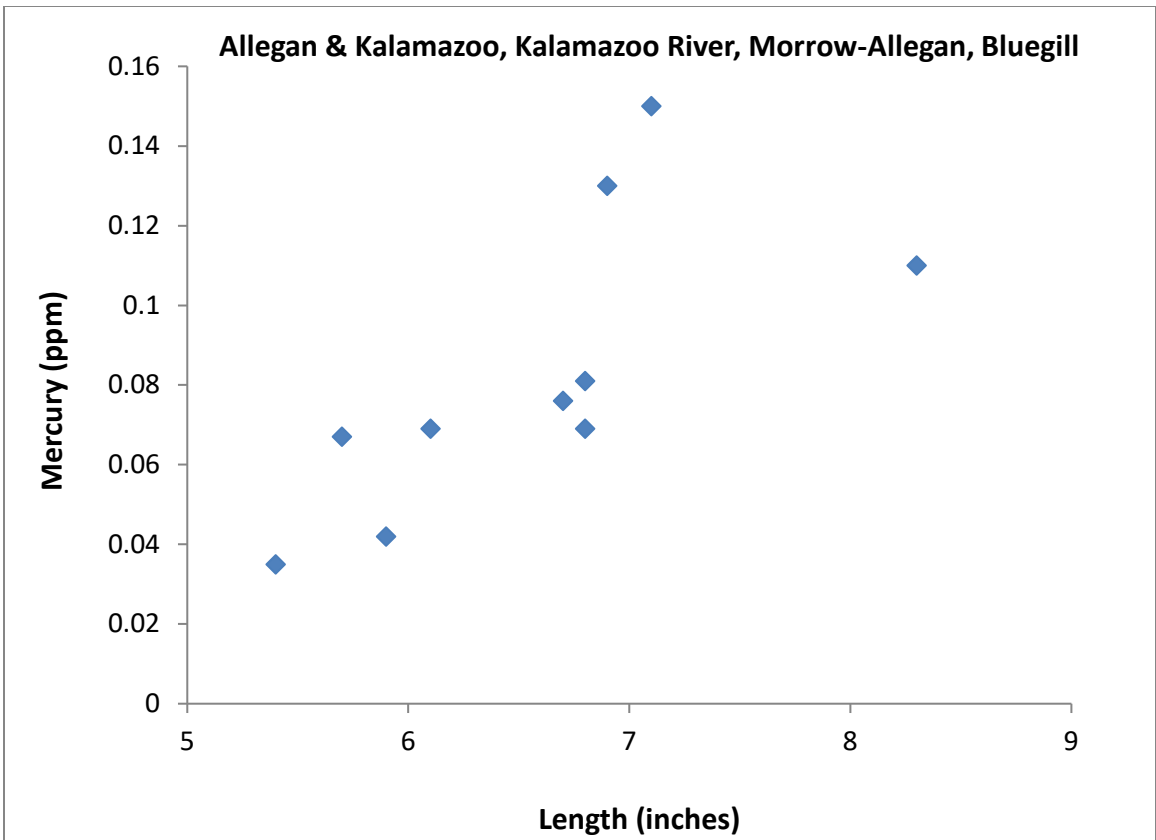
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	5.4	na	5.4	8.3
Datasets available: 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.08	0.04	0.15	0.11	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.510	0.584				

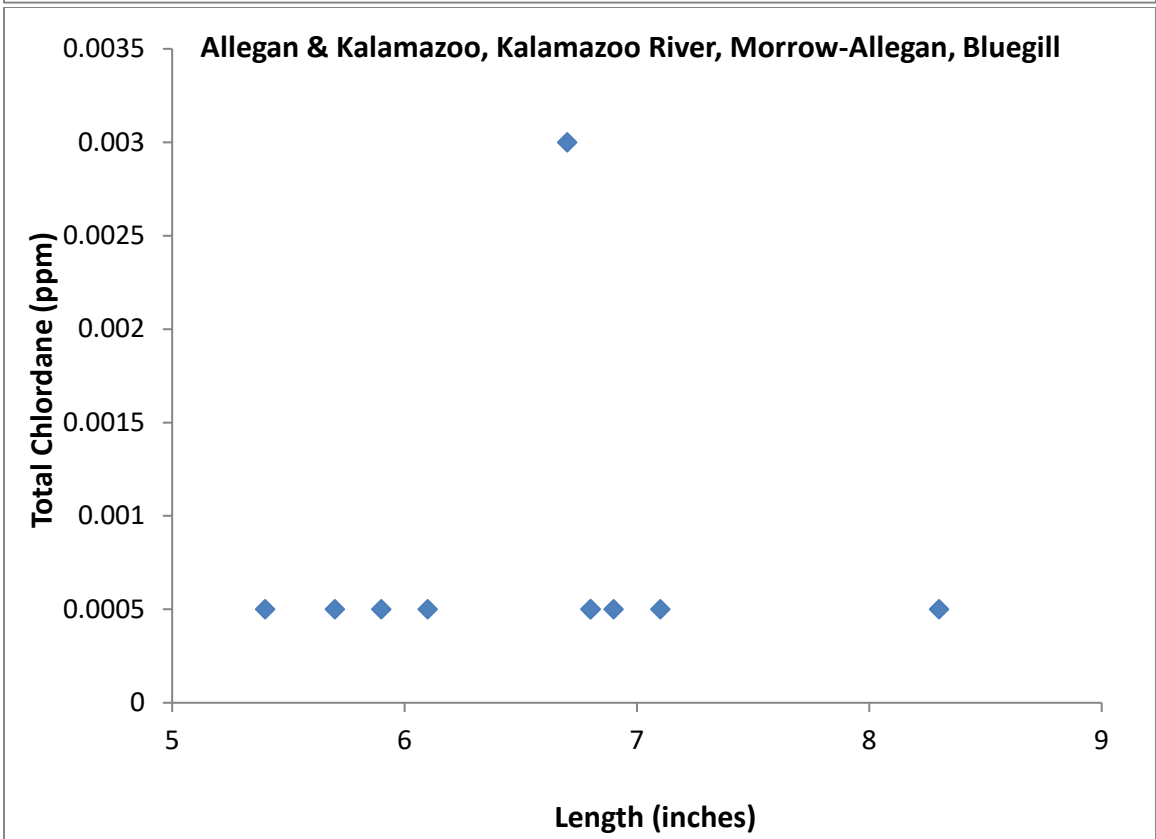
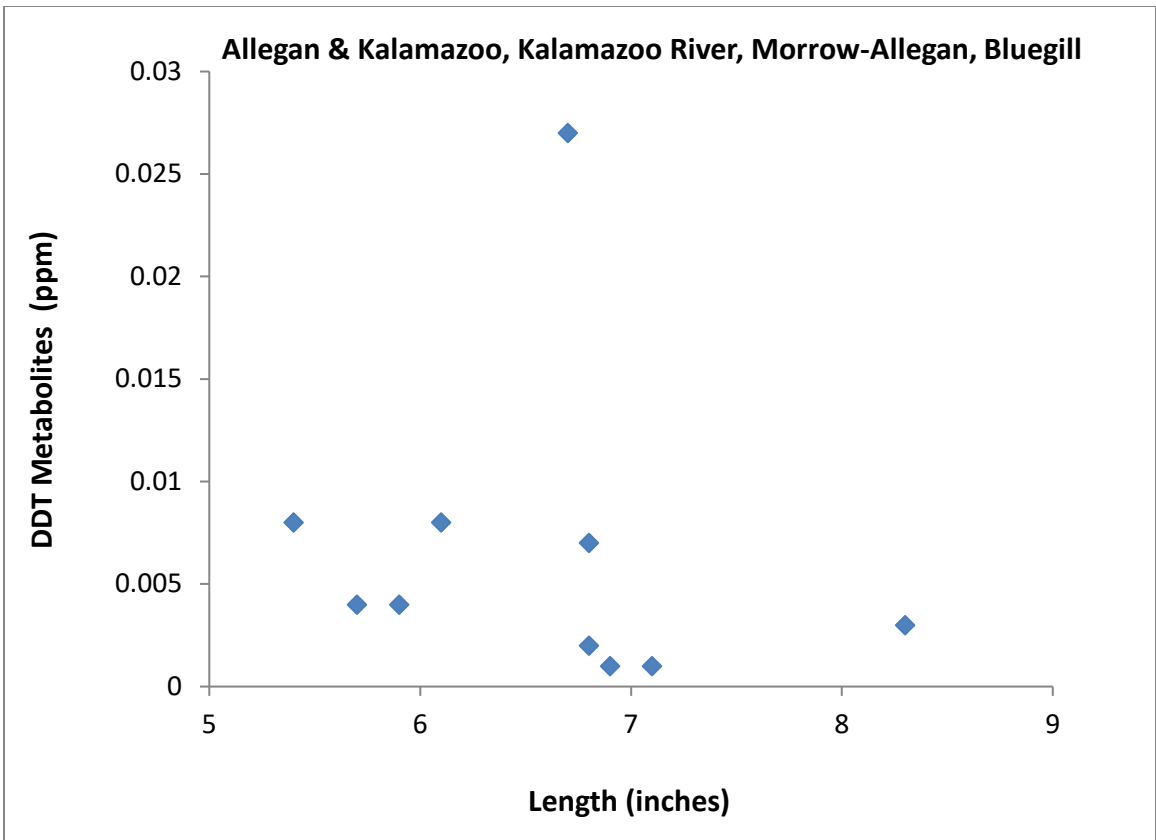
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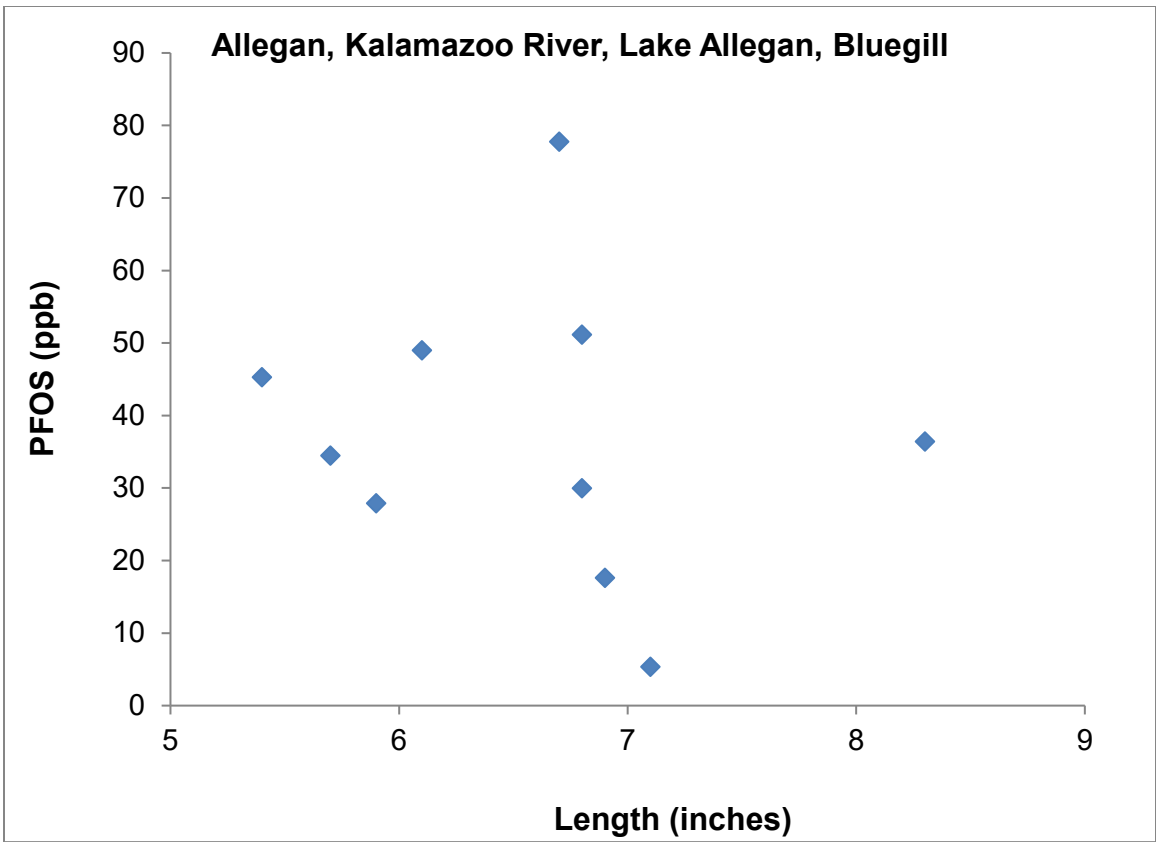
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	5.4	na	5.4	8.3
Datasets available: 1983, 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.11	0.001	0.41	0.19	1*
DDT	10	0.01	0.001	0.03	0.01	16
Chlordane	10	0.001	0.001	0.003	0.001	--
Toxaphene	10	ND	--	--	--	--
PFOS	10	37 ppb	5 ppb	78 ppb	52 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.039	0.127				
DDT	0.018	0.116				
Chlordane	0.003	0.003				
Toxaphene	--	--				
PFOS	0.026	0.054				
Final meal category based on UCL:						1*

Existing Advisory: No fish should be eaten from this segment of river due to PCB contamination.

Recommendation: Sediment remediation projects are ongoing in this reach of the Kalamazoo River. *No one should eat bluegill or sunfish from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs. Management determination used to set this guideline. PFOS and mercury would cause advisories.







Carp

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	2013	39	14.6	na	14.6	24.3
Datasets available: 1990, 1992, 1994, 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	39	0.29	0.09	0.49	0.32	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.213	0.395				

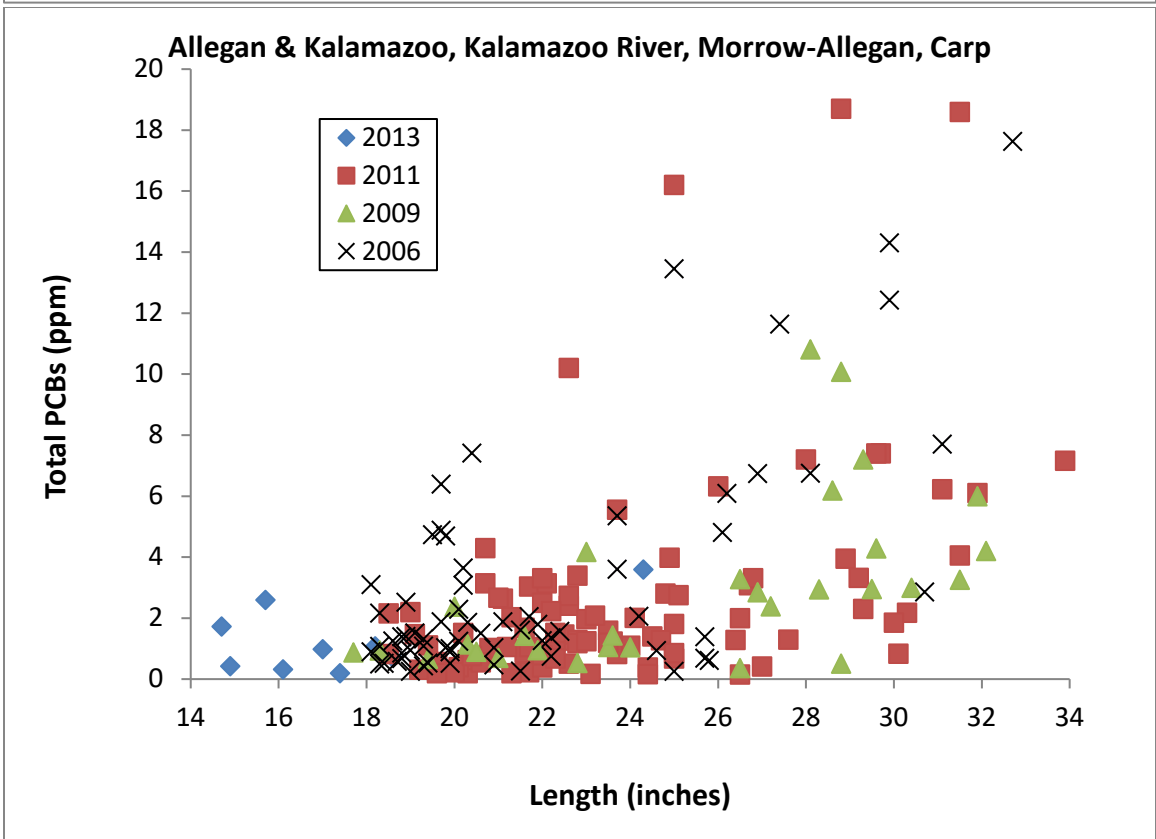
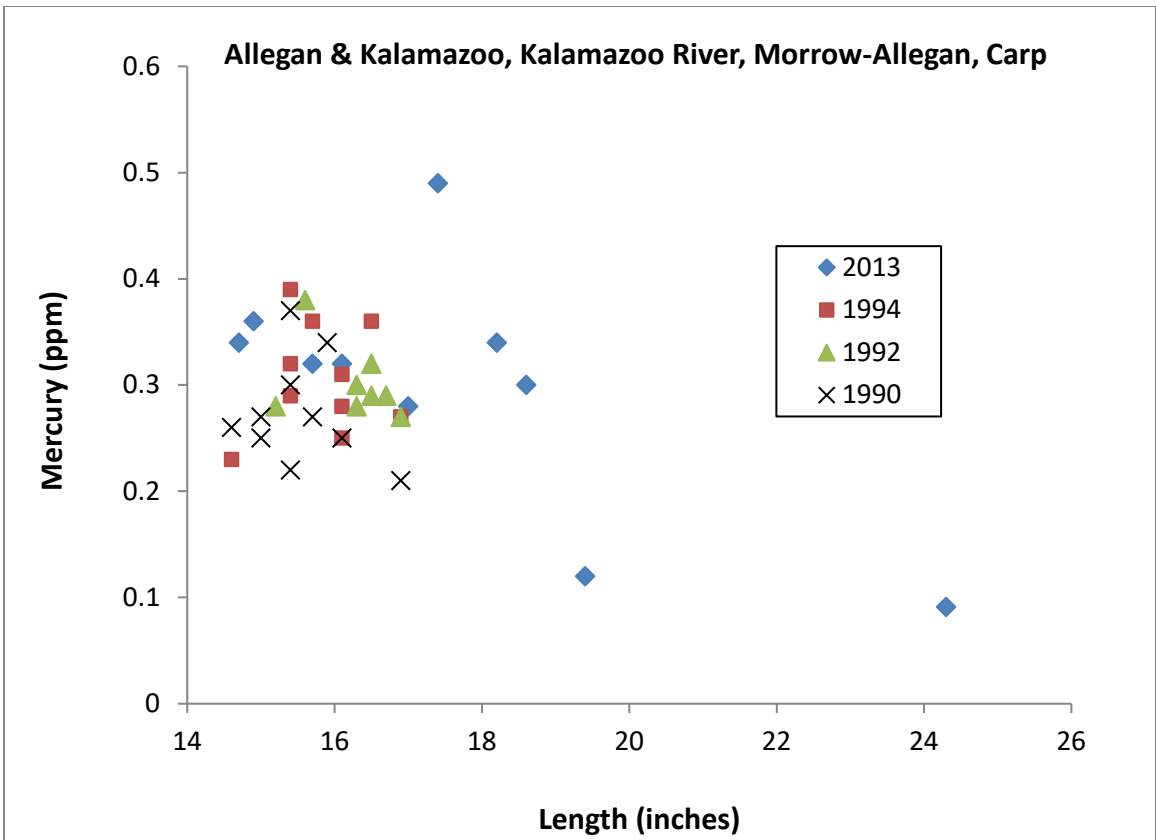
Organics Analysis:

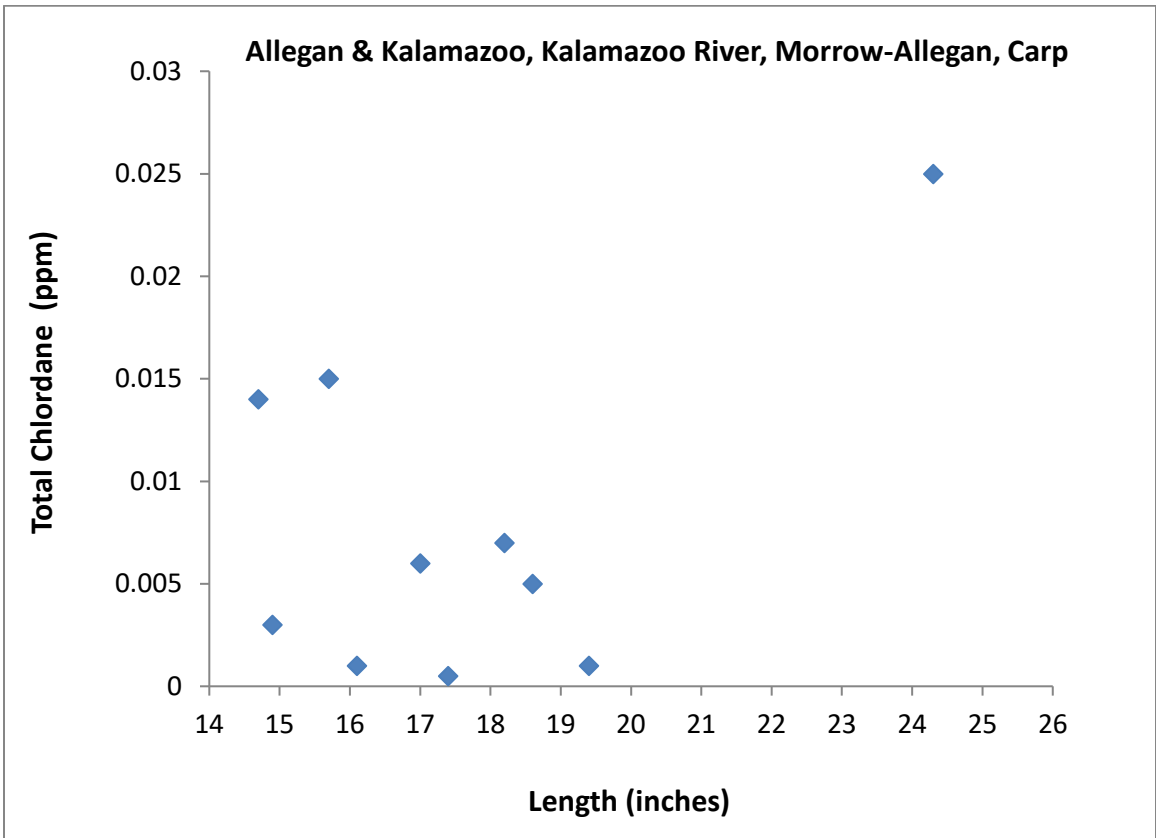
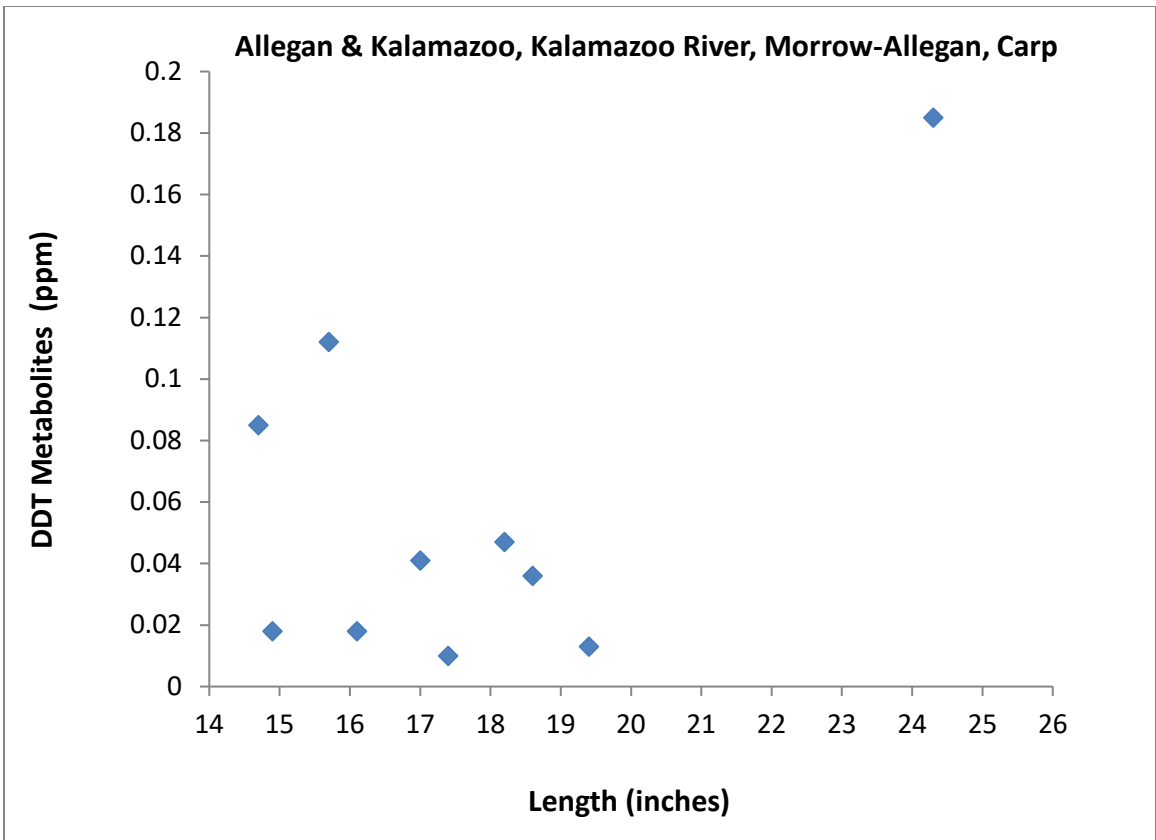
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2013	205	14.7	na	14.7	33.9
Datasets available: 1983, '85, '86, '87, '90, '92, '94, '99, 2000, '01, '03, '04, '06, '09, '11, '13						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	205	2.7	0.15	18.7	3.16	0
DDT	10	0.057	0.01	0.18	0.10	16
Chlordane	10	0.008	0.001	0.02	0.01	--
Toxaphene	10	ND	--	--	--	--
TEQ	32	24.7 ppt	3.9 ppt	98.5 ppt	31.5 ppt	Limited
PFOS	10	36 ppb	24 ppb	50 ppb	43 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.274	0.260				
DDT	0.278	0.099				
Chlordane	0.217	0.047				
Toxaphene	--	--				
TEQ	0.037	0.027				
PFOS	0.149	0.178				
Final meal category based on UCL:						0

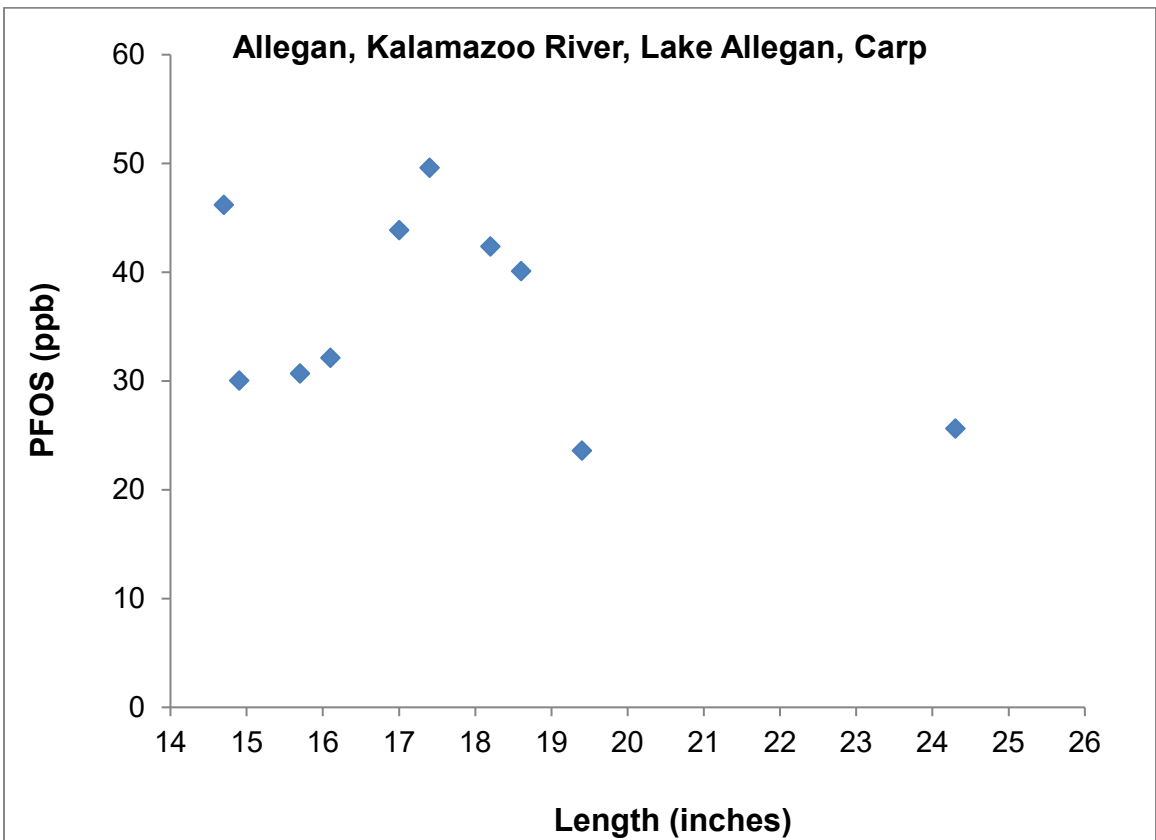
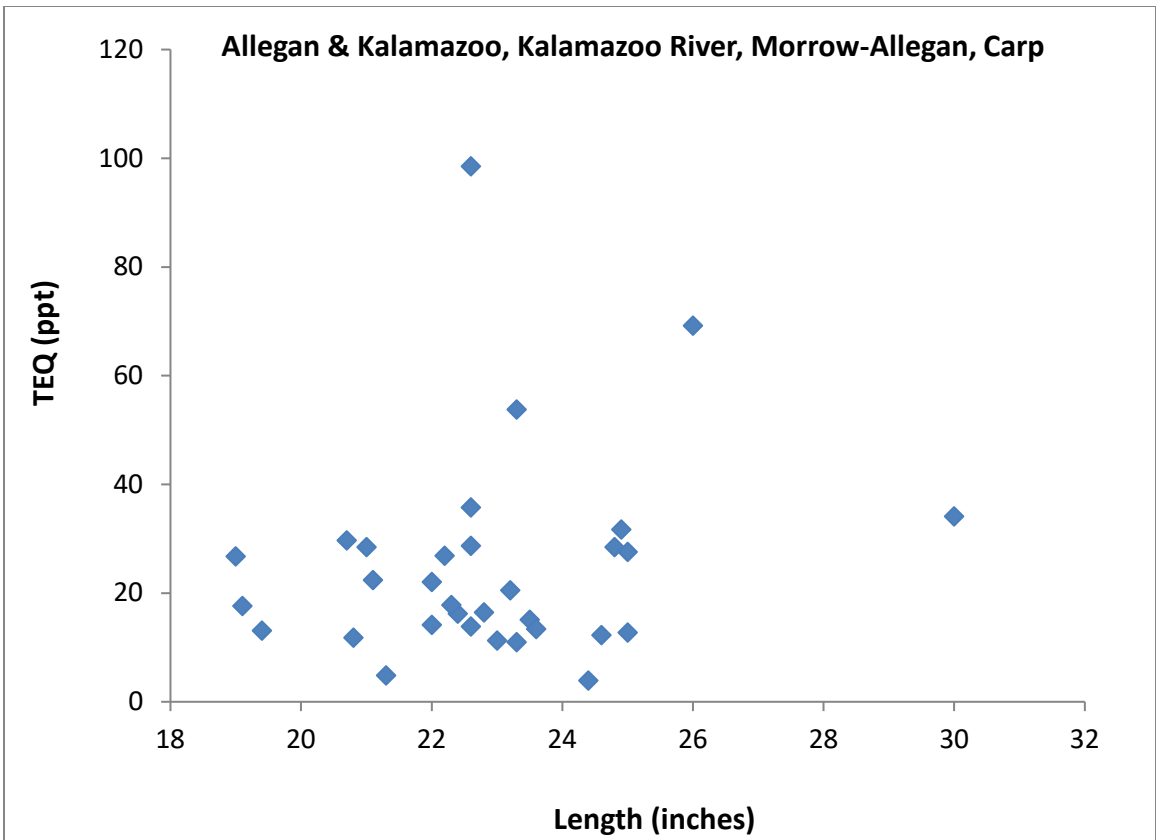
* - 2005 WHO; dl-PCBs included

Existing Advisory: No one should eat carp from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs. Mercury would cause an advisory.

Recommendation: No one should eat carp from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs. Dioxin, PFOS, and mercury would cause an advisory.







Channel Catfish

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

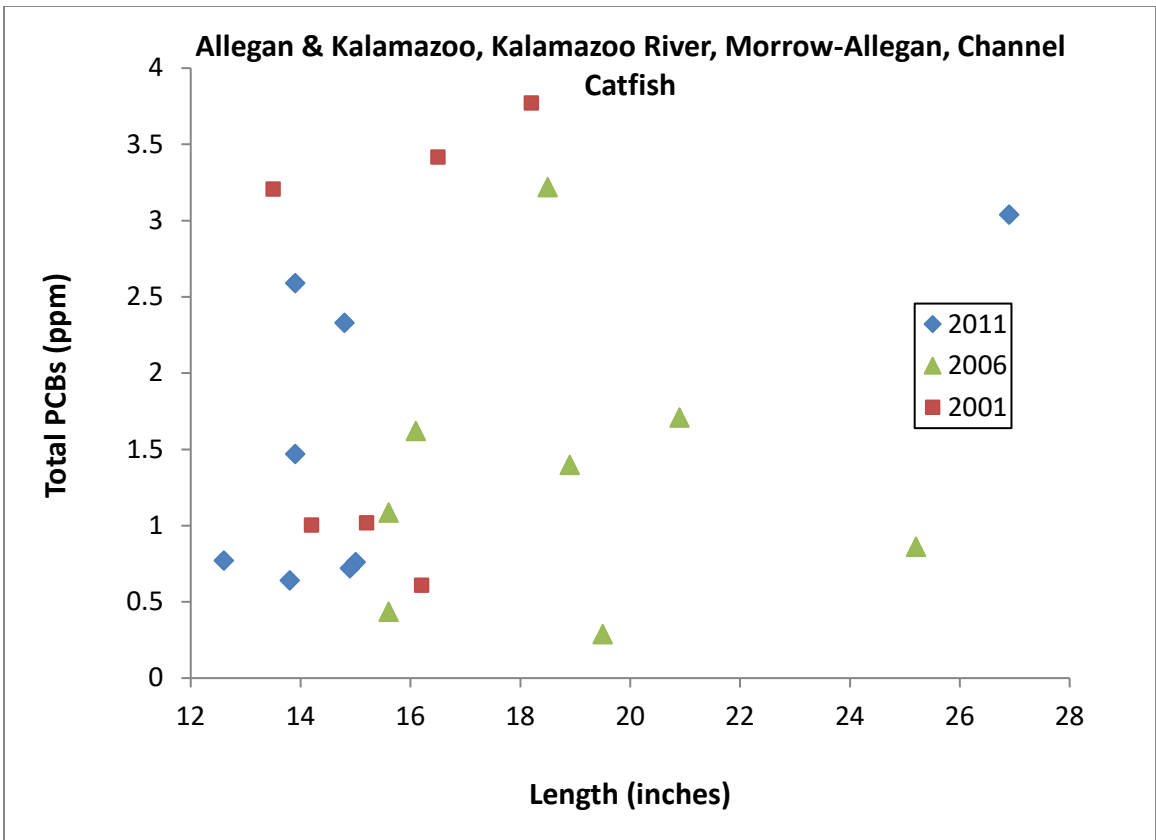
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2011	22	12.6	12	12.6	26.9
Datasets available: 1999, 2001, 2006, 2011						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	22	1.64	0.29	3.77	2.12	Limited*
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.033	0.020				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						Limited*

Existing Advisory: No one should eat channel catfish from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs.

Recommendation: Sediment remediation projects are ongoing in this reach of the Kalamazoo River. *No one should eat catfish from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs. Management determination used to set this guideline.



Northern Pike

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	24	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	1	24.4	24	24.4	24.4
Datasets available: 1987, 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.42	0.42	0.42	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat northern pike from the Kalamazoo River between Morrow and Allegan Dams as part of an “all other species” advisory due to PCBs.

Recommendation: Dataset is insufficient to set a guideline. No fish should be eaten from this segment of river due to PCB contamination. Sediment remediation projects are ongoing in this reach of the Kalamazoo River. No one should eat northern pike from the Kalamazoo River between Morrow Dam and Allegan Dam due to PCBs. Management determination used to set this guideline.

Redhorse Sucker

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan & Kalamazoo
Counties**

Hg Analysis:

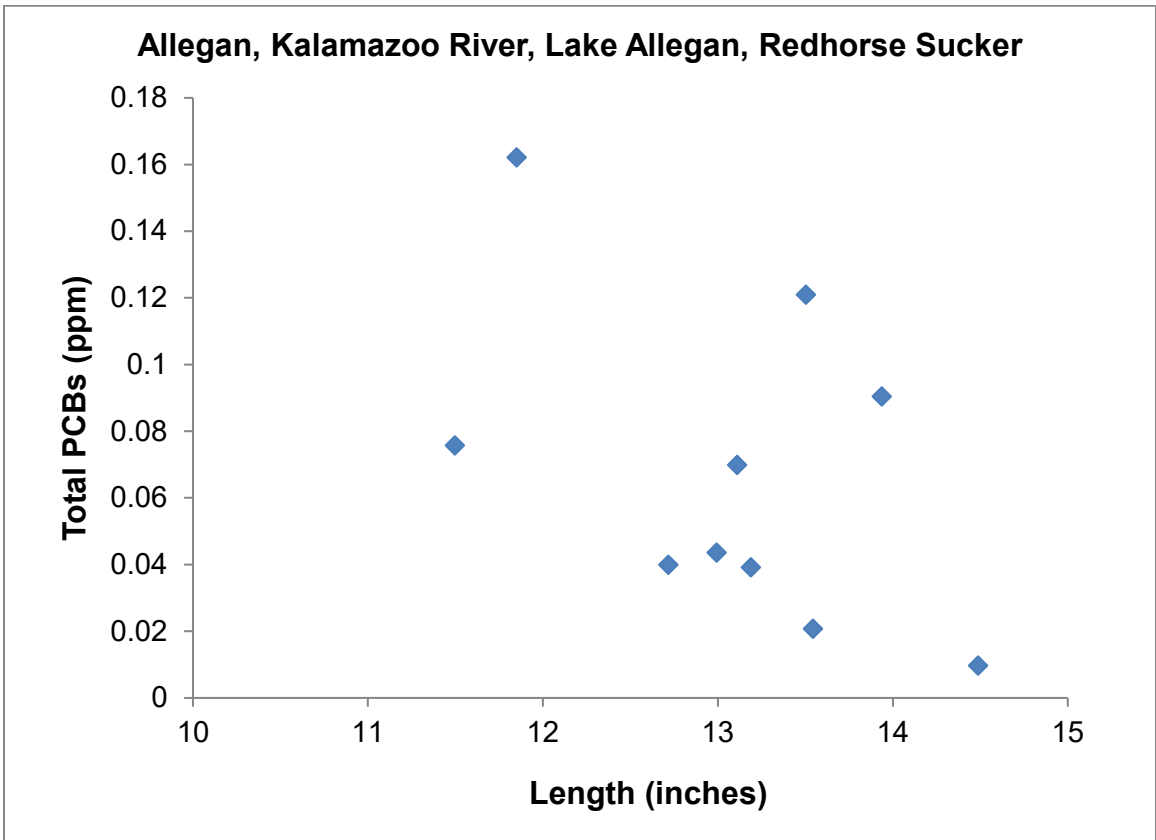
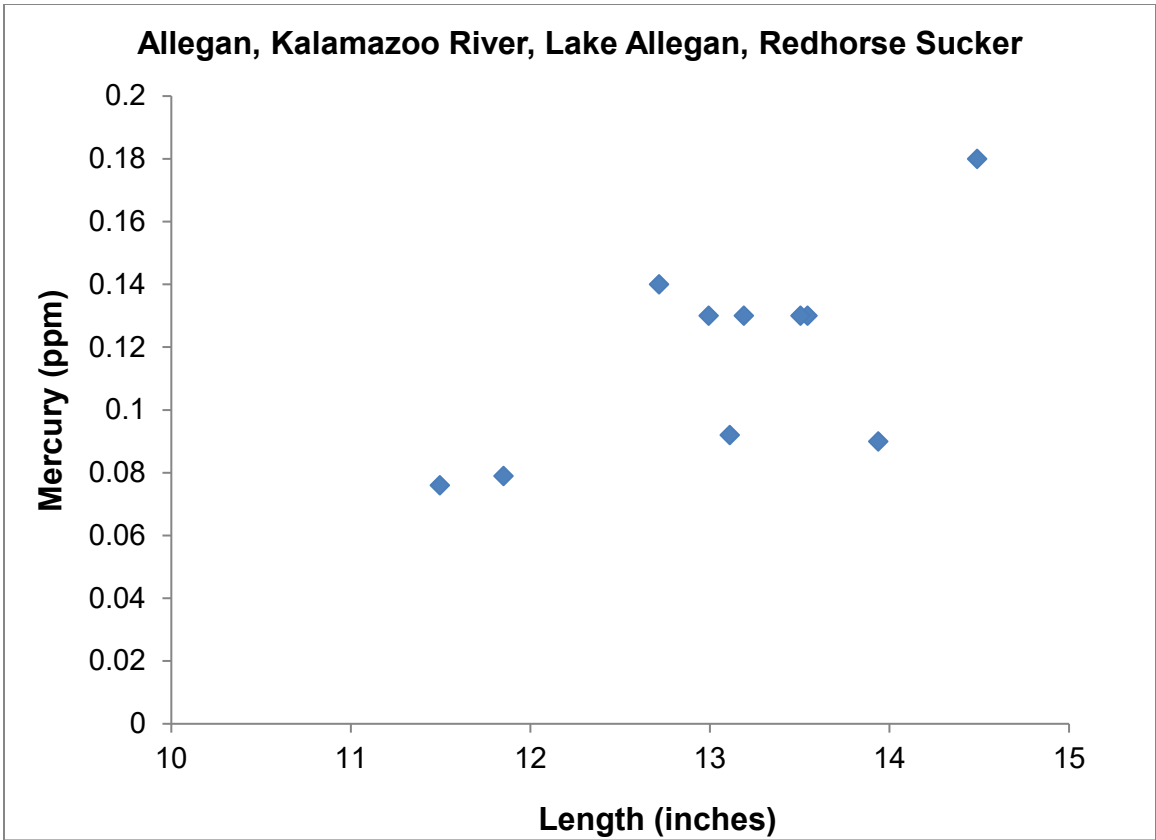
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	11.5	NA	11.5	14.5
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.118	0.076	0.180	0.141	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.461	0.471				

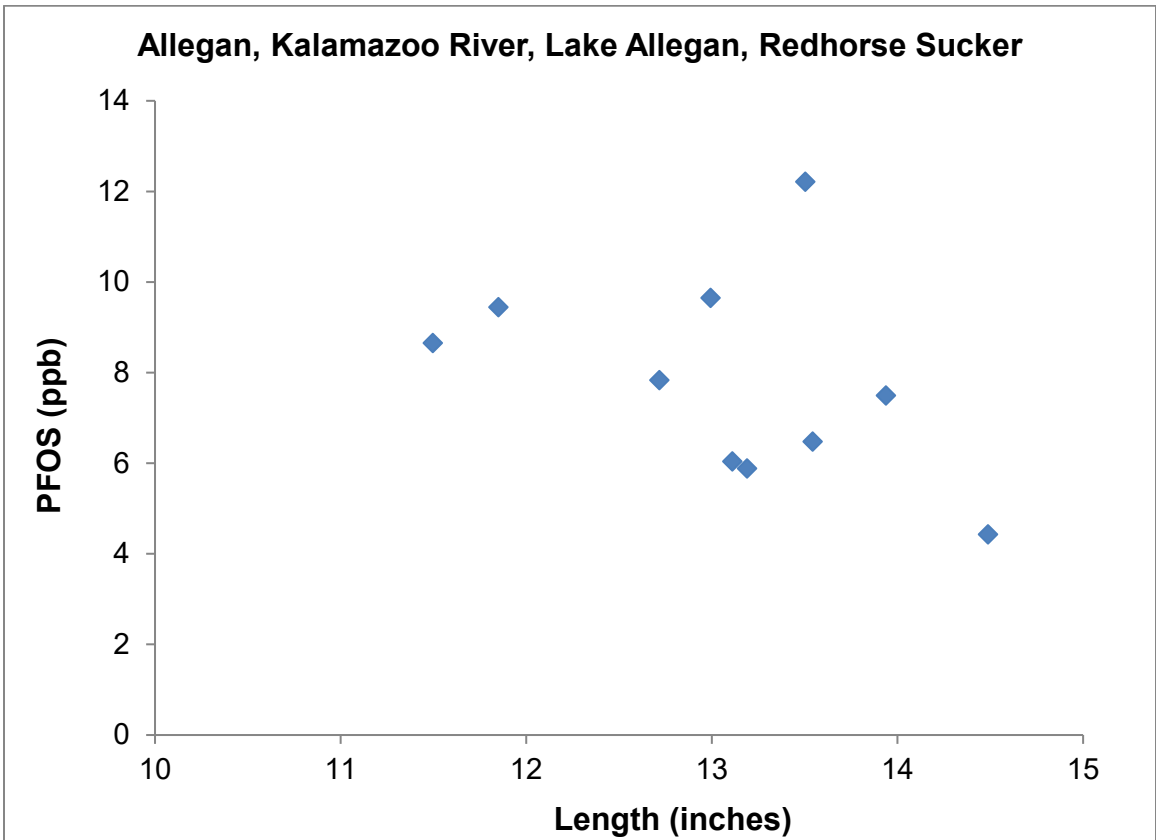
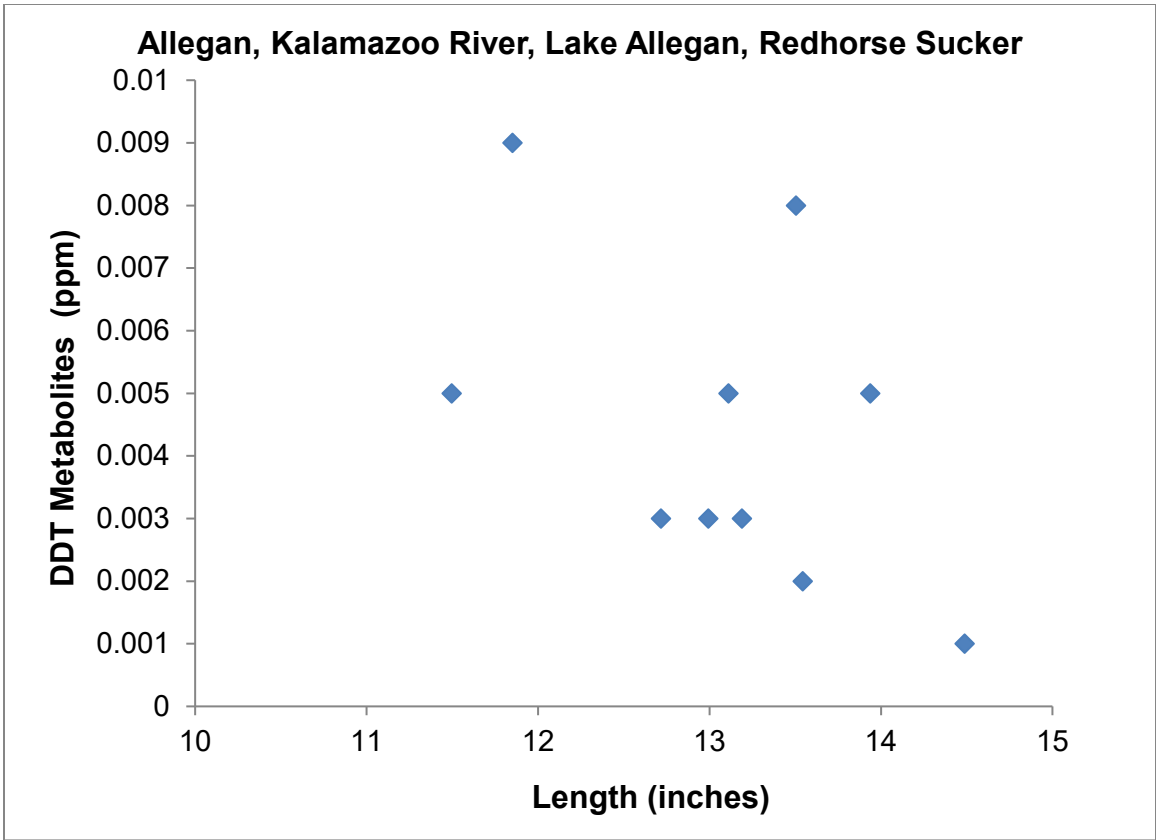
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2020	2020	10	11.5	NA	11.5	14.5
Datasets available: 2020						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.067	0.010	0.162	0.101	2
DDT	10	0.004	0.001	0.009	0.006	16
Chlordane	10	ND	--	--	--	16
Toxaphene	10	ND	--	--	--	--
PFOS	10	7.8 ppb	4.4 ppb	12.2 ppb	9.4 ppb	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.224	0.321				
DDT	0.234	0.325				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.170	0.247				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Suckers from the Kalamazoo River upstream of the Allegan dam to the Morrow dam, including Lake Allegan, are covered under the Do Not Eat 'all other species' from this stretch of the river due to PCBs.

Recommendation: No one should eat suckers of any size from the Kalamazoo River upstream of the Allegan dam to the Morrow dam, including Lake Allegan, due to PCBs. Management determination used to set this guideline. Mercury and PFOS causes less restrictive advice. Additional fish upstream of Lake Allegan are needed for analysis to evaluate this advisory.





Rock Bass

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	1	8.3	na	8.3	8.3
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.05	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should note eat rock bass from the Kalamazoo River between Morrow and Allegan Dams as part of an “all other species” advisory due to PCBs.

Recommendation: Dataset is insufficient to set a guideline. No fish should be eaten from this segment of river due to PCB contamination. Sediment remediation projects are ongoing in this reach of the Kalamazoo River. No one should eat rock bass from the Kalamazoo River between Morrow Dam and Allegan Dam due to PCBs. Management determination used to set this guideline.

Smallmouth Bass

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2013	46	10.3	14	13.5	17.1
Datasets available: 2006, 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	18	0.27	0.12	0.53	0.32	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.236	0.296				

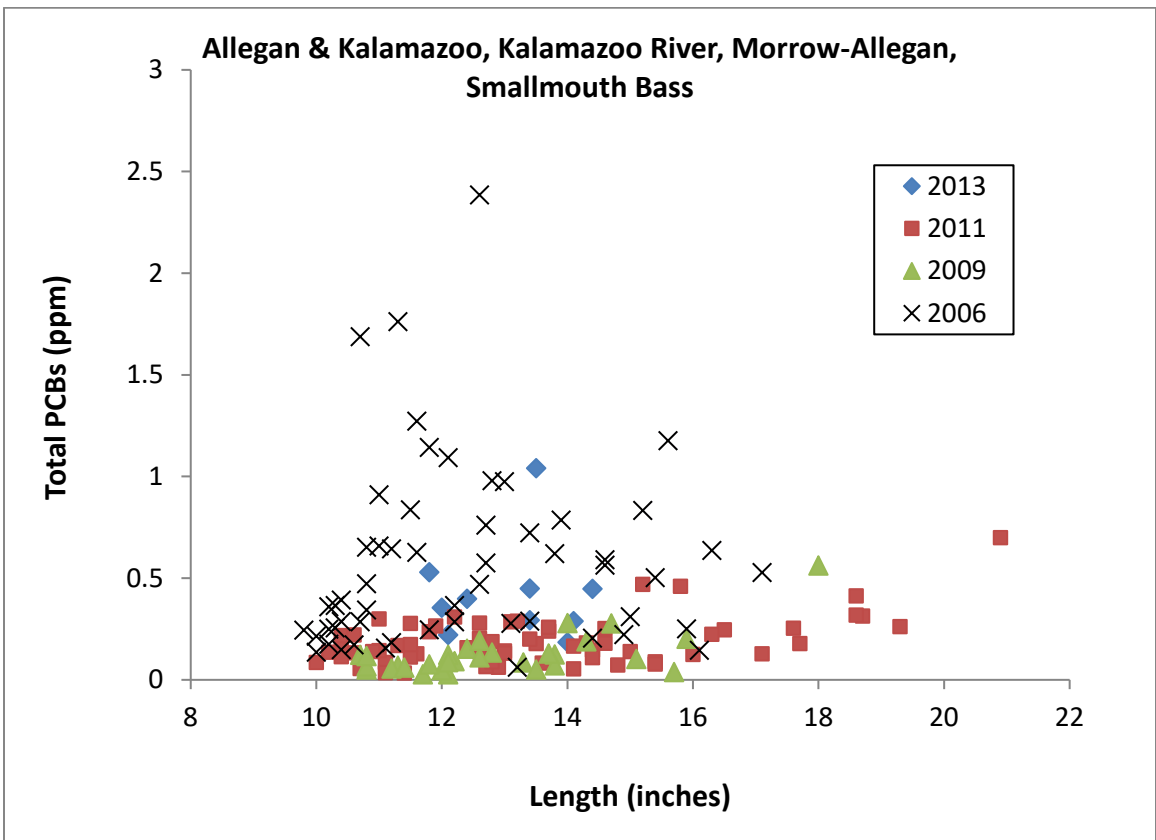
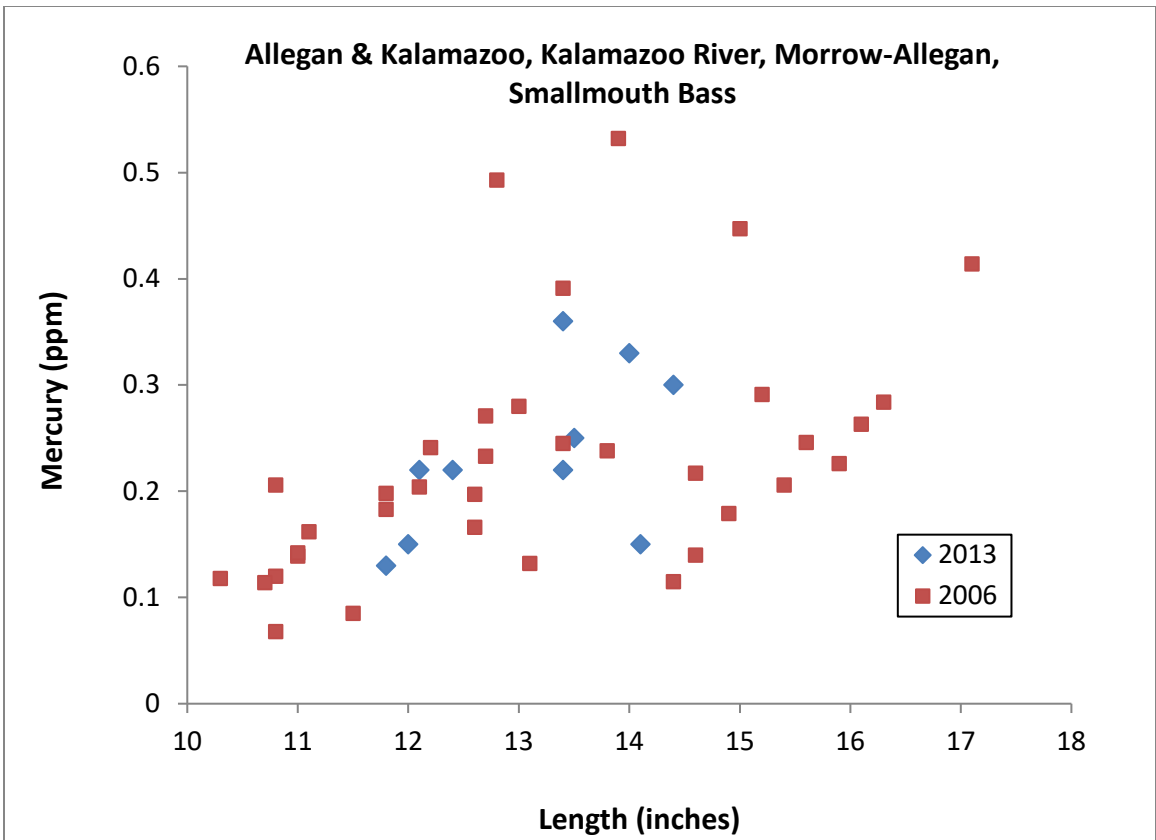
Organics Analysis:

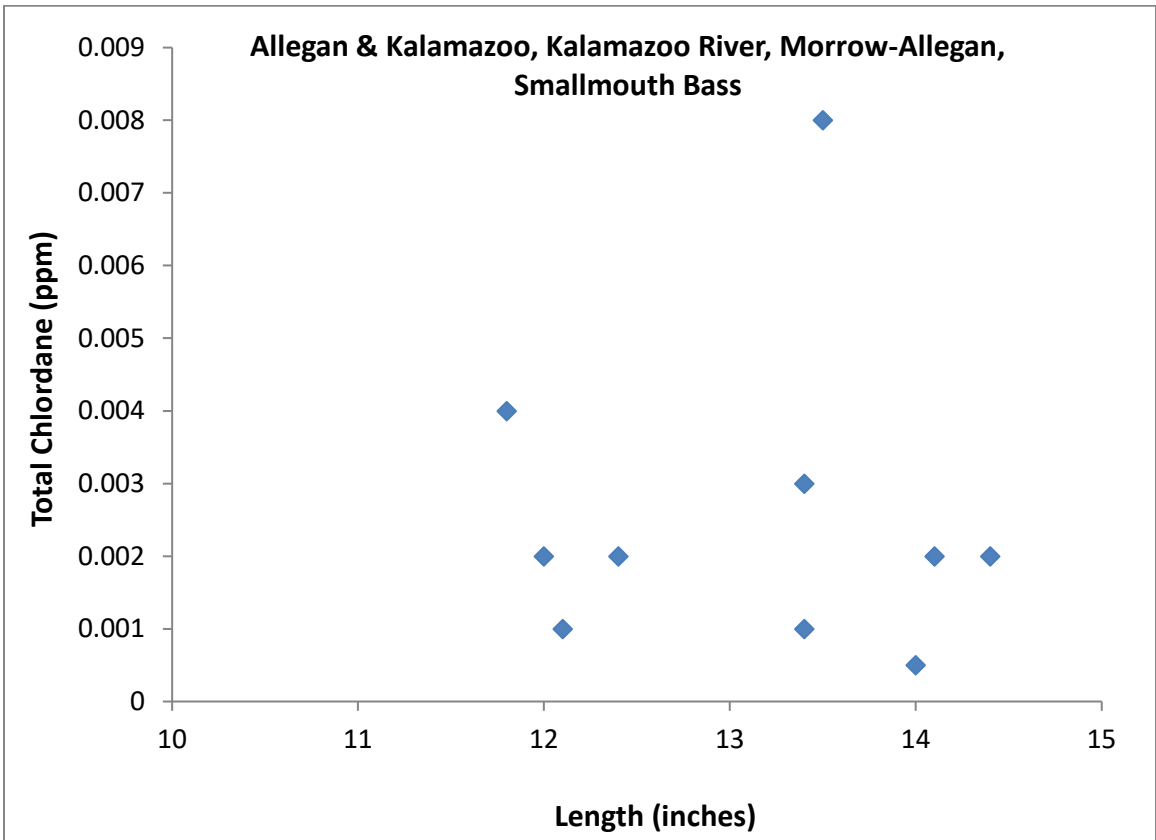
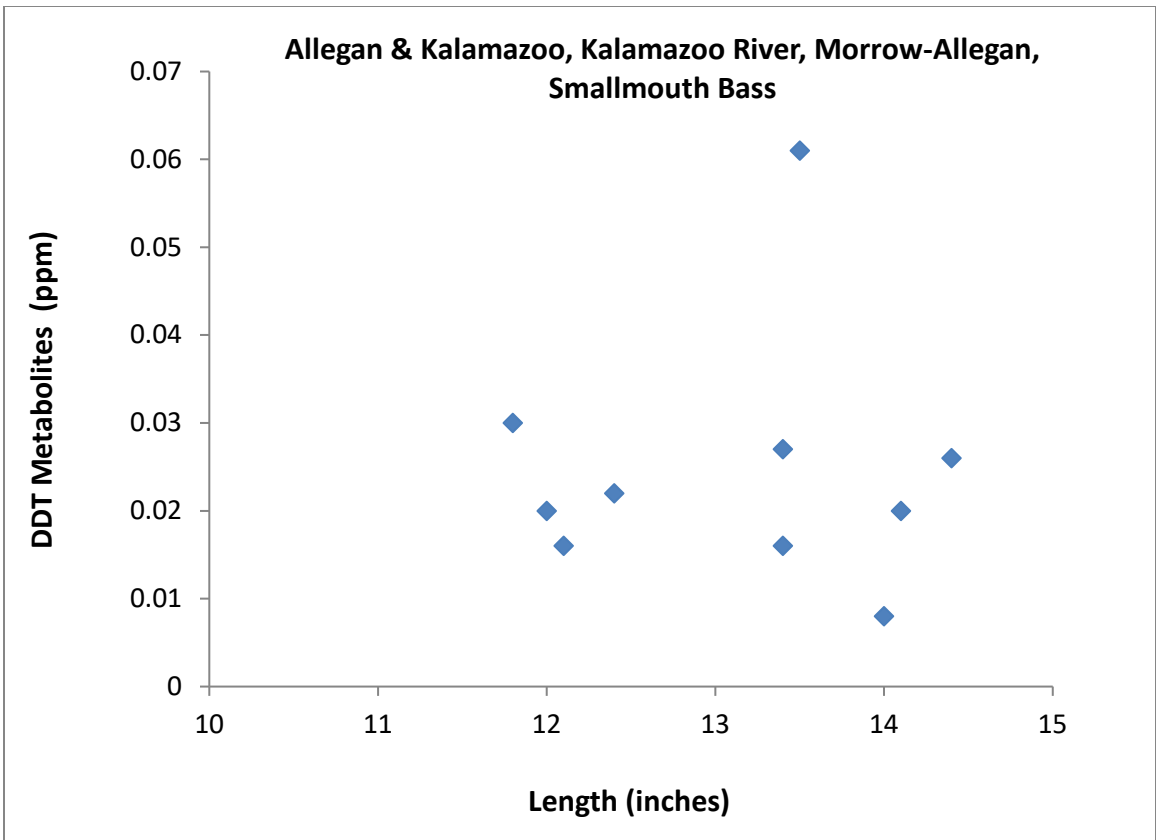
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2013	158	9.8	14	13.5	20.9
Datasets available: 1983, '85, '87, '99, '00, '01, '06, '09, '11, '13						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	57	0.31	0.04	1.18	0.380	0.5
DDT	4	0.03	0.01	0.06	0.065	16
Chlordane	4	0.003	0.001	0.008	0.008	--
Toxaphene	4	ND	--	--	--	--
PFOS	10*	82 ppb	61 ppb	99 ppb	93 ppb	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.001	0.015				
DDT	0.001	0.008				
Chlordane	0.001	0.022				
Toxaphene	--	--				
PFOS	0.040	0.049				
Final meal category based on UCL:						0.5*

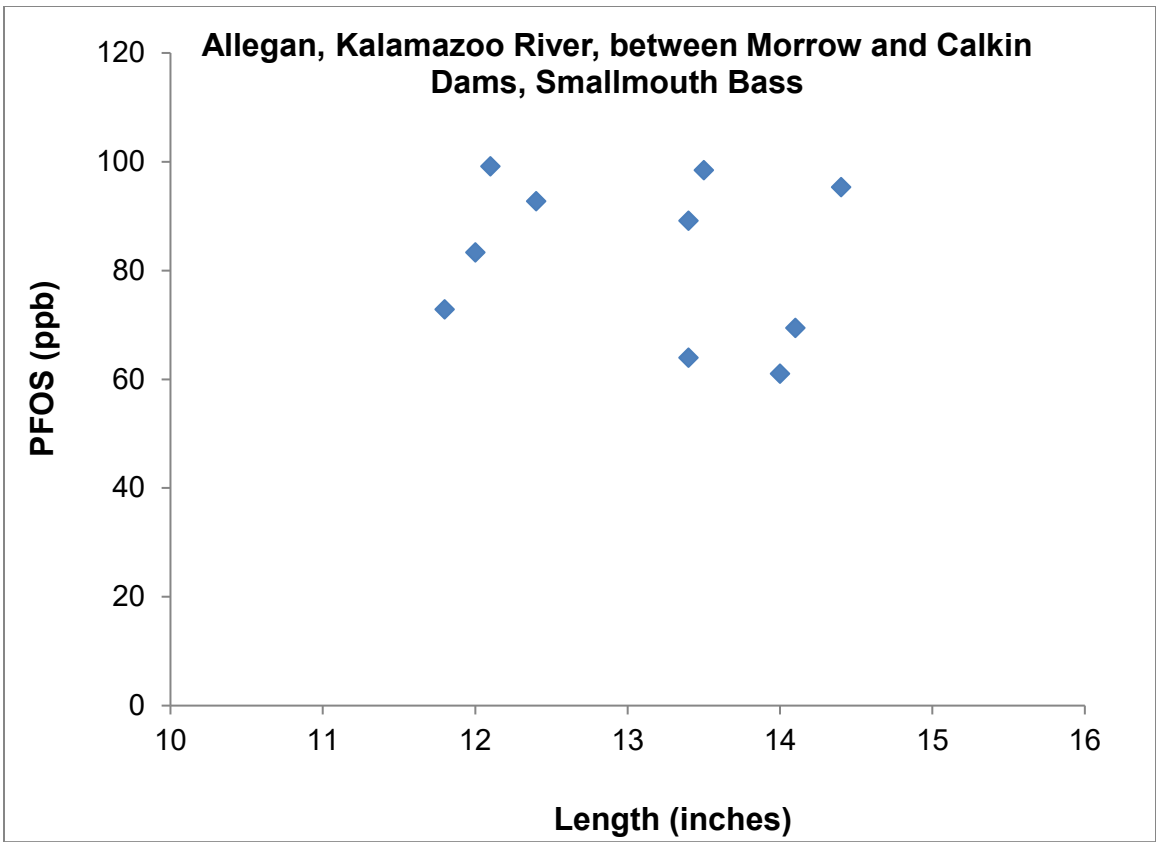
* - 10 fish collected in 2013 analyzed, 4 of legal size; all used in evaluation

Existing Advisory: No one should eat largemouth or smallmouth bass from the Kalamazoo River between Morrow and Allegan Dams, including Lake Allegan, due to PCBs.

Recommendation: Sediment remediation projects are ongoing in this reach of the Kalamazoo River. *No one should eat smallmouth bass or largemouth bass from the Kalamazoo River between Morrow Dam and Allegan Dam, including Lake Allegan, due to PCBs. PFOS and mercury would cause an advisory. Management determination used to set this guideline.







Walleye

**Kalamazoo River
Morrow Dam to Allegan Dam**

**Allegan &
Kalamazoo Counties**

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	15	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	2	16.9	15	16.9	22.8
Datasets available: 1993, 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	1.06	0.32	1.80	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
TEQ	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should note eat walleye from the Kalamazoo River between Morrow and Allegan Dams as part of an “all other species” advisory due to PCBs.

Recommendation: Dataset is insufficient to set a guideline. No fish should be eaten from this segment of river due to PCB contamination. Sediment remediation projects are ongoing in this reach of the Kalamazoo River. No one should eat walleye from the Kalamazoo River between Morrow Dam and Allegan Dam due to PCBs. Management determination used to set this guideline.

Smallmouth/Largemouth Bass

Kalamazoo River Morrow to Allegan Dam

Allegan & Kalamazoo Counties

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2006	2020	66	9.7	14.0	13.5	20.9	
Datasets available: 2006, 2013, 2015, 2016, 2020							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	29	0.292		0.094	0.620	0.344	2
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.100	0.143					

Organics Analysis:

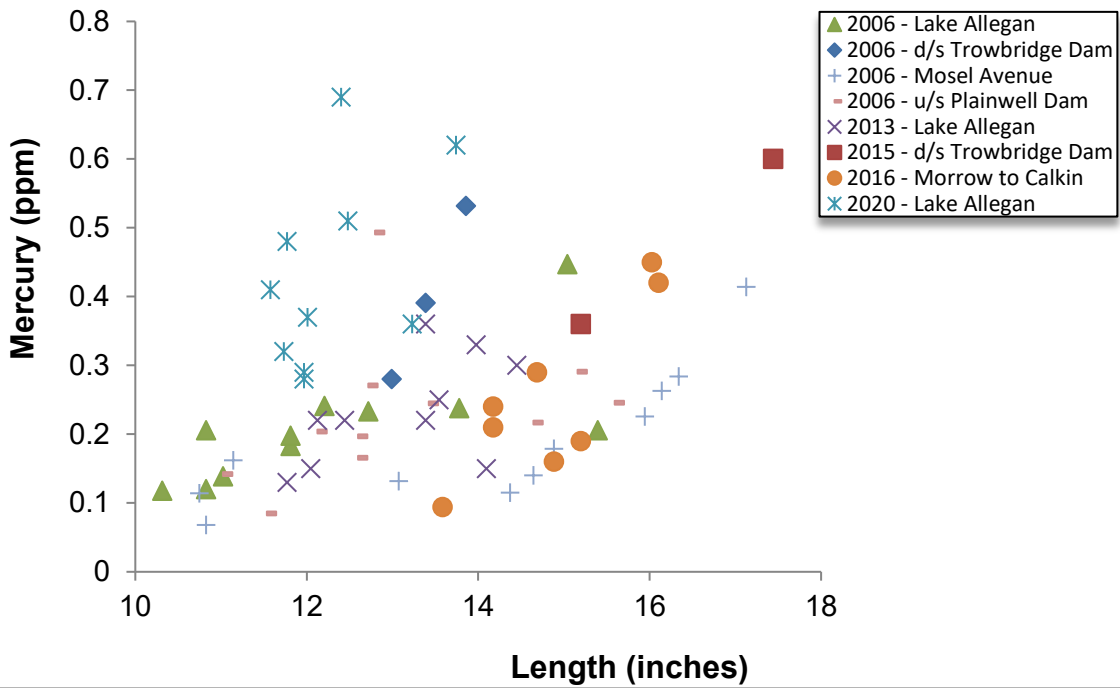
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2006	2020	178	9.8	14.0	13.5	20.9	
Datasets available: 2013, 2020; No PFOS: 1985, 2015, 2016: PCBs Only: 1985, 1987, 1999, 2000, 2001, 2006, 2011							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	68	0.283		0.035	1.177	0.341	0.5
DDT	14	0.017		0.003	0.061	0.027	16
Chlordane	14	0.002		<0.001	0.008	0.003	16
Toxaphene	15	ND		--	--	--	--
PFOS	20*	85.5 ppb		50.4 ppb	163.0 ppb	98.1 ppb	1
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.000	0.009					
DDT	0.002	0.001					
Chlordane	0.000	0.000					
Toxaphene	--	--					
PFOS	0.014	0.030					
Final meal category based on UCL:							0.5

*Sub-legal sized fish used in the analysis as no correlation between fish size and PFOS has been observed in the statewide dataset.

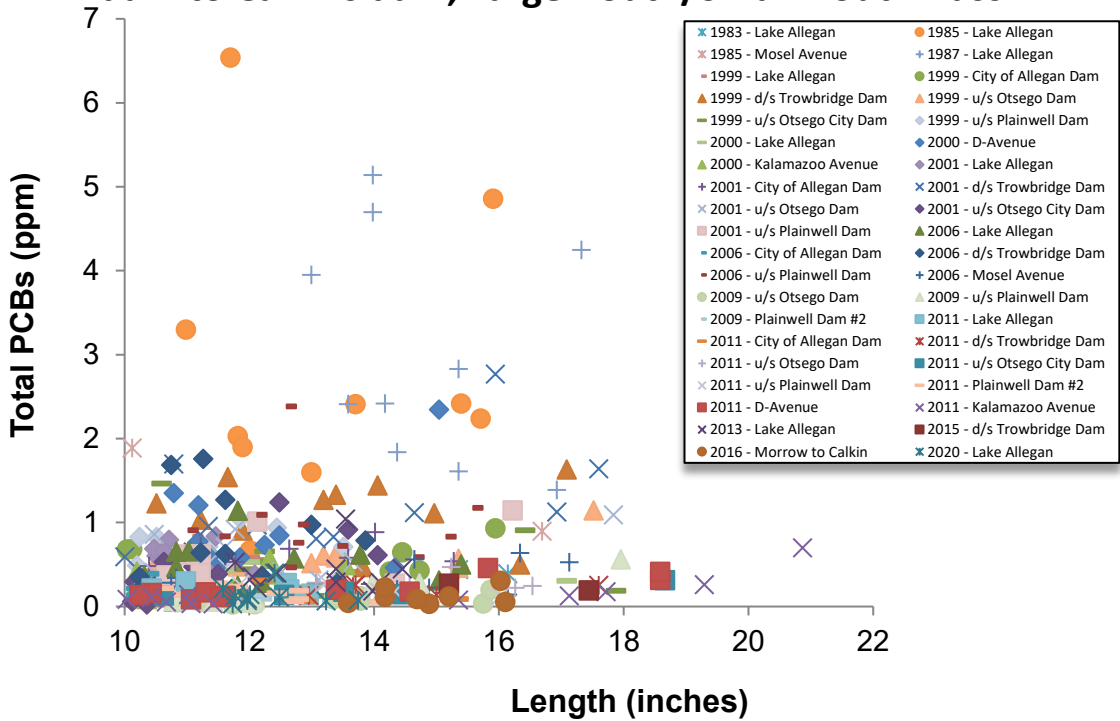
Existing MDHHS Advisory: Sediment remediation projects are ongoing in this reach of the Kalamazoo River. No one should eat smallmouth bass or largemouth bass of any size from the Kalamazoo River between Morrow dam and Allegan dam, including Lake Allegan, due to PCBs. PFOS and mercury cause less restrictive advice. Management determination used to set this guideline.

Recommendation: No change to the advisory is recommended.

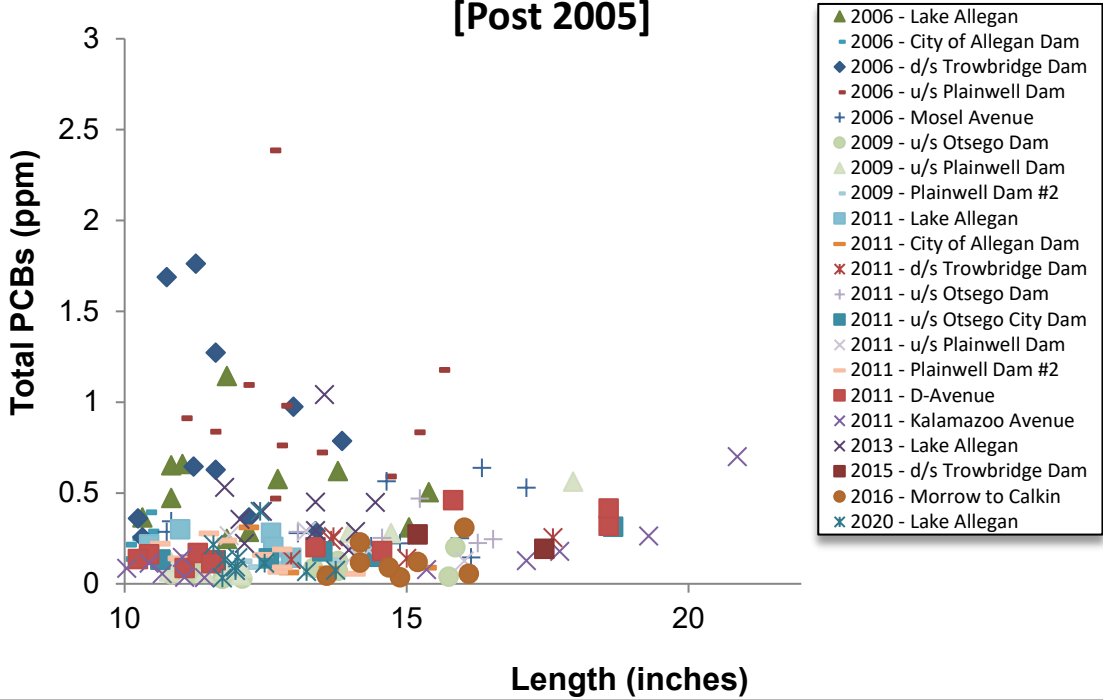
Allegan/Kalamazoo, Kalamazoo River, Morrow dam to Calkins dam, Largemouth/Smallmouth Bass



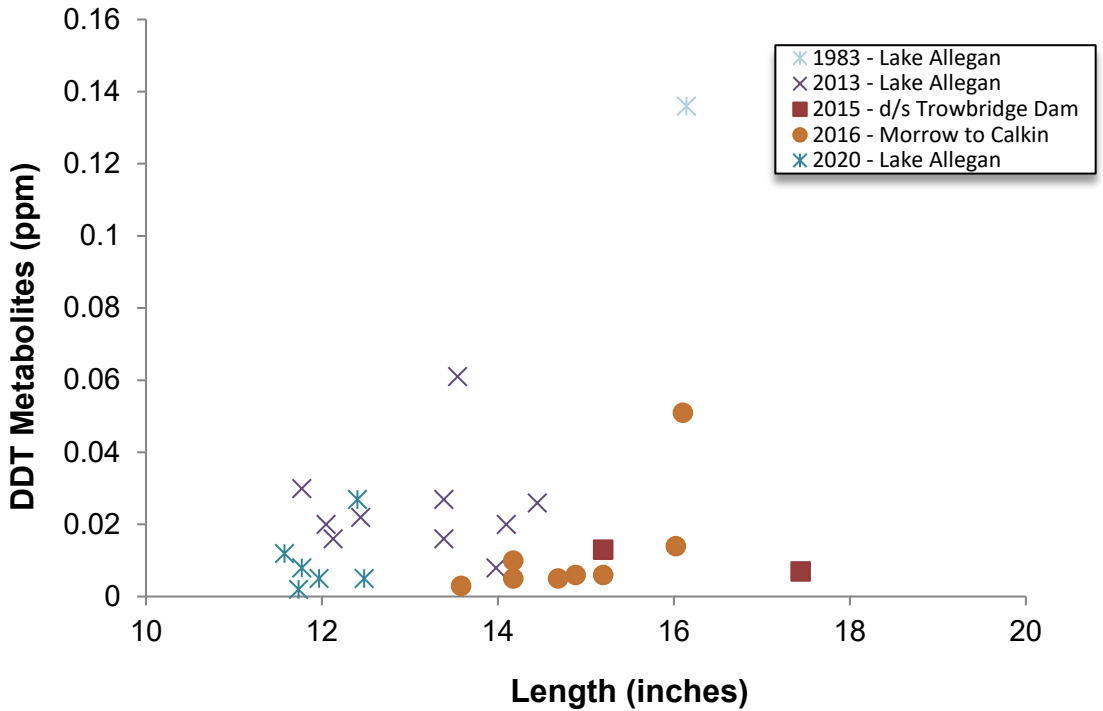
Allegan/Kalamazoo, Kalamazoo River, Morrow dam to Calkins dam, Largemouth/Smallmouth Bass



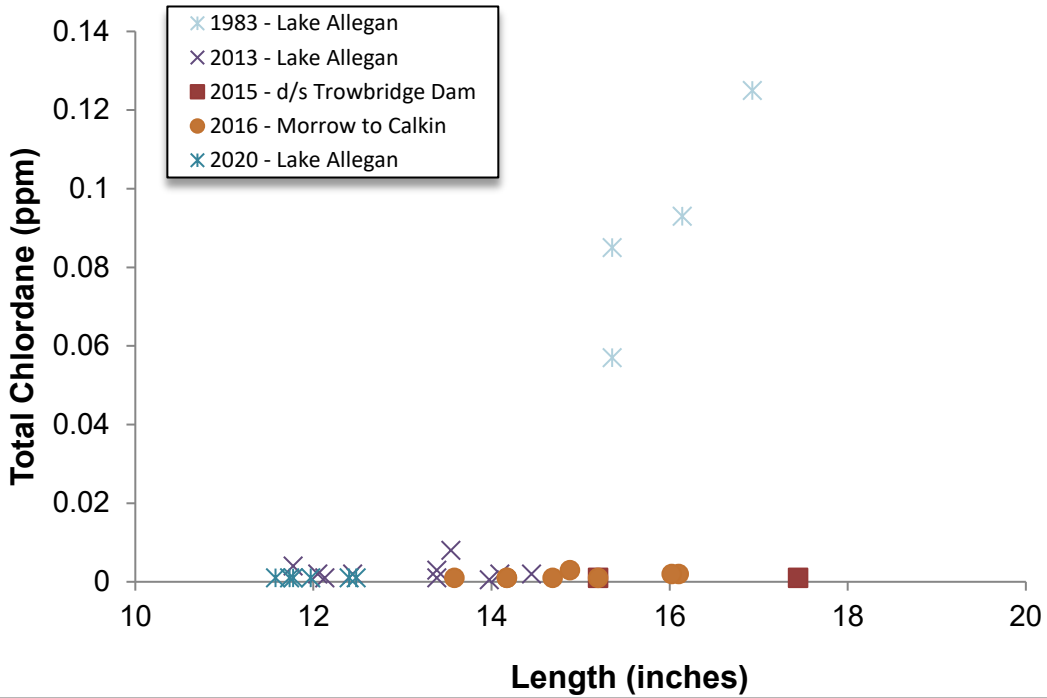
**Allegan/Kalamazoo, Kalamazoo River, Morrow
dam to Calkins dam, Largemouth/Smallmouth Bass
[Post 2005]**



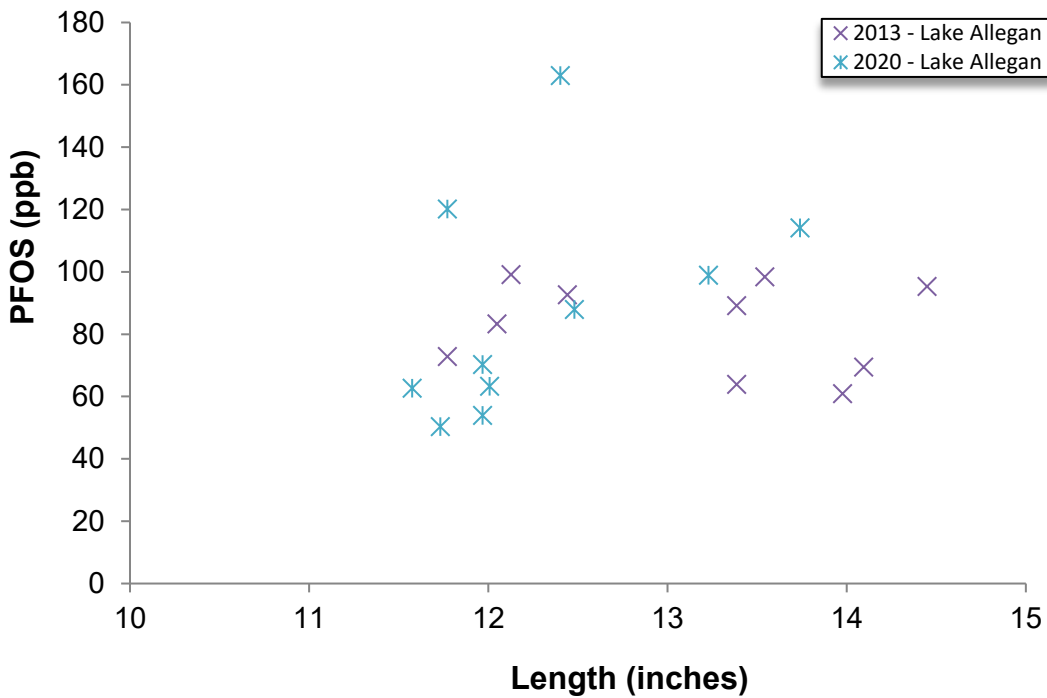
**Allegan/Kalamazoo, Kalamazoo River, Morrow
dam to Calkins dam, Largemouth/Smallmouth Bass**



Allegan/Kalamazoo, Kalamazoo River, Morrow dam to Calkins dam, Largemouth/Smallmouth Bass



Allegan, Kalamazoo River, Lake Allegan, Largemouth/Smallmouth Bass



White Sucker

**Kalamazoo River
South Branch**

Hillsdale County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	8	10.4	na	10.4	16.5
Datasets available:		1998				
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8*	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	8	10.4	na	10.4	16.5
Datasets available:		1998				
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	8*	--	--	--	--	--
DDT	8*	--	--	--	--	--
Chlordane	8*	--	--	--	--	--
Toxaphene	8*	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

*- composite samples

Existing Advisory: There are no current consumption advisories for South Branch Kalamazoo River white sucker.

Recommendation: The dataset consists of results for 2 composite samples of fillets. There are insufficient data available to develop specific advice for South Branch Kalamazoo River sucker. The statewide consumption guidelines recommend that no one eat more than 8 meals per month of suckers of any size due to mercury.

Carp

**Kalamazoo River
Upstream Marshall Dam**

Calhoun County

Hg Analysis:

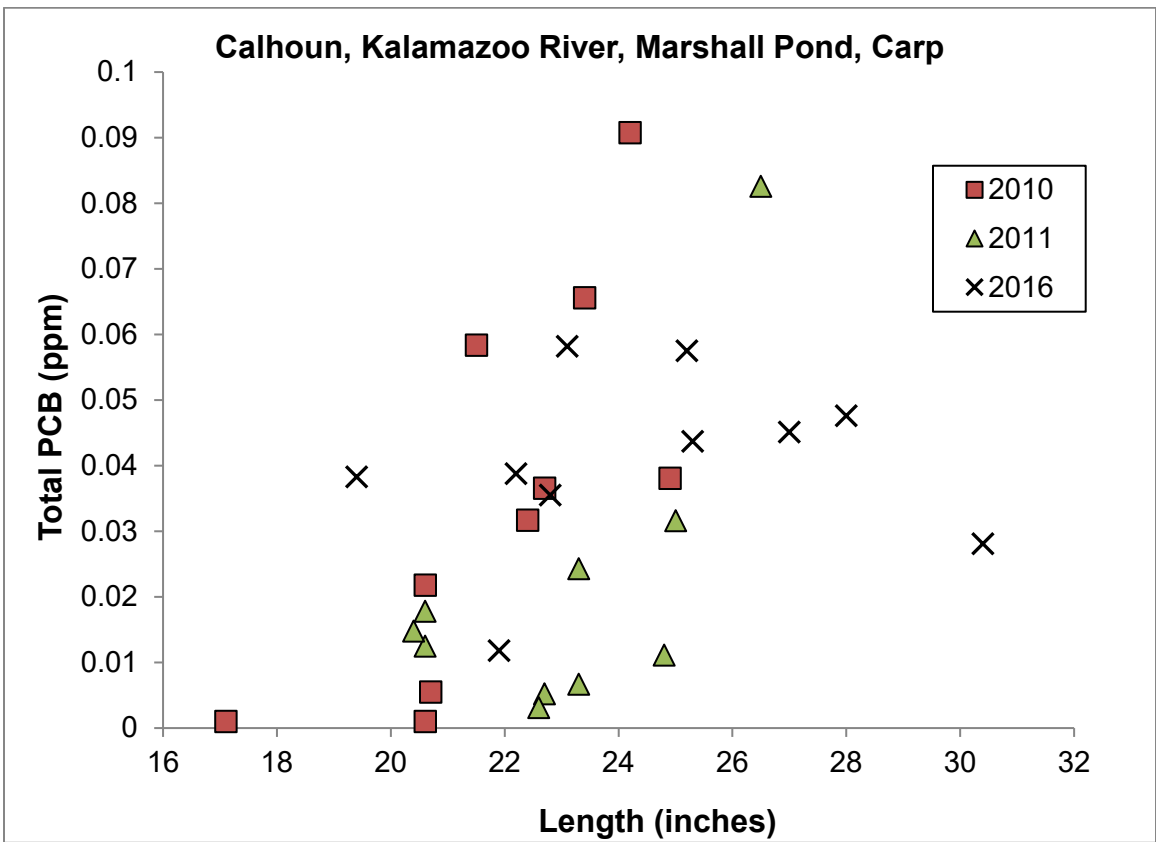
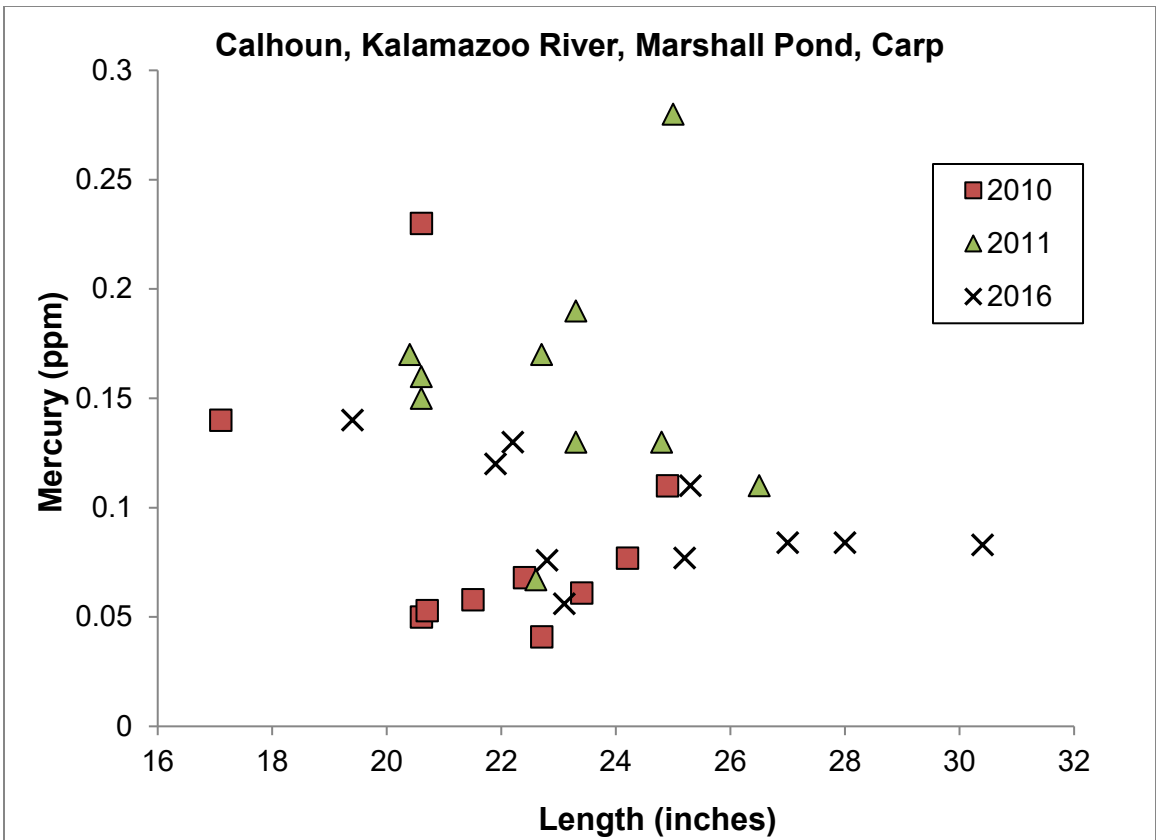
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2010	2016	30	17.1	na	17.1	30.4	
Datasets available: 2010, 2011, 2016							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	30	0.11		0.04	0.28	0.14	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.027	0.018					

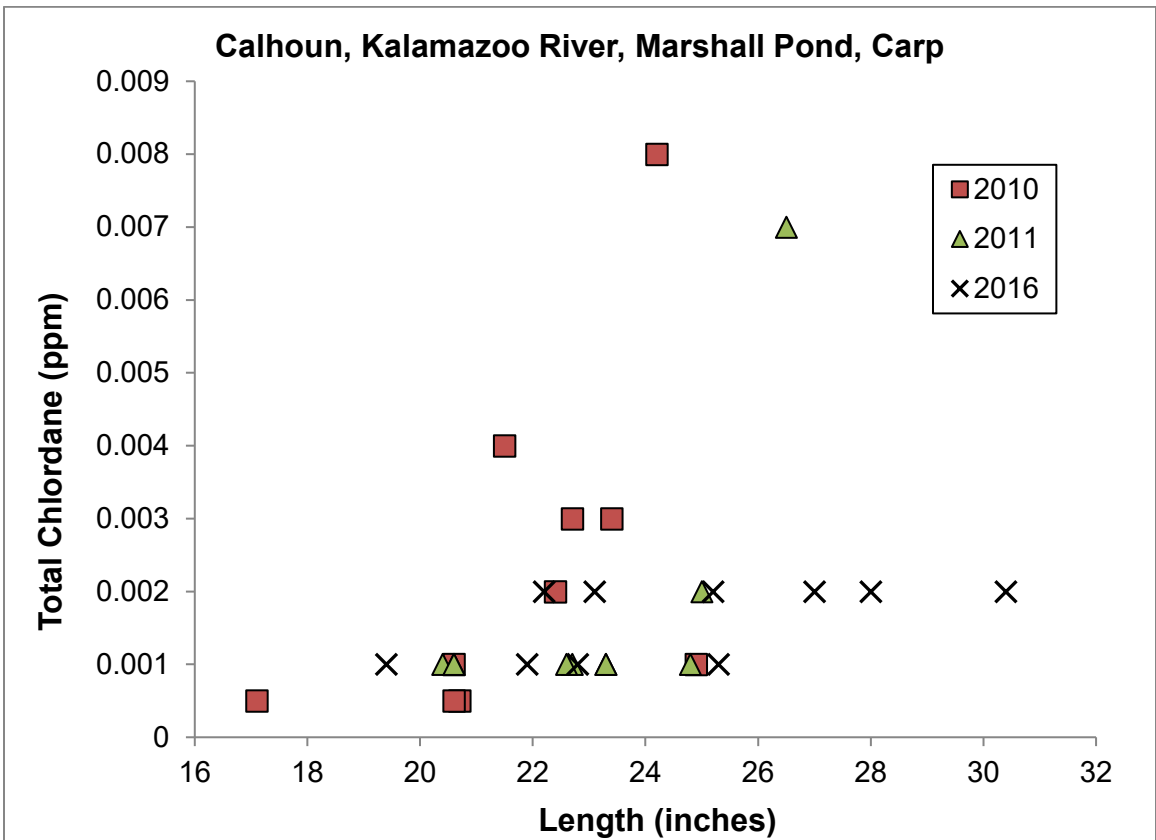
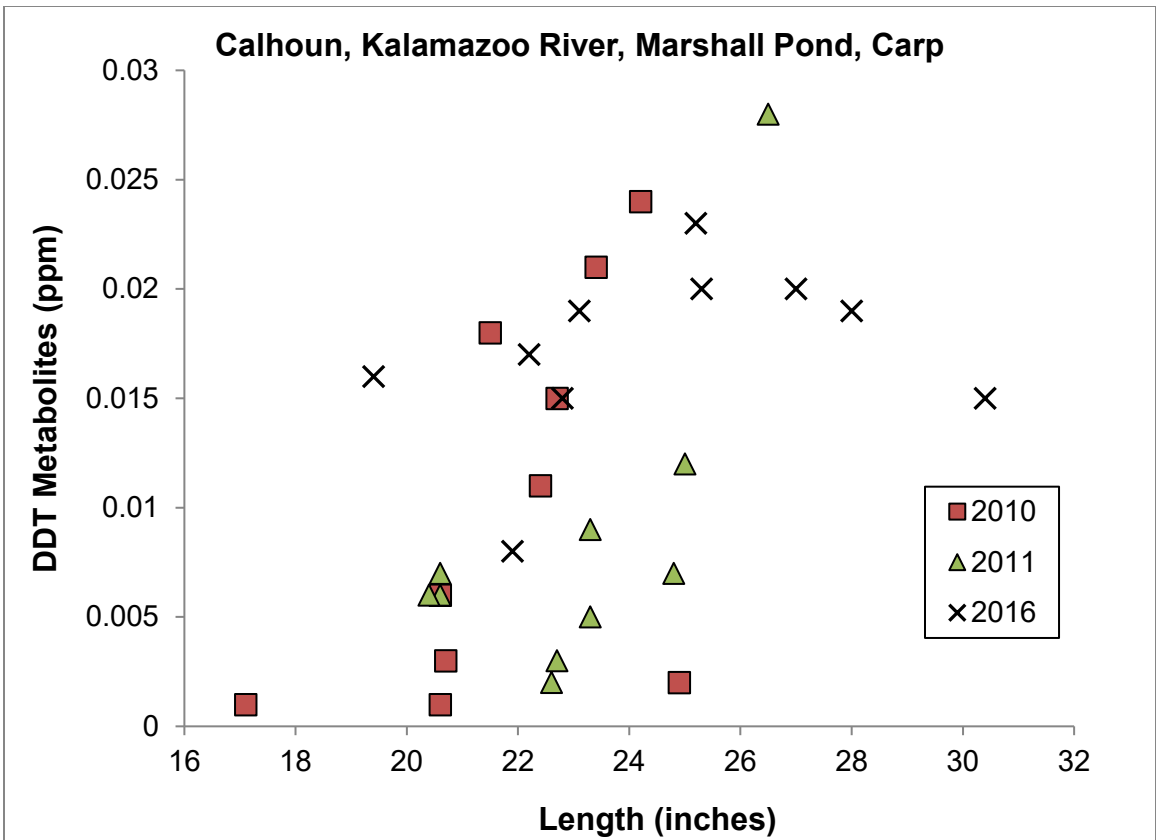
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2010	2016	30	17.1	na	17.1	30.4	
Datasets available: 2010, 2011, 2016							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	30	0.032		0.001	0.091	0.041	4
DDT	30	0.012		0.001	0.028	0.015	16
Chlordane	30	0.002		0.001	0.008	0.003	--
Toxaphene	30	ND		--	--	--	--
TEQ	0	--		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.200	0.268					
DDT	0.277	0.267					
Chlordane	0.115	0.243					
Toxaphene	--	--					
TEQ	--	--					
Final meal category based on UCL:							4

Existing MDHHS Advisory: No one should eat more than 4 meals per month of carp from the Kalamazoo River upstream of the Marshall Dam due to mercury and PCBs.

Recommendation: No change is recommended.





**Largemouth and
Smallmouth Bass
Hg Analysis:**

**Kalamazoo River
Upstream Marshall Dam**

Calhoun County

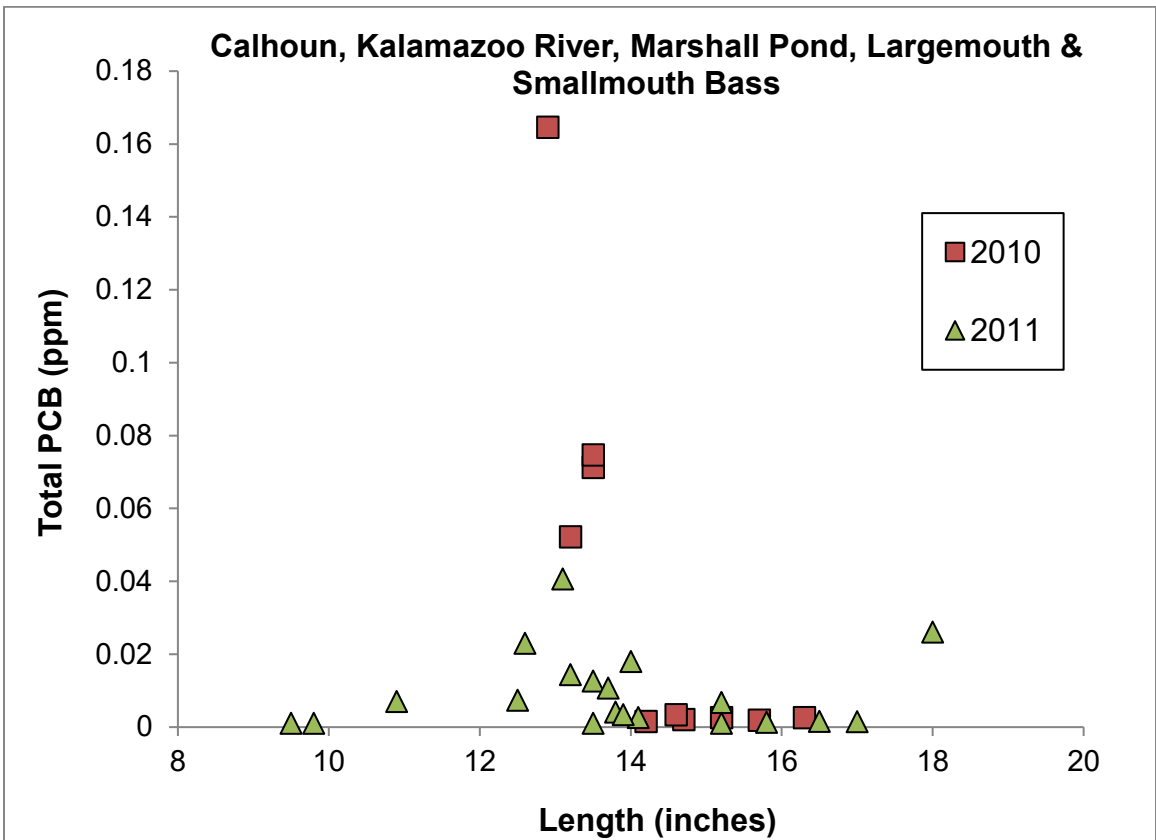
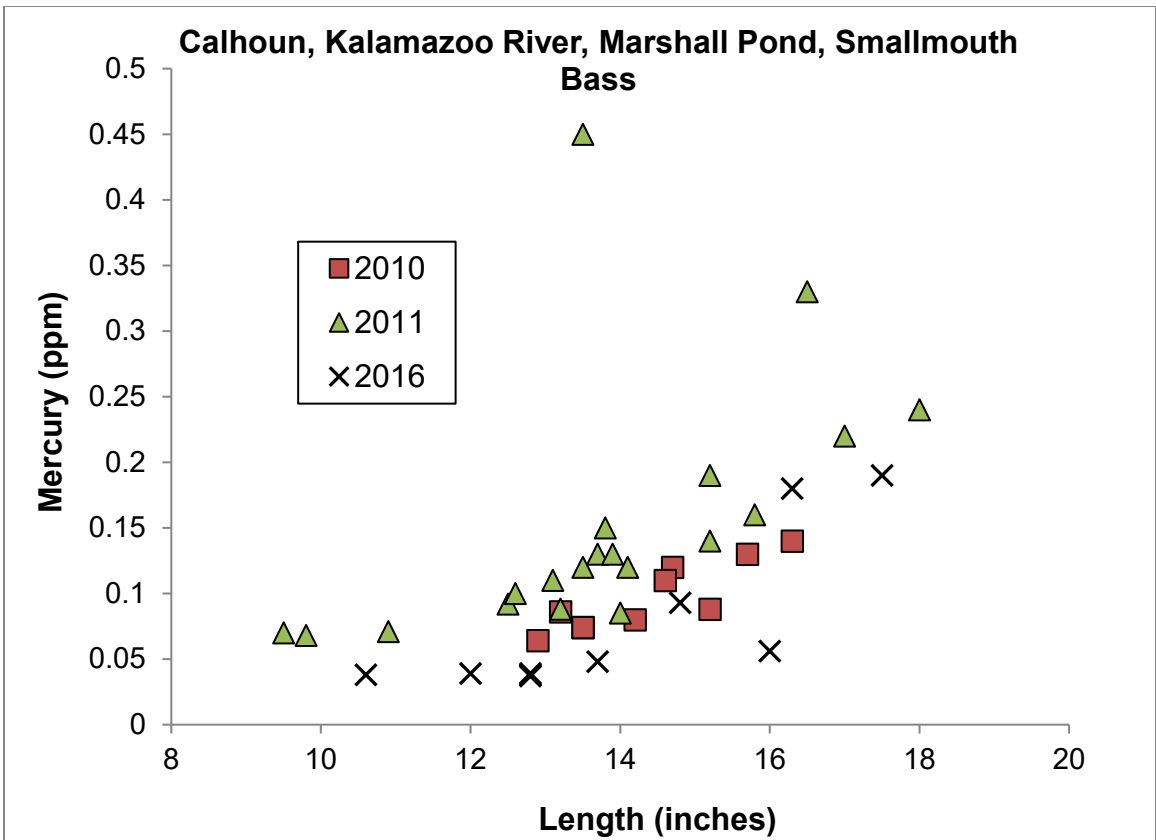
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest 2010	Most Recent 2016	40	9.5	14	Min 13.5	Max 18	
Datasets available: 2010, 2011, 2016							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	26	0.15		0.05	0.45	0.18	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.260	0.385					

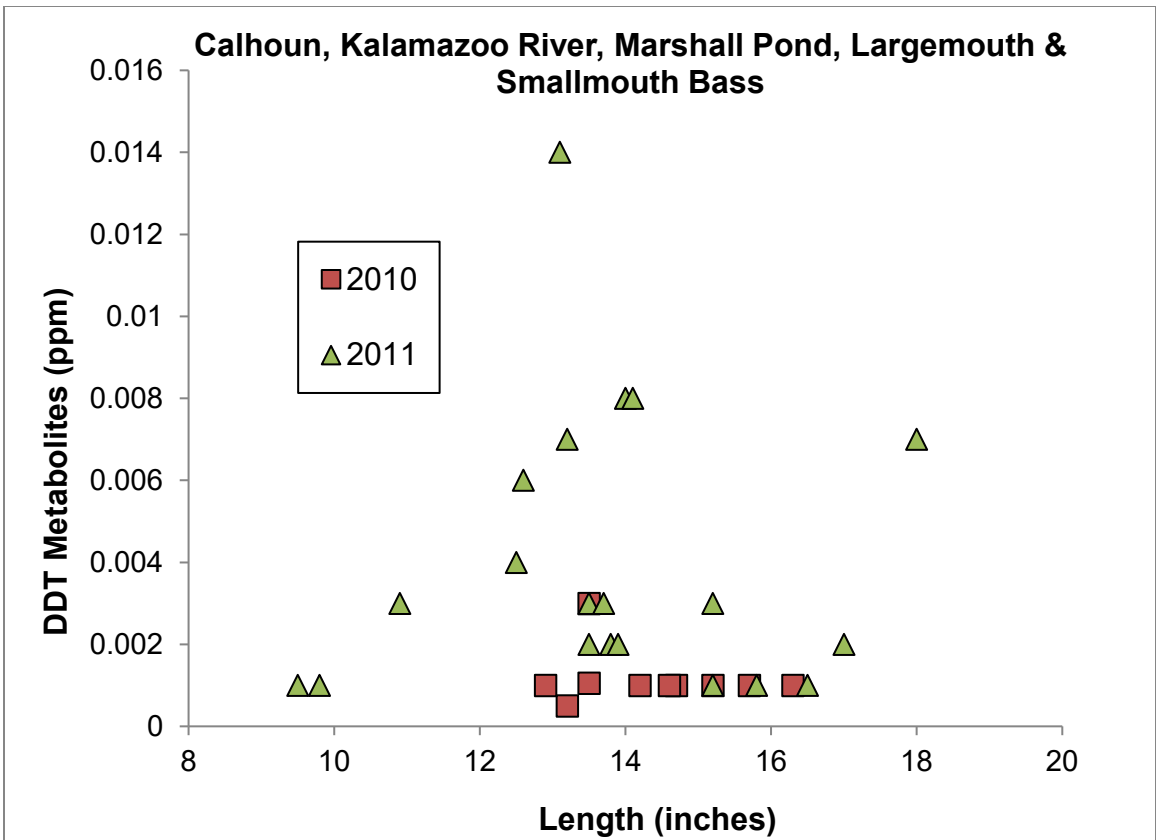
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Chlorinated							
Earliest 2010	Most Recent 2011	30	9.5	14	Min 13.5	Max 18.0	
Datasets available: 2010, 2011							
PFOS							
Earliest 2016	Most Recent 2016	10	10.6	14	13.7	17.5	
Datasets available: 2016							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	21	0.012		0.001	0.08	0.02	12
DDT	21	0.003		0.001	0.008	0.004	16
Chlordane	21	ND		--	--	--	--
Toxaphene	21	ND		--	--	--	--
PFOS	5	2.0 ppb		< 0.25 ppb	5.7 ppb	4.6 ppb	16
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.022	0.014					
DDT	0.001	0.001					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	0.071	0.008					
Final meal category based on UCL:							4

Existing MDHHS Advisory: No one should eat more than 4 meals per month of largemouth or smallmouth bass smaller than 18 inches from the Kalamazoo River upstream of the Marshall Dam or more than 2 meals per month of those fish larger than 18 inches due to mercury. PCBs would cause an advisory. Statewide length break applied as the size range of the fish was limited.

Recommendation: No change is recommended.





Rock Bass

**Kalamazoo River
Upstream Marshall Dam**

Calhoun County

Hg Analysis:

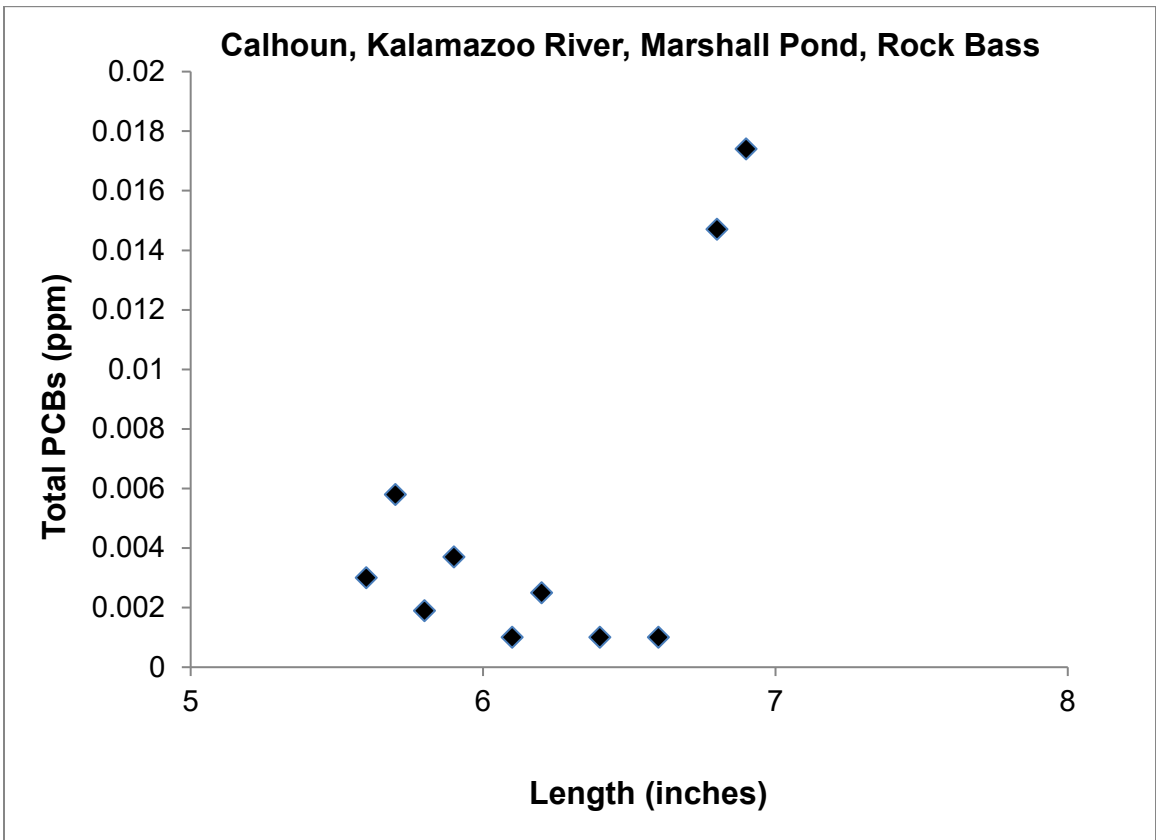
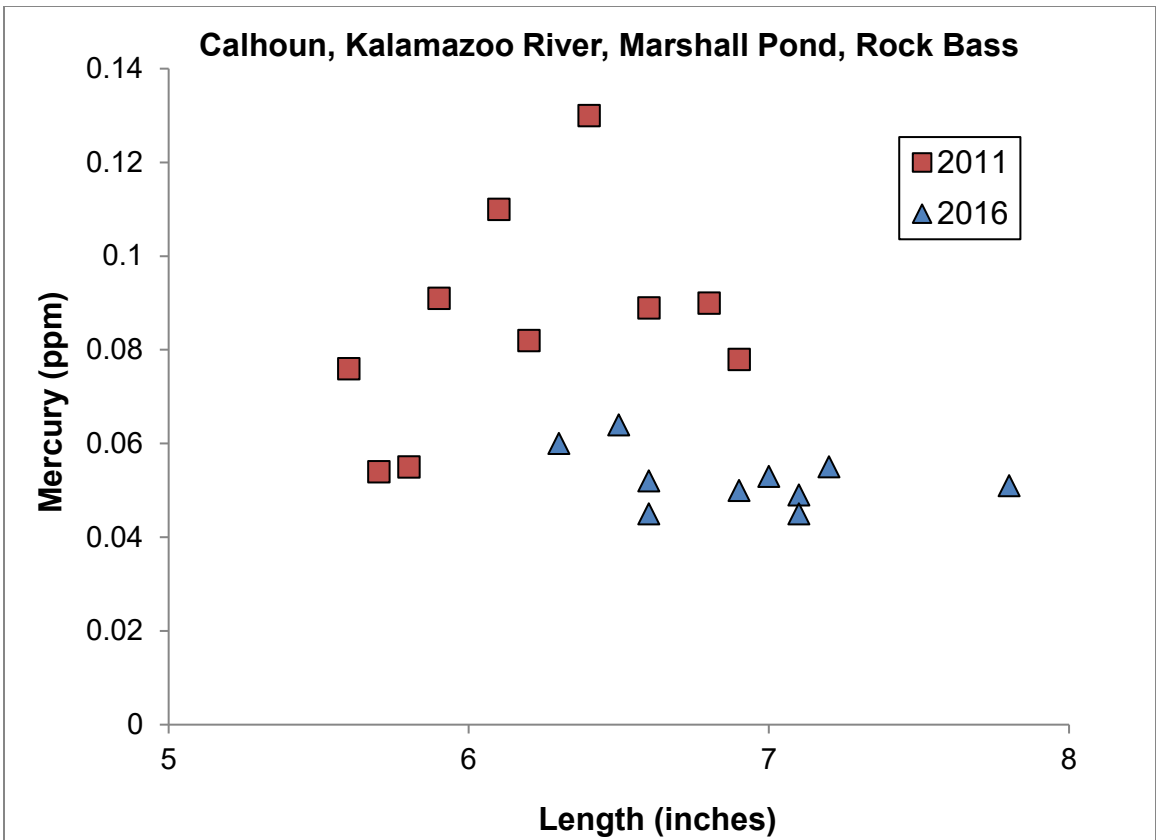
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2011	2016	20	5.6	na	5.6	7.8
Datasets available: 2011, 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.07	0.04	0.13	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.124	0.151				

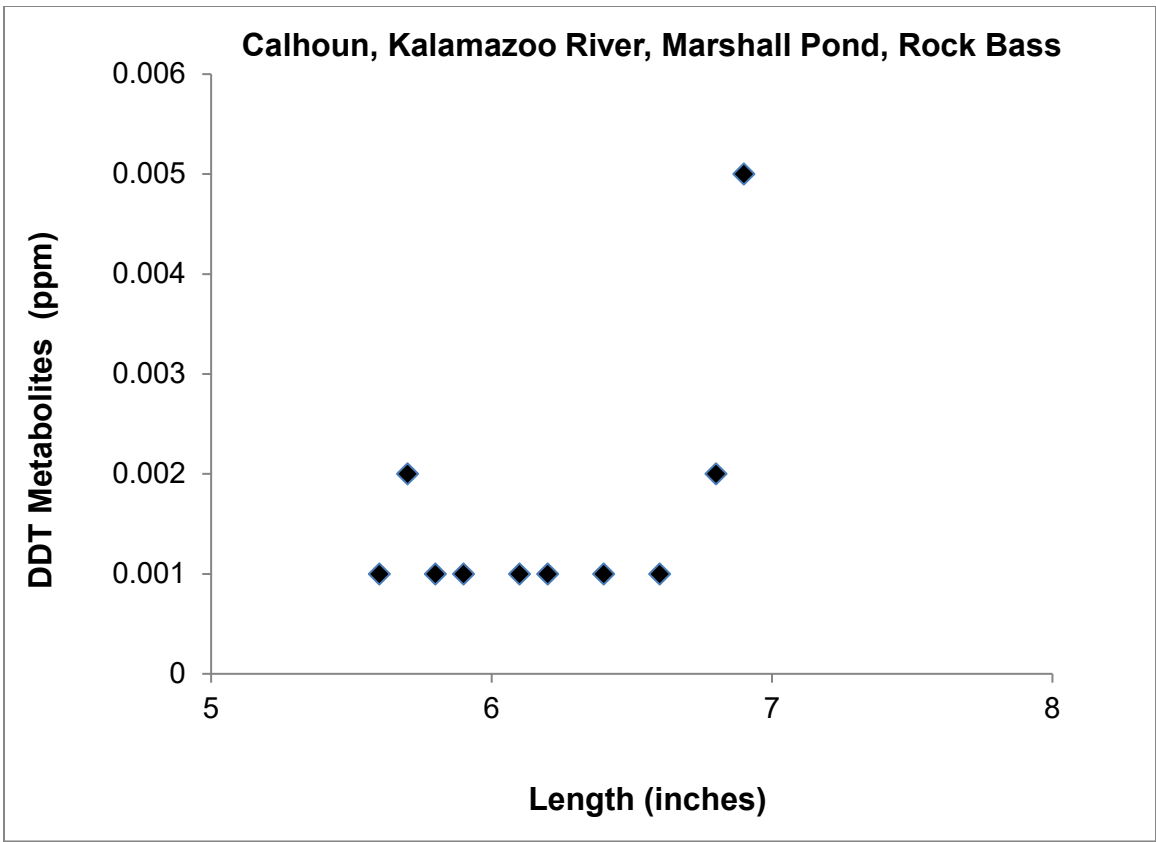
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
Chlorinated						
2011	2011	10	5.6	na	5.6	6.9
Datasets available: 2011						
PFOS						
2016	2016	10	6.3	na	6.3	7.8
Datasets available: 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.005	0.001	0.02	0.01	16
DDT	10	0.002	0.001	0.005	0.003	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--
PFOS	10	ND	<0.25 ppb	<0.25 ppb	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.365	0.106				
DDT	0.304	0.281				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	--	--				
Final meal category based on UCL:						12

Existing MDHHS Advisory: No one should eat more than 8 meals per month of rock bass from the Kalamazoo River upstream of the Marshall Dam due to mercury.

Recommendation: No change is recommended. An additional year of data is needed to relax the advisory.





Kent County

Brook Trout

Belmont Creek

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	8	6.2	7	6.5	10.7
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.07	0.05	0.11	0.09	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.772	0.647				

Organics Analysis:

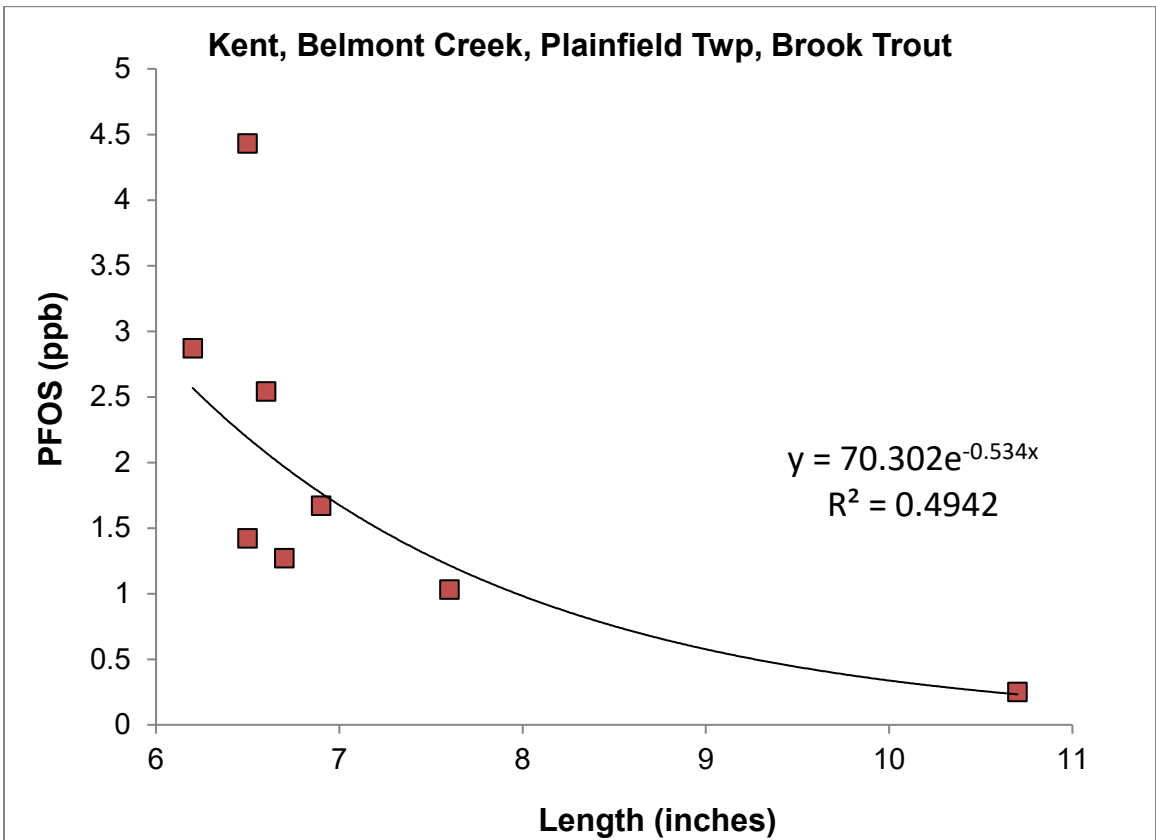
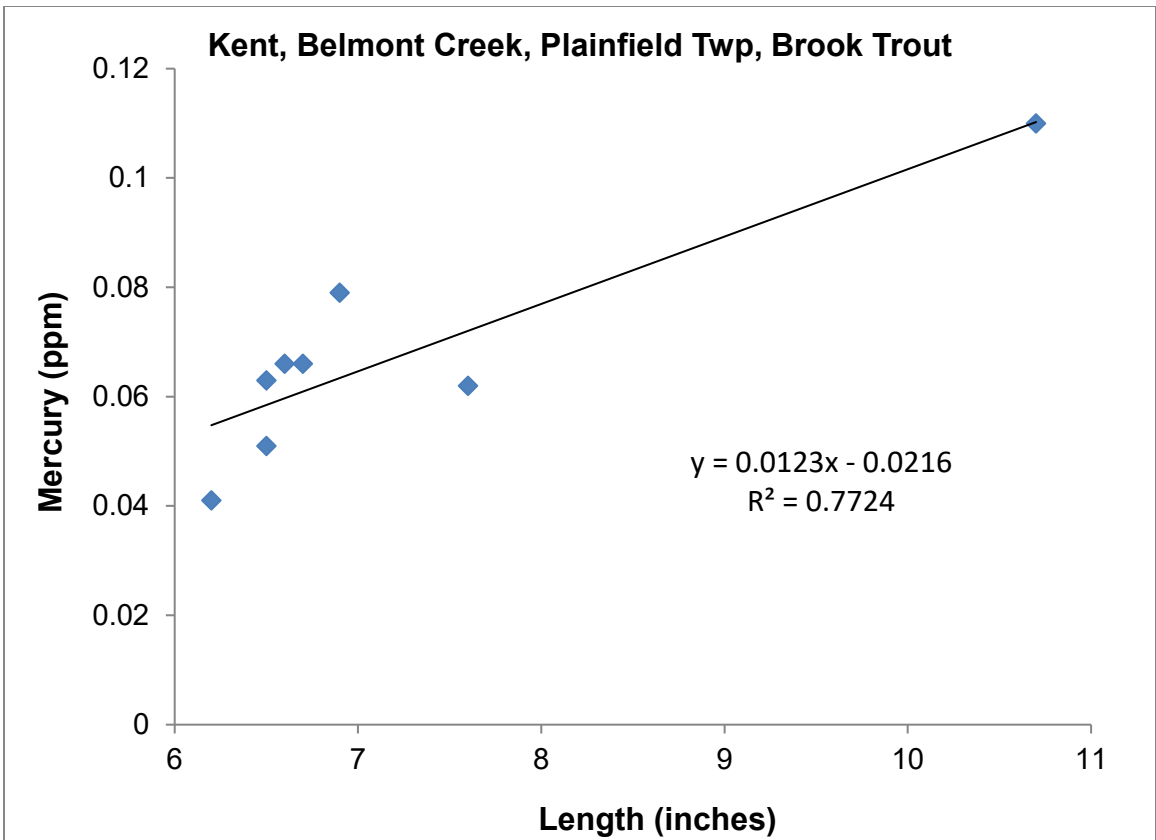
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	8	6.2	7	6.5	10.7
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	ND	< 0.001	< 0.001	--	16
DDT	7	ND	< 0.001	< 0.001	--	16
Chlordane	7	ND	< 0.001	< 0.001	--	--
Toxaphene	7	ND	< 0.05	< 0.05	--	--
TEQ	0	--	--	--	--	--
PFOS	7	2 ppb	< 0.25 ppb	4 ppb	3 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
PFOS	0.405	0.817*				
Final meal category based on UCL:						12

* - regression line with negative slope; not used in evaluation

Existing MDHHS Advisory: Belmont Creek brook trout are not covered by a fish consumption advisory.

Recommendation: No one should eat more than 12 meals per month of Belmont Creek brook trout smaller than 9 inches or more than 8 meals per month of those fish larger than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	0.05	16
7	0.06	16
8	0.08	12
9	0.09	12
10	0.1	8
11	0.11	8
12	0.13	8
<i>Shaded area denotes extrapolated estimates</i>		



Bluegill

Bostwick Lake

Kent County

Hg Analysis:

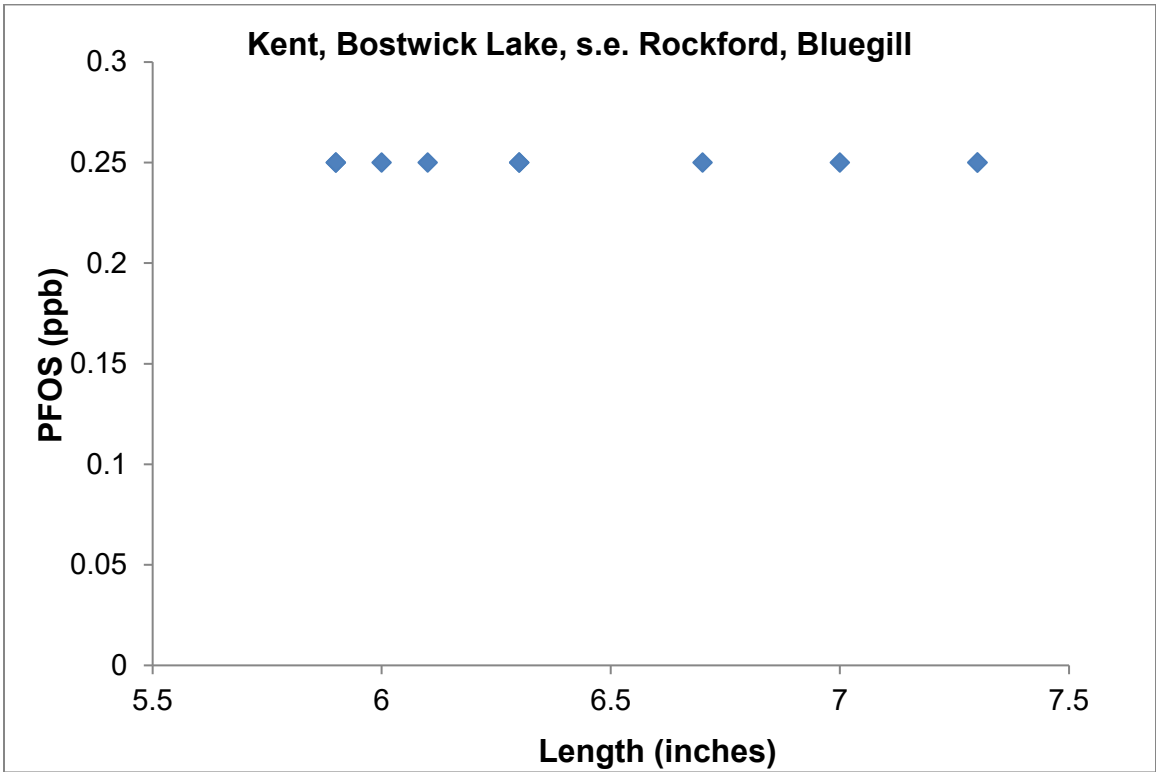
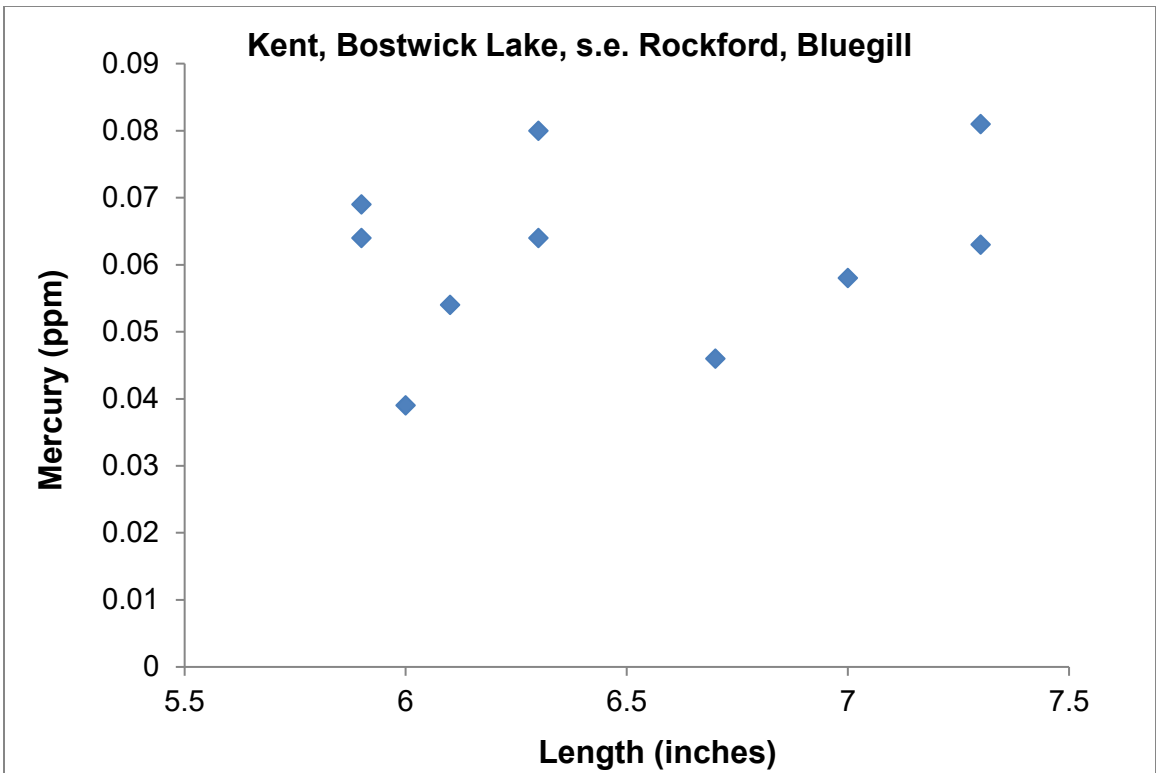
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	5.9	na	5.9	7.3
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.06	0.04	0.08	0.07	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.058	0.058				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	5.9	na	5.9	7.3
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	<0.25 ppb	<0.25 ppb	<0.25 ppb	--	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	--	--				
Final meal category based on UCL:						12

Existing MDHHS Advisory: Bostwick Lake bluegill are covered by the statewide advisory. No one should eat more than 8 meals per month of bluegill of any size due to mercury.

Recommendation: No one should eat more than 12 meals per month of Bostwick Lake bluegill of any size due to mercury.



**Largemouth and
Smallmouth Bass**

Bostwick Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	13.5	14	13.5	16.8
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.22	0.13	0.33	0.27	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.607	0.587				

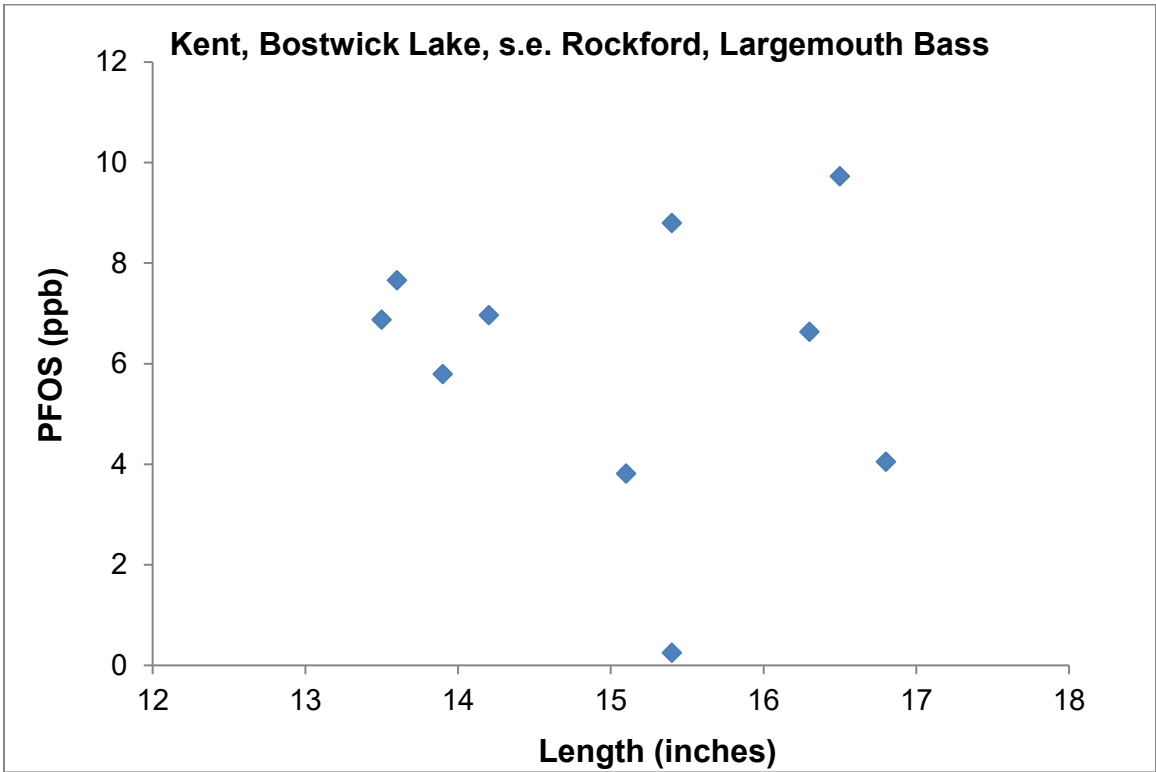
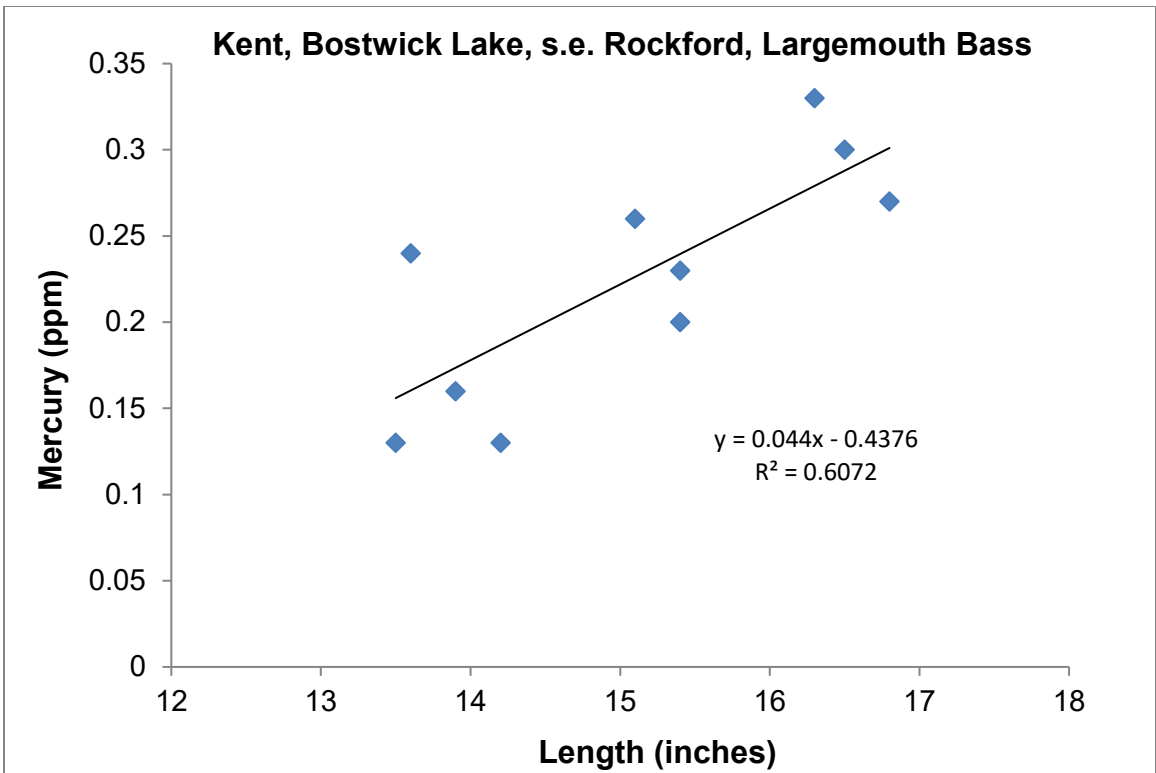
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	13.5	14	13.5	16.8
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	6 ppb	<0.25 ppb	10 ppb	8 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.008	0.015				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Bostwick Lake largemouth and smallmouth bass are covered by the statewide advisory. No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury.

Recommendation: No one should eat more than 2 meals per month of Bostwick Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury. Statewide length break applied as the size range of the dataset was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
12	0.09	12
14	0.18	4
16	0.27	4
17	0.31	2
18	0.35	2
20	0.44	2
22	0.53	2
<i>Shaded area denotes extrapolated estimates</i>		



Brown Bullhead

Camp Lake

Kent County

Hg Analysis:

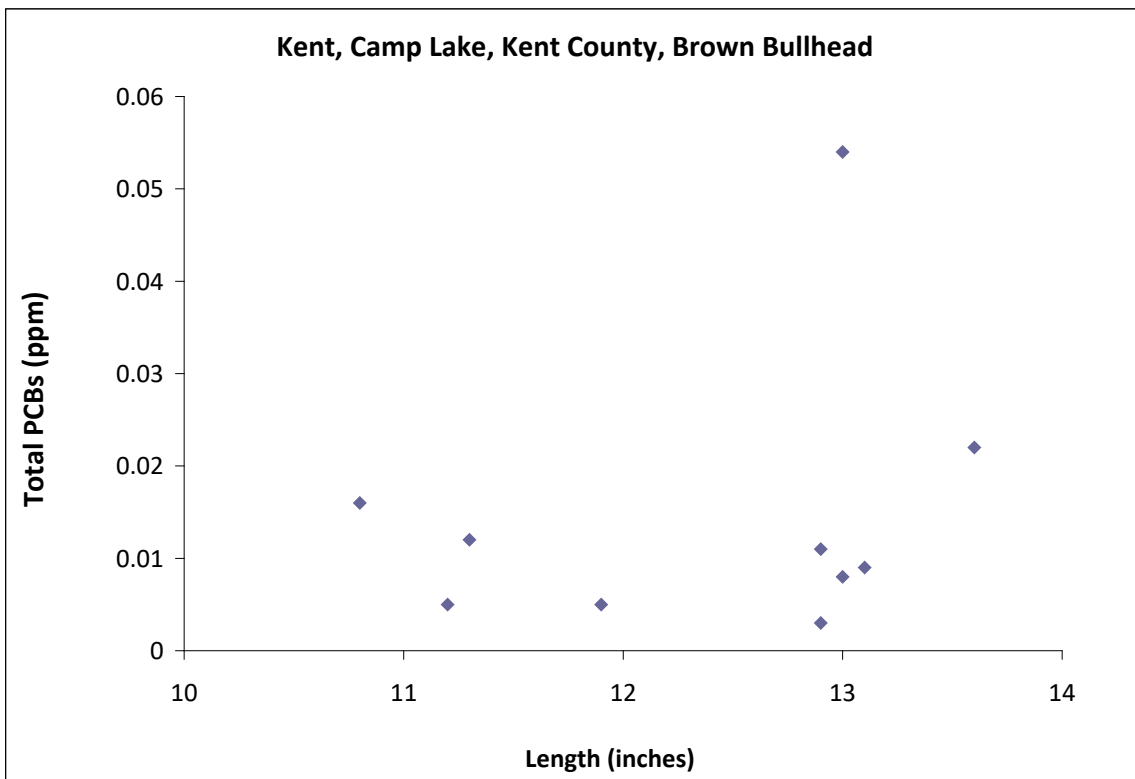
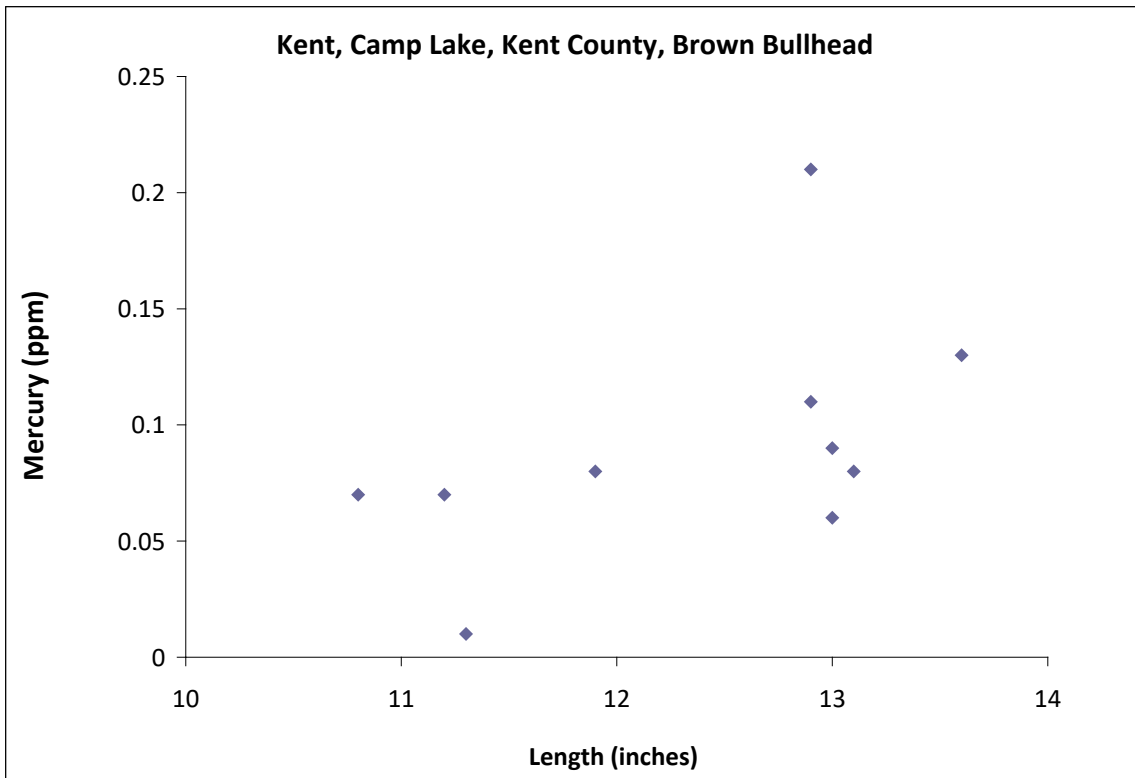
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	10.8	na	10.8	13.6
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.09	0.01	0.21	0.13	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.276	0.290				

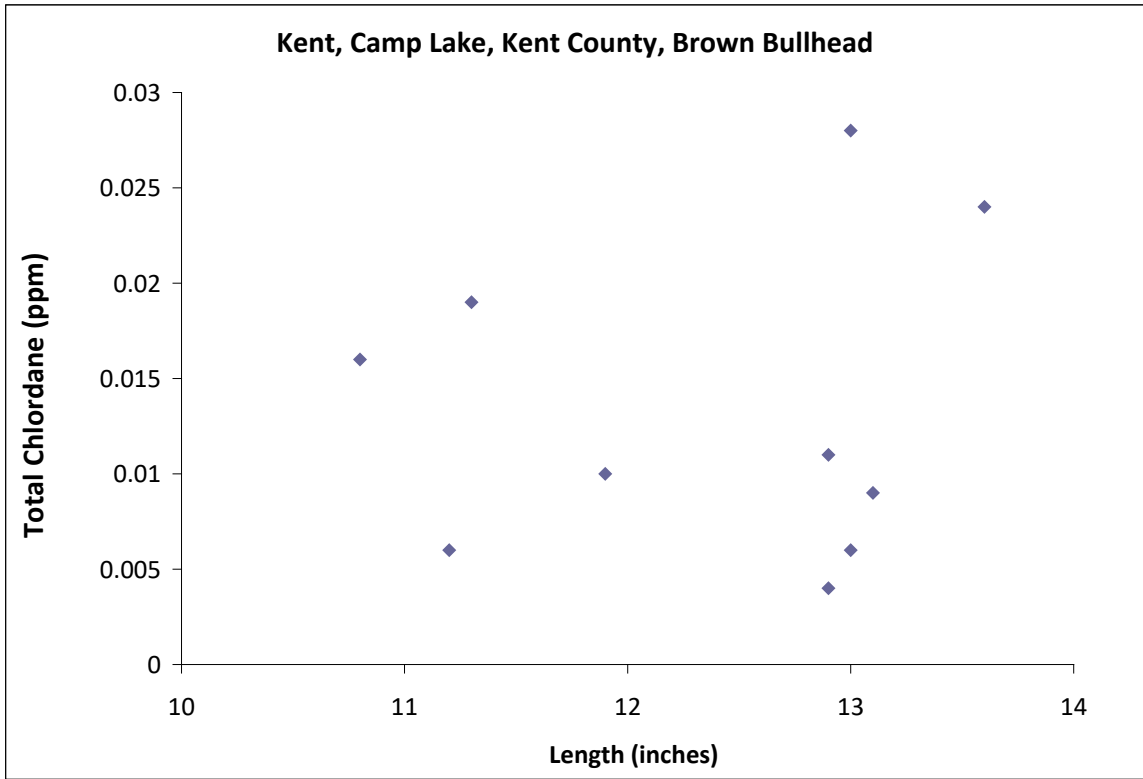
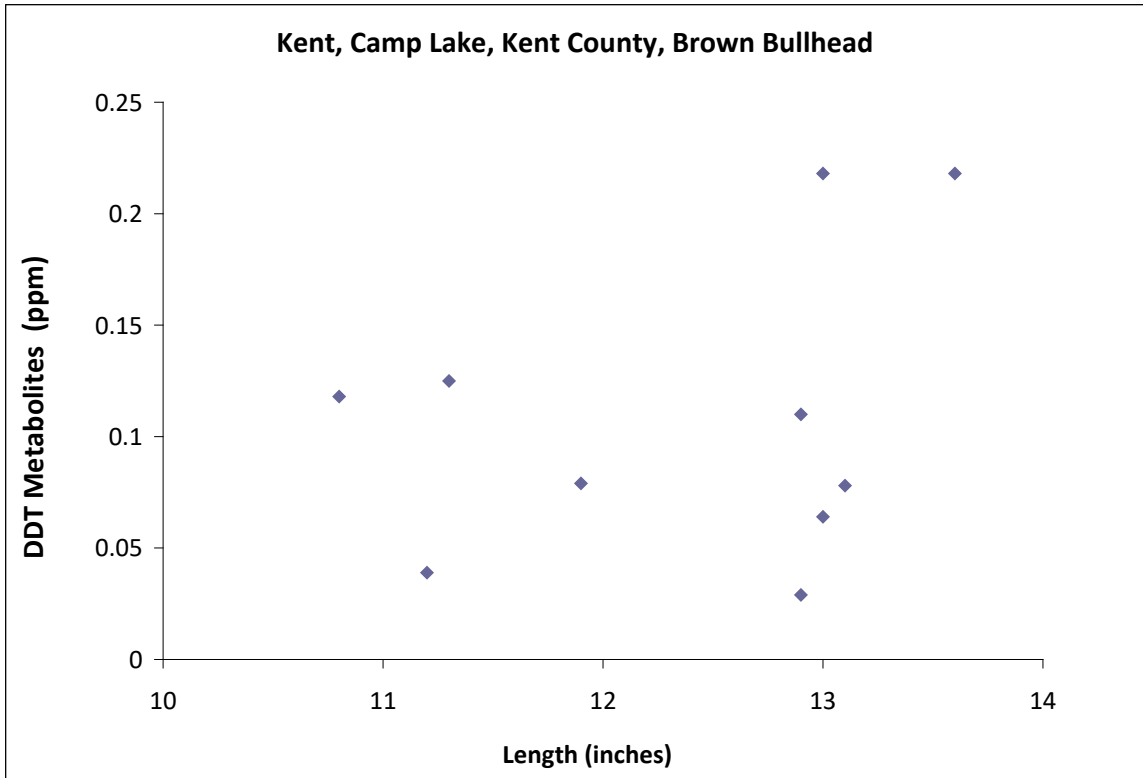
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	10	10.8	NA	10.8	13.6
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.02	0.003	0.05	0.03	8
DDT	10	0.11	0.03	0.22	0.16	8
Chlordane	10	0.01	0.004	0.03	0.02	--
Toxaphene	10	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.066	0.038				
DDT	0.090	0.036				
Chlordane	0.013	0.000				
Toxaphene	--	--				
Final meal category based on UCL:						8

Existing Advisory: Camp Lake brown bullhead are not covered by an advisory.

Recommendation: No one should eat more than 8 meals per month of bullhead from Camp Lake due to mercury, PCBs, and DDT.





Largemouth Bass

Camp Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	7	10.1	14	14	15.9
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.31	0.22	0.43	0.38	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.750	0.746				

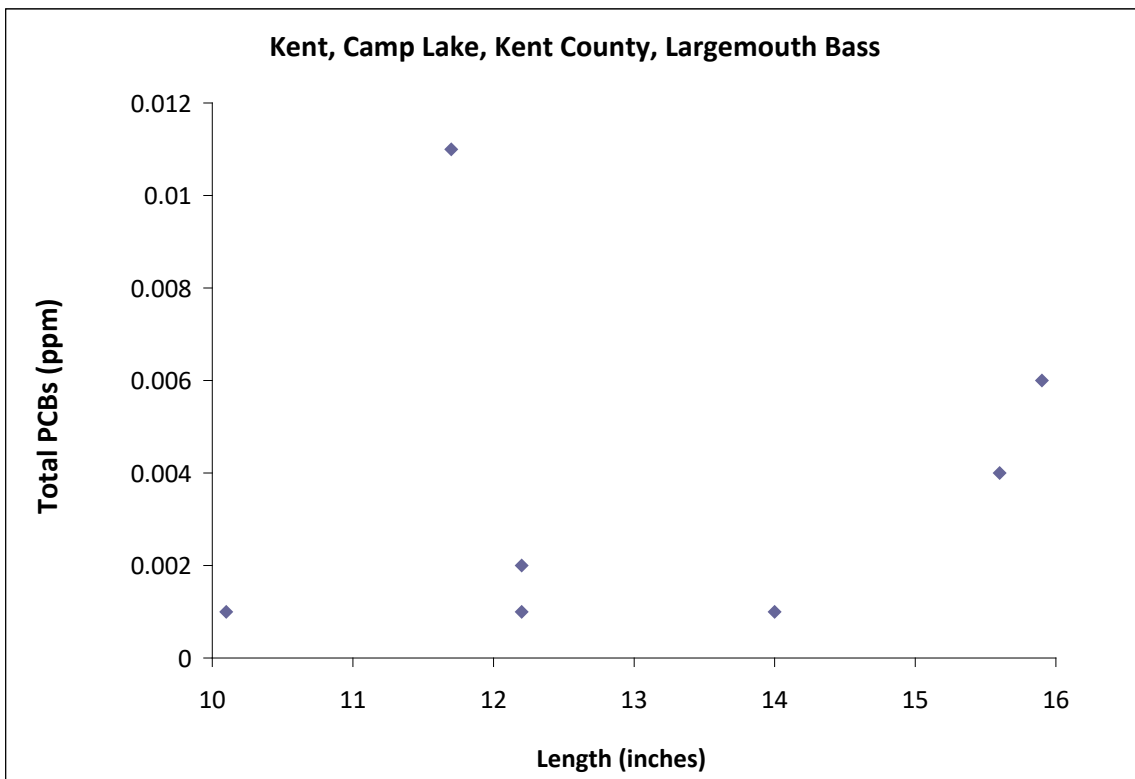
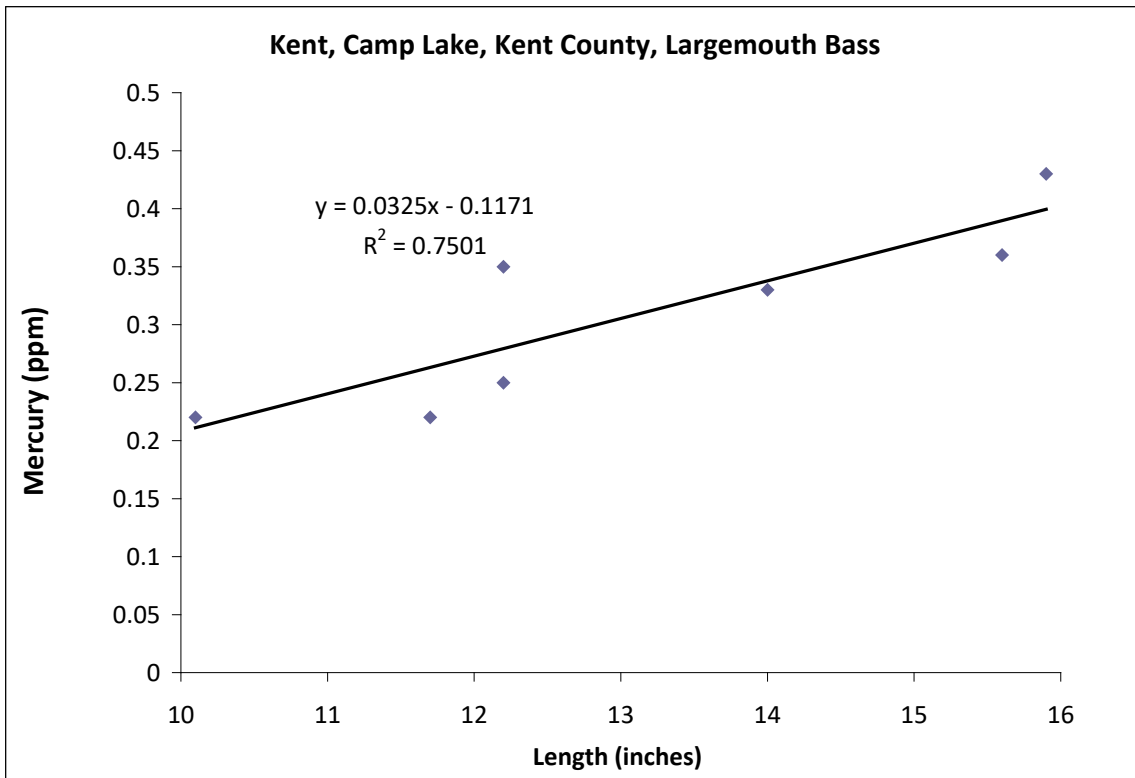
Organics Analysis:

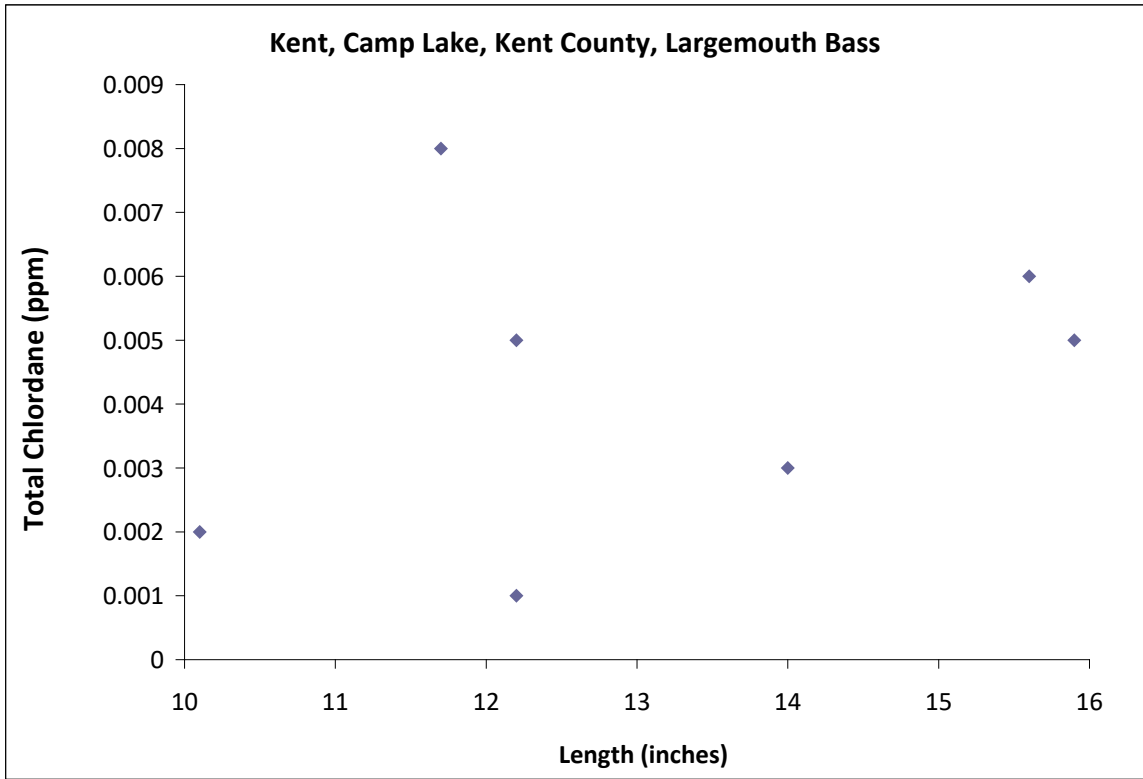
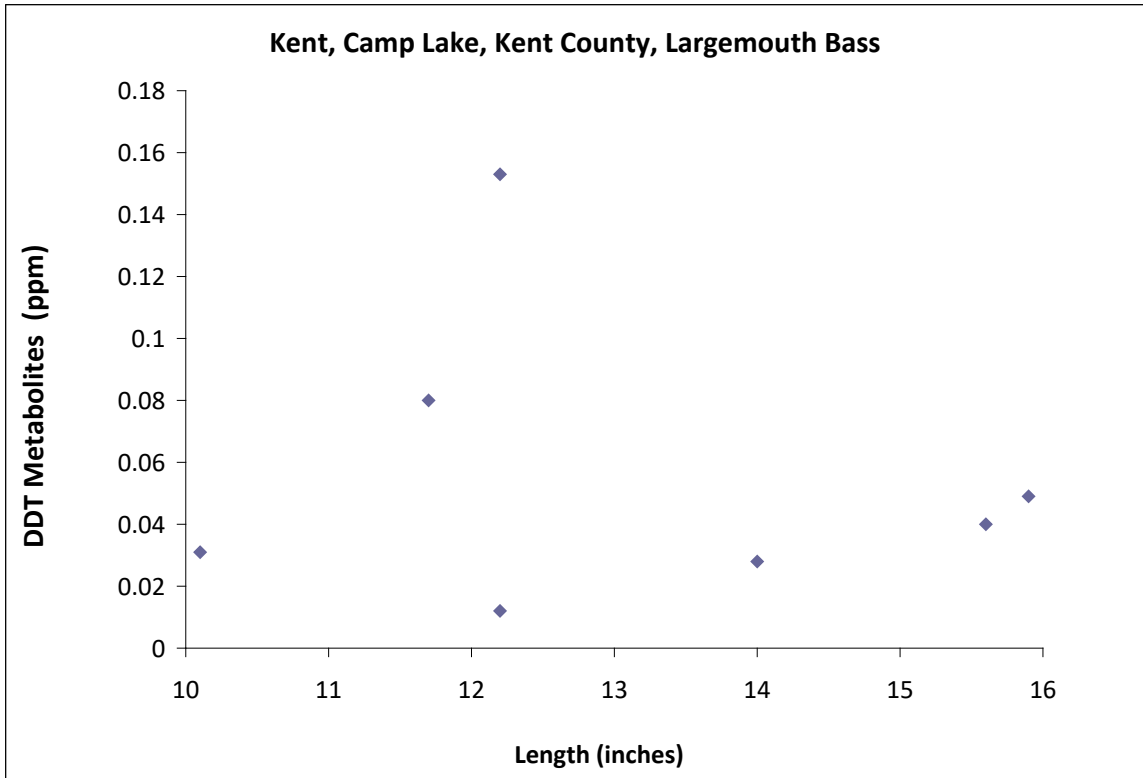
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	7	10.1	14	14	15.9
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.004	0.001	0.011	0.01	16
DDT	7	0.056	0.012	0.153	0.10	16
Chlordane	7	0.004	0.001	0.008	0.01	--
Toxaphene	7	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.019	0.128				
DDT	0.022	0.000				
Chlordane	0.085	0.145				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat more than one meal per week of Camp Lake largemouth bass smaller than 18 inches in length and no more than one meal per month of those fish greater than 18 inches in length.

Recommendation: No one should eat more than 1 meal per month of largemouth or smallmouth bass over 18 inches or more than 2 meals per month of these fish under 18 inches in length due to mercury. Statewide length break applied as the length range was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.34	2
15	0.37	2
16	0.40	2
17	0.44	2
18	0.47	2
19	0.50	2
20	0.53	1
21	0.56	1
22	0.60	1
<i>Shaded area denotes extrapolated estimates</i>		





Northern Pike

Camp Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	4	19.6	24	28.3	28.3
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.560	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.449	0.459				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2003	4	19.6	24	28.3	28.3
Datasets available: 2003						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.004	--	--	--	--
DDT	1	0.038	--	--	--	--
Chlordane	1	0.006	--	--	--	--
Toxaphene	1	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.060	0.130				
DDT	0.455	0.600				
Chlordane	0.004	0.013				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Camp Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: Statewide guidelines apply. Dataset limited due to sample size. No one should eat more than 1 meal per month of northern pike over 30 inches or more than 2 meals per month of northern pike under 30 inches in length.

Largemouth Bass

Campbell Lake

Kent County

Hg Analysis:

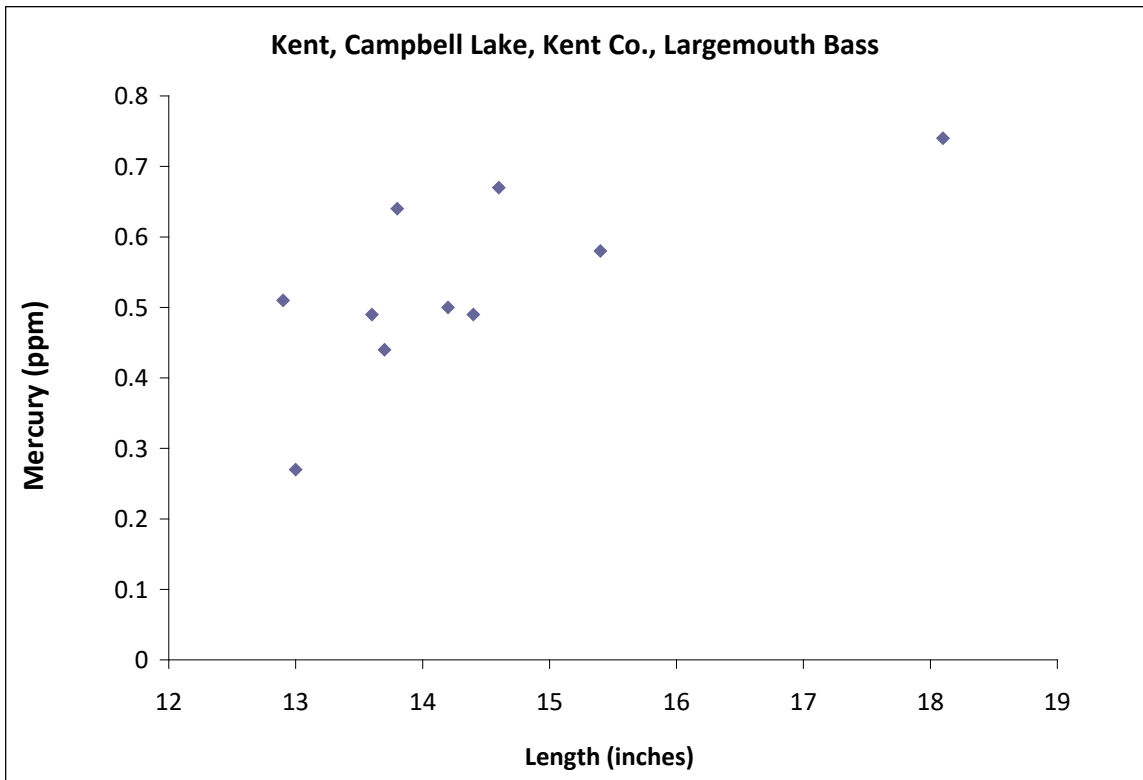
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2006	10	12.9	14	13.6	18.1
Datasets available: 2006						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.57	0.44	0.74	0.66	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.509	0.416				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	14	--	--
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Campbell Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of largemouth or smallmouth bass under 18 inches or 6 meals per year of these fish over 18 inches from Campbell Lake due to mercury.



Bluegill

Clear Bottom Lake

Kent County

Hg Analysis:

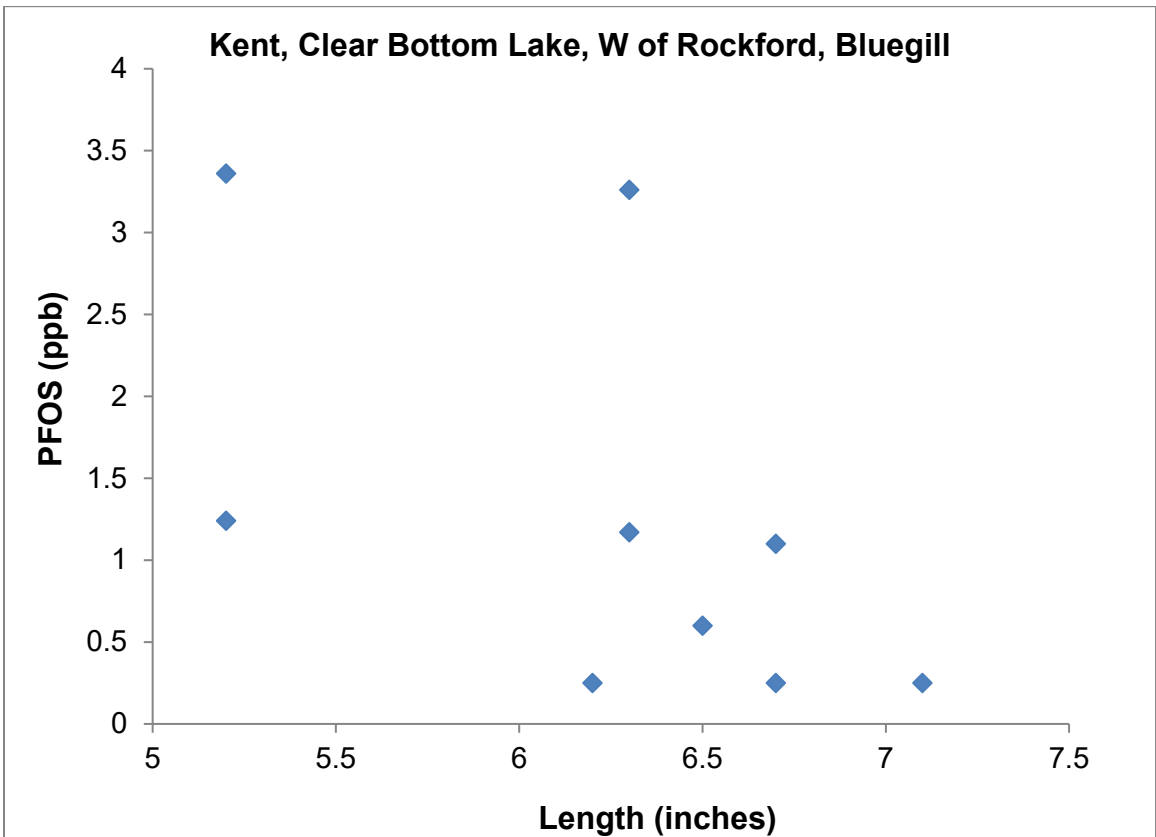
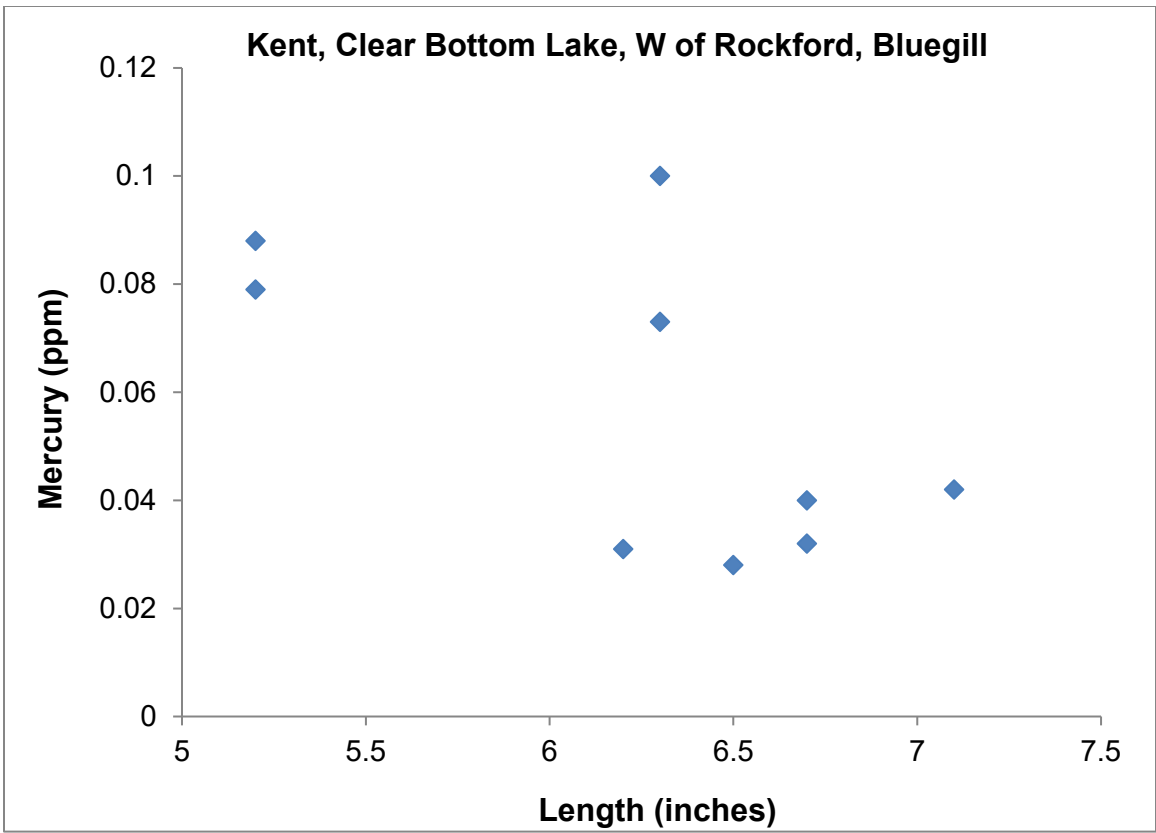
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	9	5.2	Na	5.2	7.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.06	0.03	0.10	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.386	0.373				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	9	5.2	Na	5.2	7.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	9	1.3 ppb	< 0.25 ppb	3.4 ppb	2.2 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.317	0.363				
Final meal category based on UCL:						12

Existing MDHHS Advisory: Clear Bottom Lake bluegill and sunfish are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 12 meals per month of Clear Bottom Lake bluegill or sunfish of any size due to mercury.



Largemouth Bass

Clear Bottom Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	7	11.1	14	16.9	16.9
Datasets available: 2018						
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7*	0.45	0.22	0.85	0.68	1
Chemical	Linear Regression	Exponential Regression	<i>Regression driven by 1 data point</i>			
	R ²	R ²				
Mercury	0.621	0.512				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	7	11.1	14	16.9	16.9
Datasets available: 2018						
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	7*	4.2 ppb	1.8 ppb	7.7 ppb	5.9 ppb	16
Chemical	Linear Regression	Exponential Regression	Final meal category based on UCL: 1			
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.026	0.080				

*Sub-legal sized fish were used in the mercury and PFOS data summaries

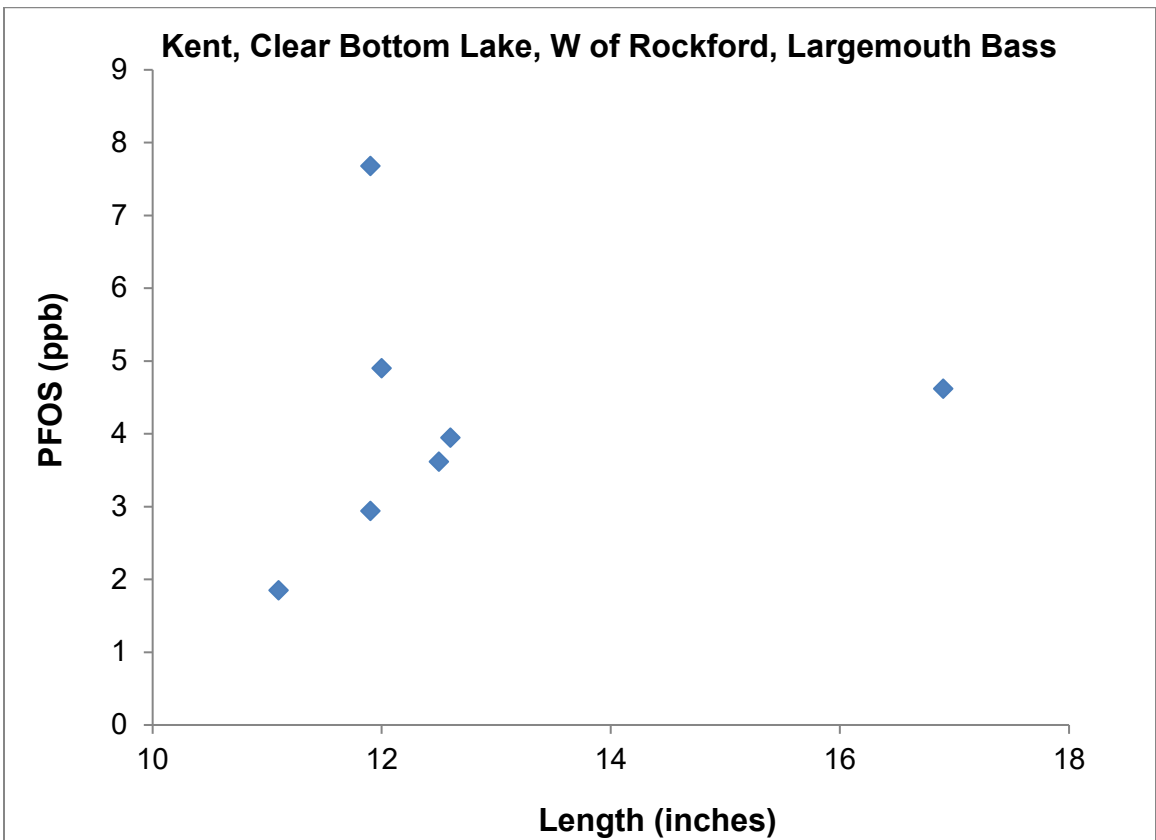
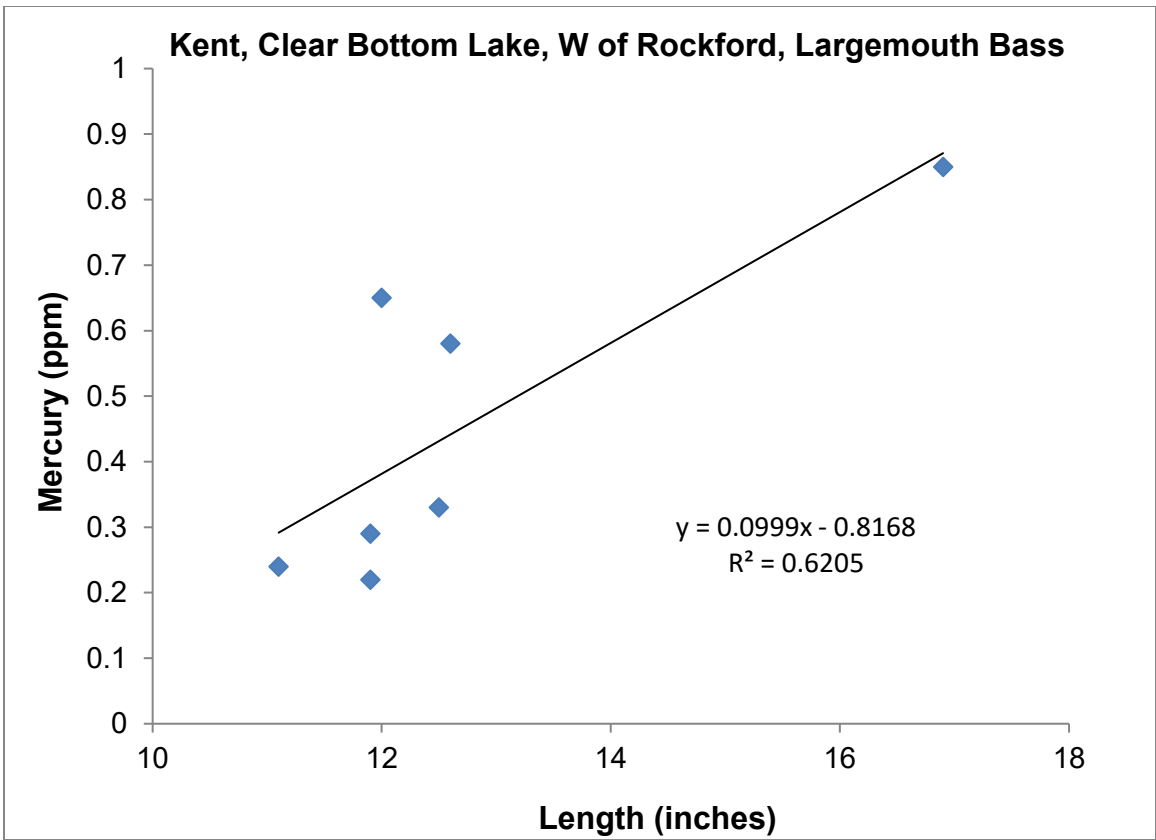
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
12	0.38	2
14	0.58	1
16	0.78	1
18	0.98	1
20	1.18	0.5
22	1.38	0.5

Shaded area denotes extrapolated estimates

Existing MDHHS Advisory: Clear Bottom Lake largemouth and smallmouth bass are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Recommendation: No one should eat more than 1 meal per month of largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. Statewide length break applied as the linear regression is driven mainly by one data point.

Note: Although just one fish was of legal length, the full dataset was used in the mercury evaluation as this approach resulted in a more restrictive meal category than the statewide guideline.



Yellow Perch

Emerald Lake

Kent County

Hg Analysis:

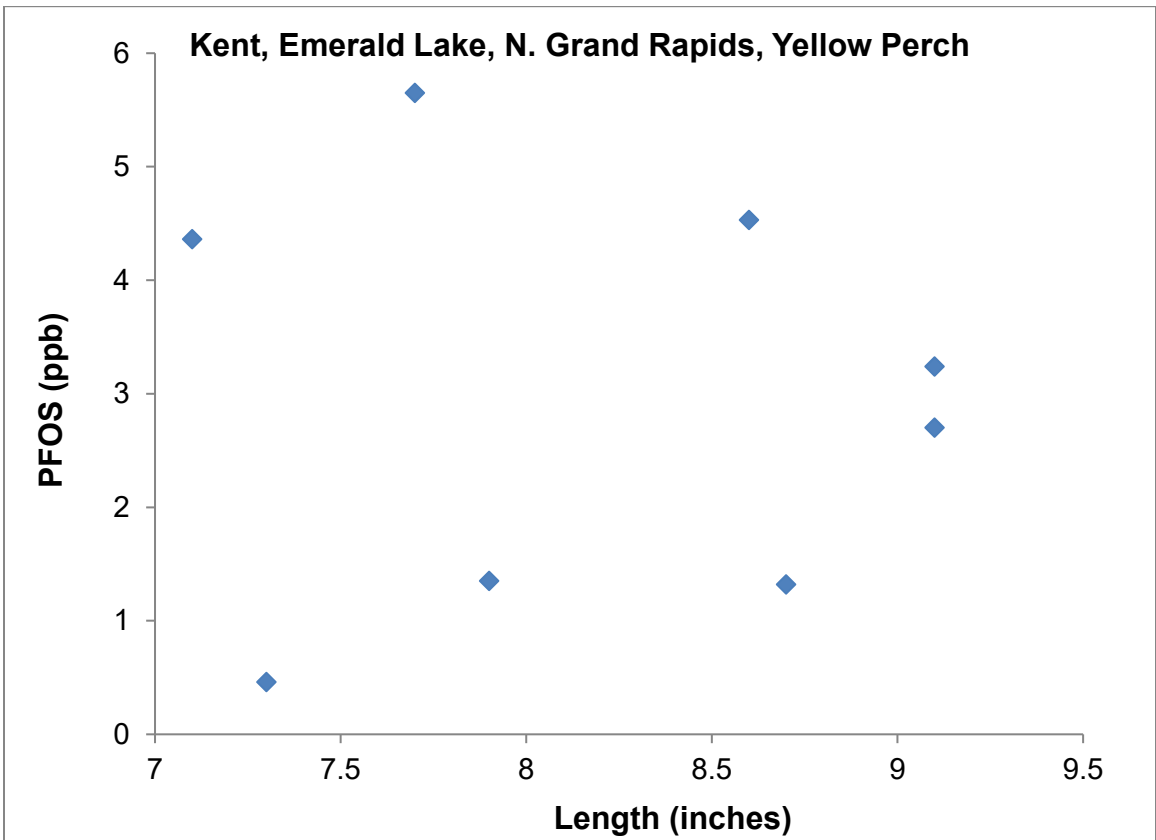
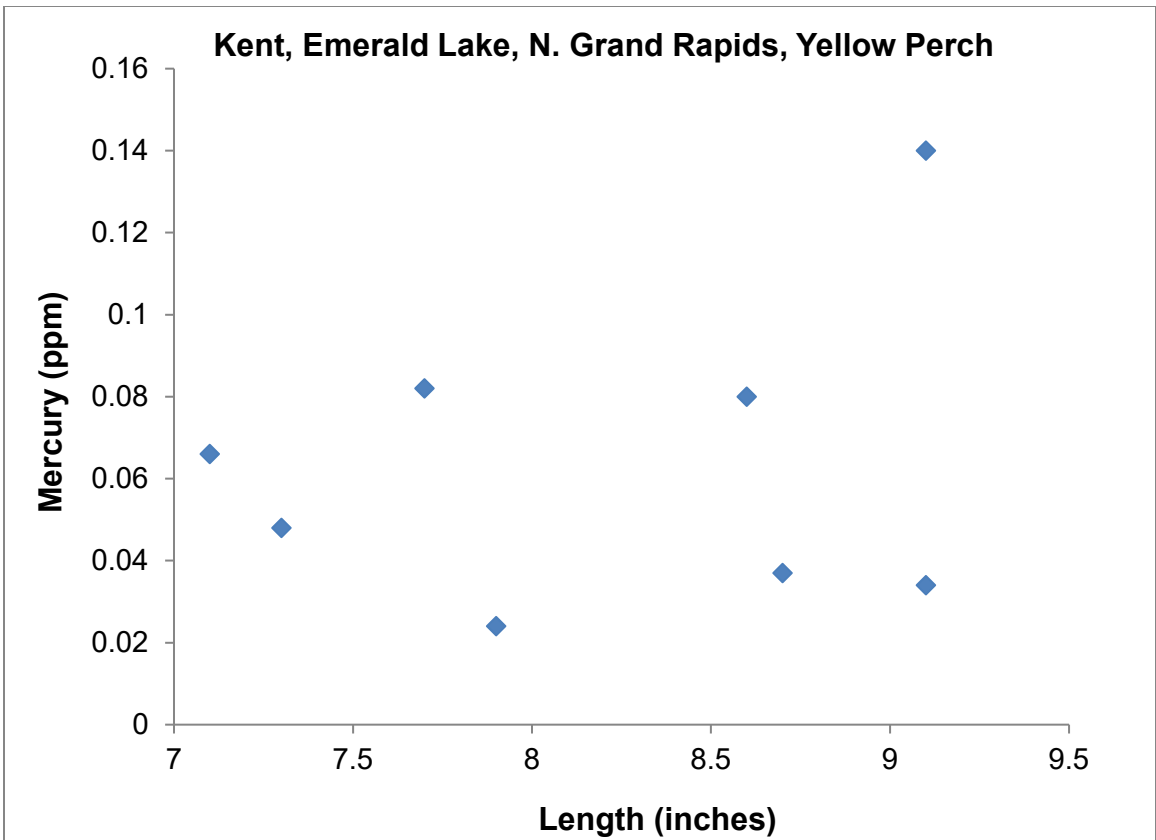
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	8	7.1	na	7.1	9.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.06	0.02	0.14	0.10	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.057	0.011				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	8	7.1	na	7.1	9.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	8	3 ppb	0.5 ppb	5.6 ppb	4.5 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.001	0.037				
Final meal category based on UCL:						8

Existing MDHHS Advisory: Emerald Lake yellow perch are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of yellow perch of any size.

Recommendation: No one should eat more than 8 meals per month of Emerald Lake yellow perch due to mercury.



Bluegill

Freska Lake

Kent County

Hg Analysis:

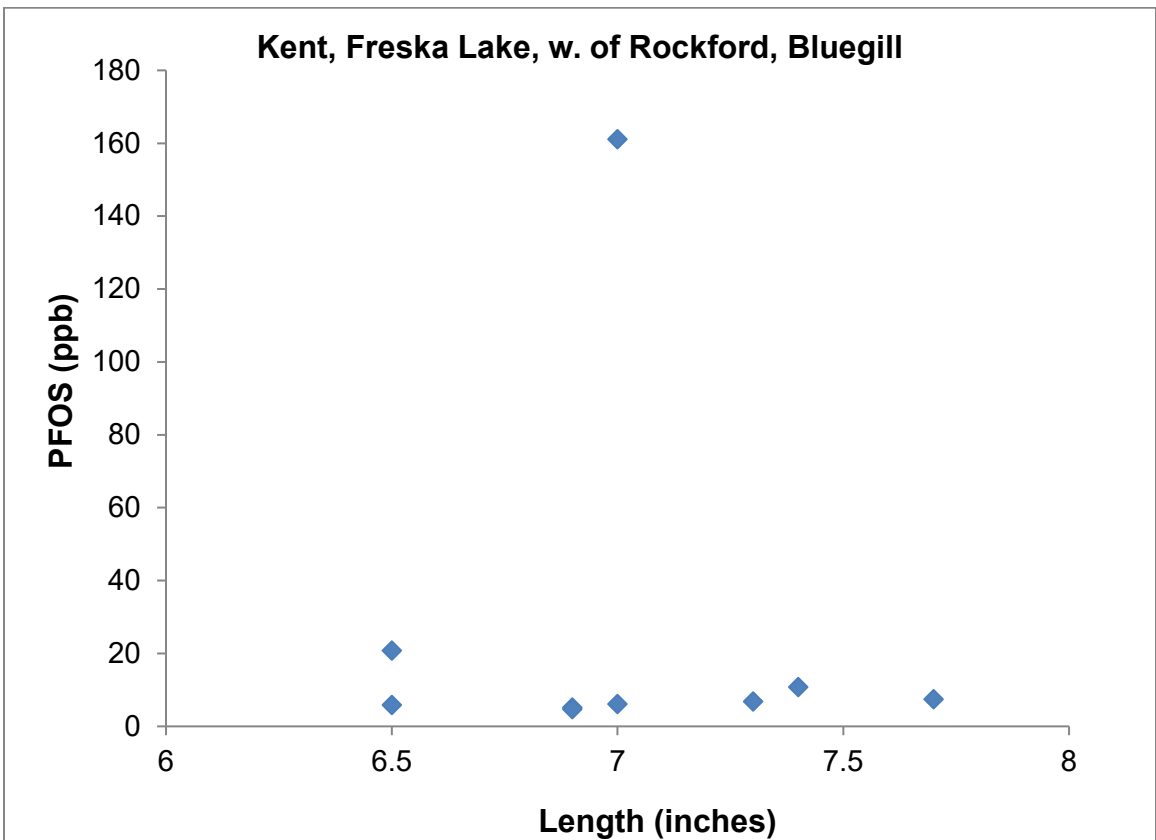
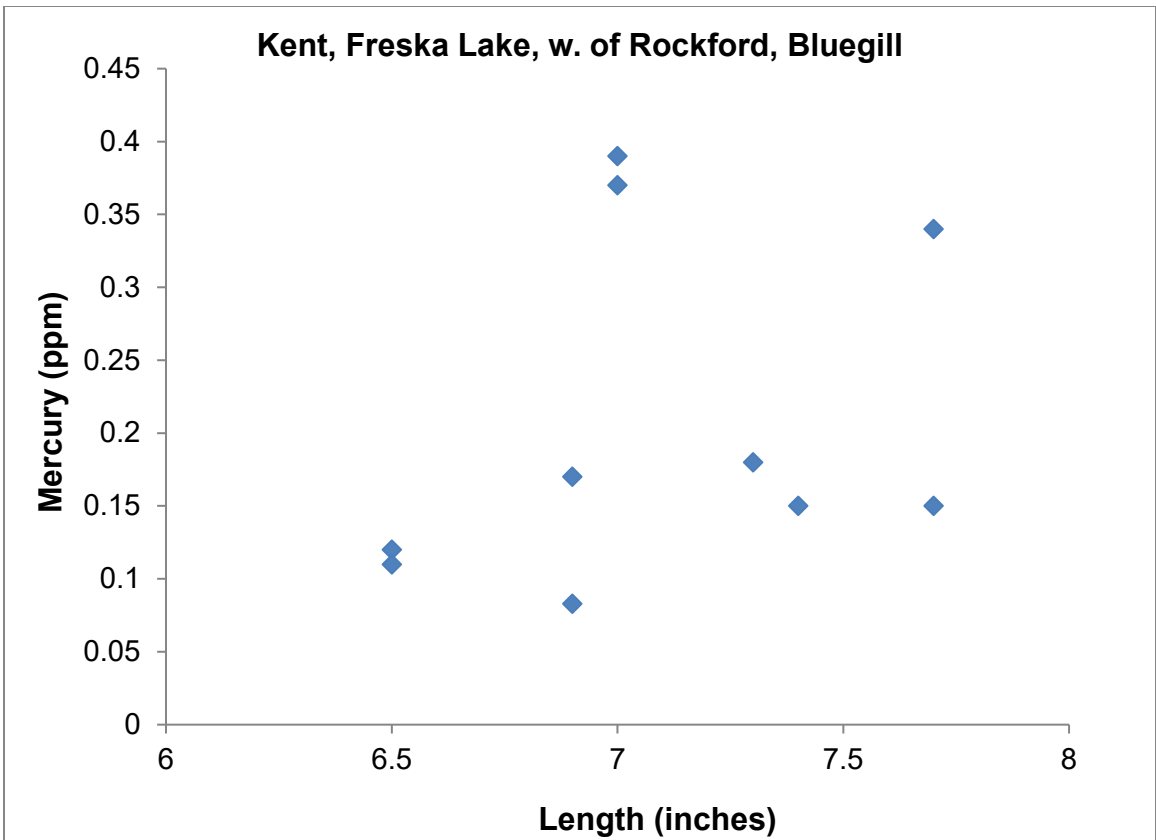
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	6.5	na	6.5	7.7
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.21	0.08	0.39	0.29	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.087	0.138				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	6.5	na	6.5	7.7
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	9	25 ppb	4.7 ppb	161 ppb	65 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.077	0.097				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Bluegill and sunfish from Lake Freska in Kent County are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 2 meals per month of Freska Lake bluegill or sunfish due to mercury and PFOS. In the future, additional fish should be collected to account for PFOS concentration variability within this population.



**Largemouth and
Smallmouth Bass**

Freska Lake

Kent County

Hg Analysis:

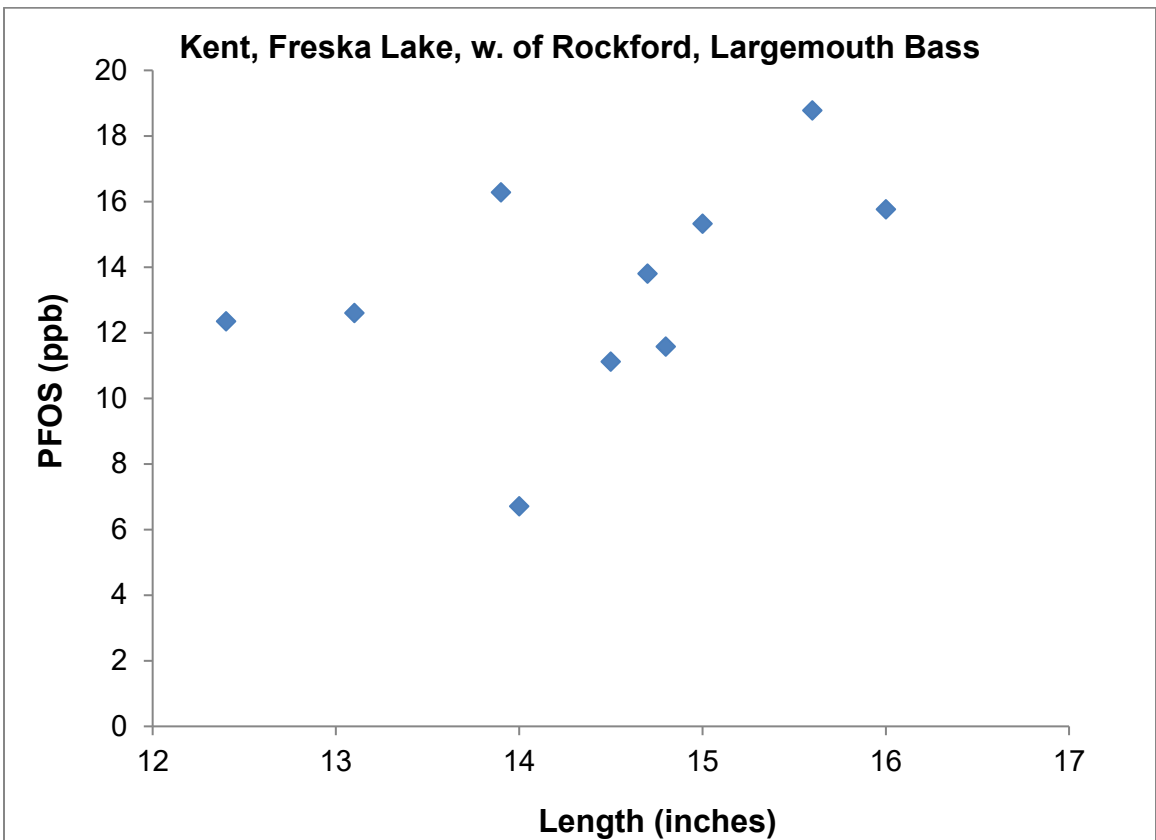
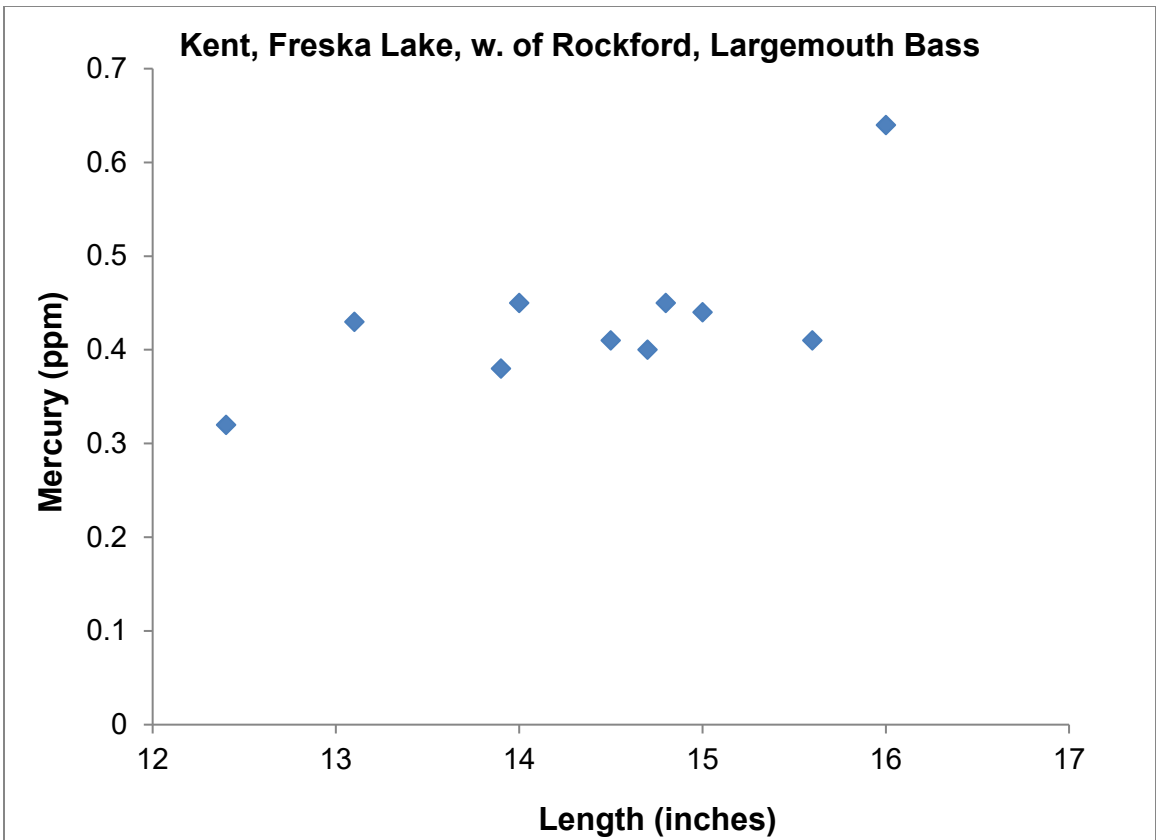
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2017	2017	10	12.4	14	13.9	16	
Datasets available: 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)		
Mercury	8	0.45	0.38	0.64	0.52	2	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.464	0.505					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2017	2017	10	12.4	14	13.9	16	
Datasets available: 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)		
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
PFOS	8	13.7 ppb	6.7 ppb	18.8 ppb	16.8 ppb	8	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	0.204	0.154	Final meal category based on UCL:				2

Existing MDHHS Advisory: Largemouth and smallmouth bass from Freska Lake in Kent County are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of largemouth or smallmouth bass larger than 18 inches.

Recommendation: No one should eat more than 2 meals per month of Freska Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of bass larger than 18 inches due to mercury. The statewide length break was applied as the size of the fish was limited. PFOS would cause an advisory. In the future, additional fish should be collected to account for population variability.



Brown Trout

Indian Mill Creek

Kent County

Hg Analysis:

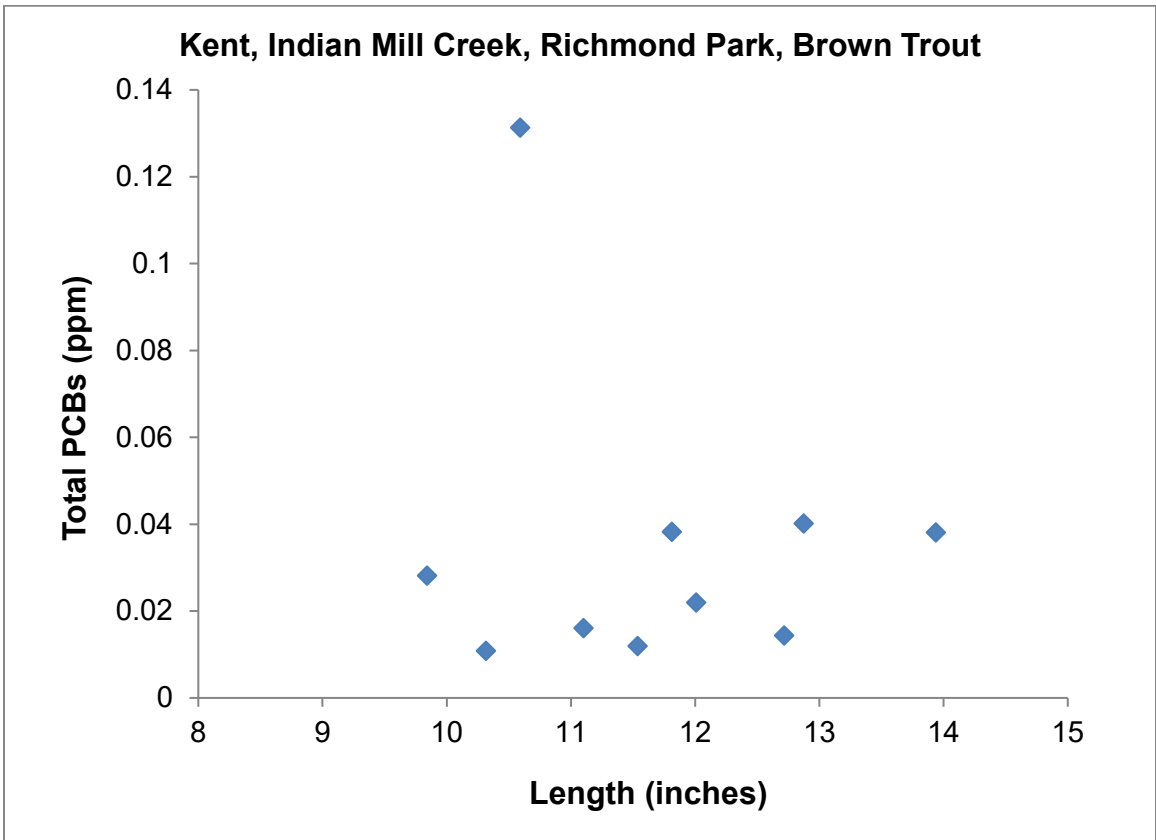
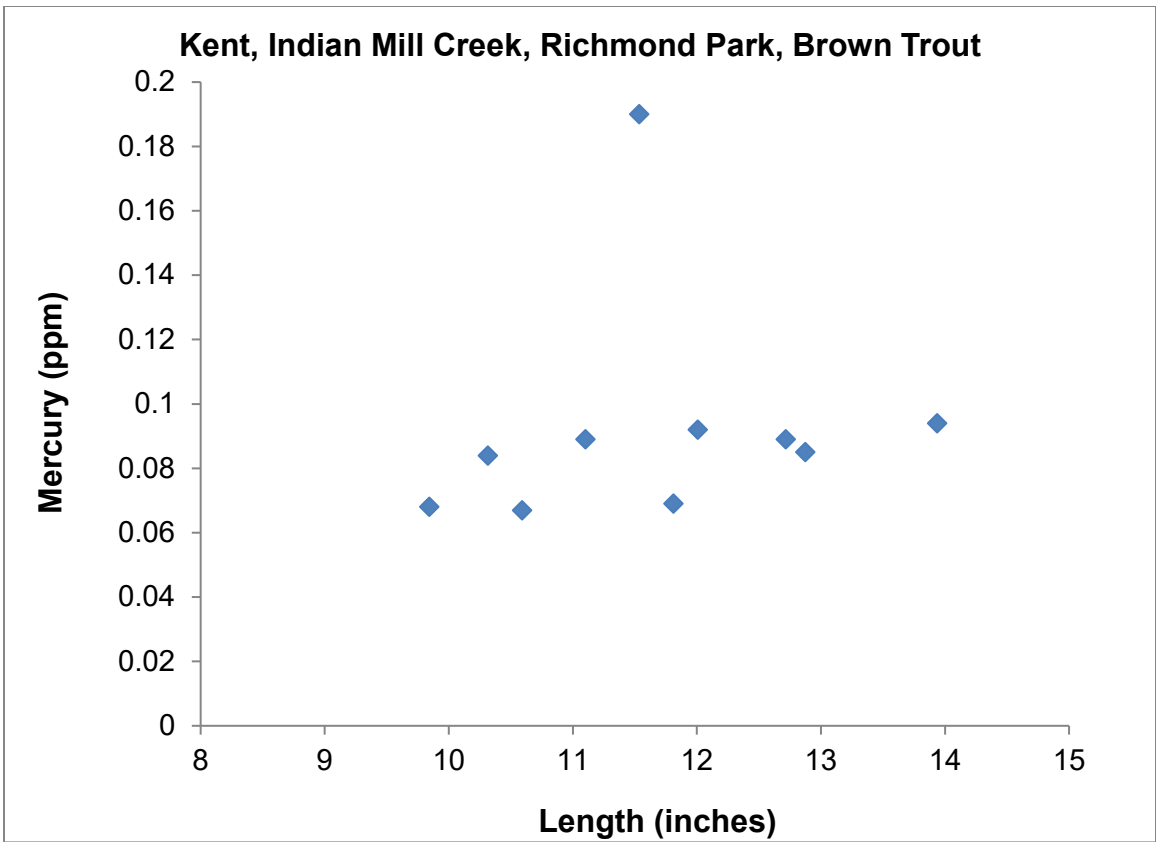
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	9.8	8	9.8	13.9
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.093	0.067	0.190	0.118	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.022	0.058				

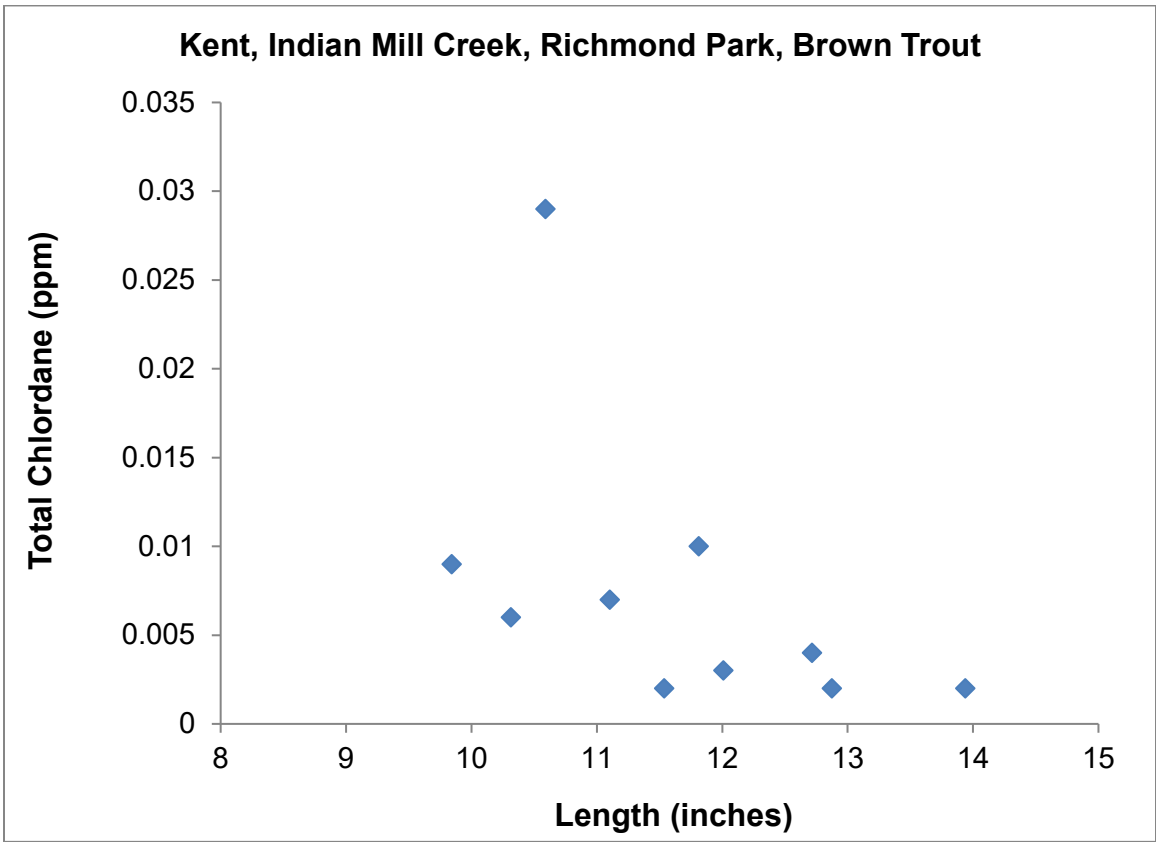
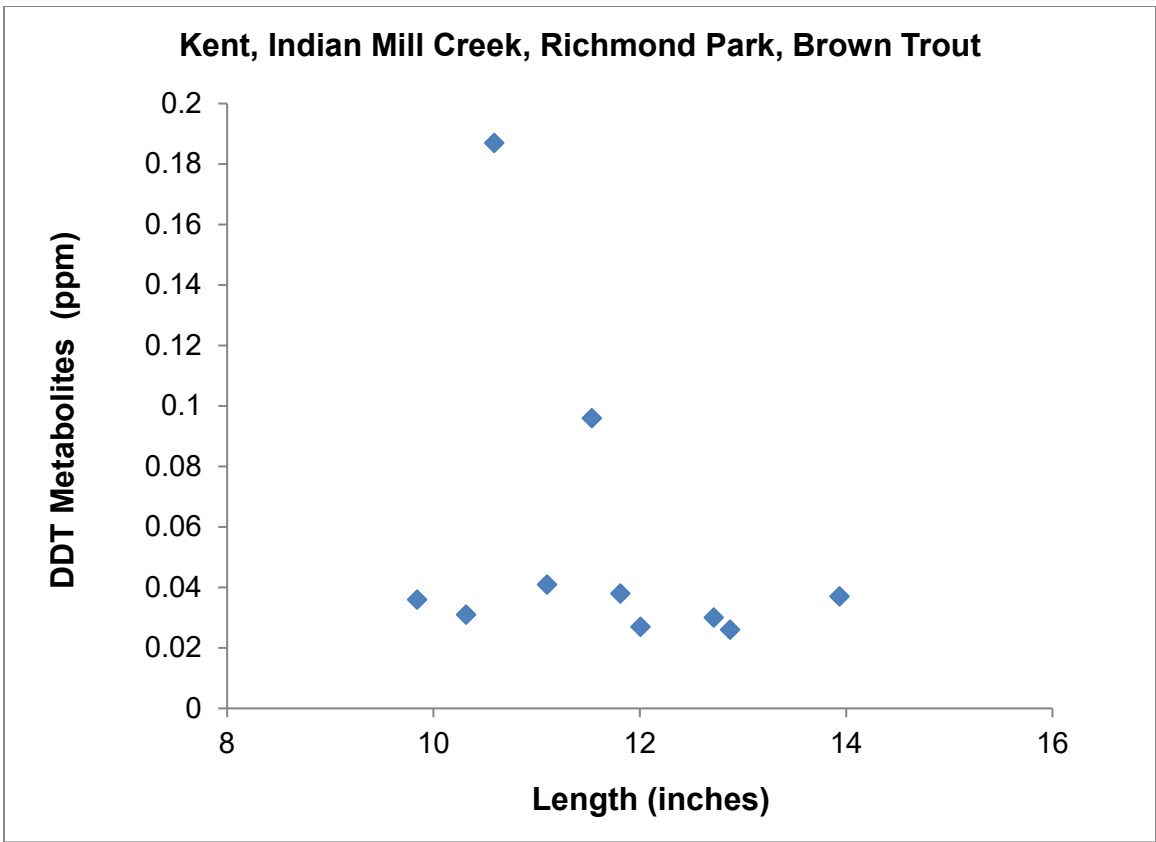
Organics Analysis:

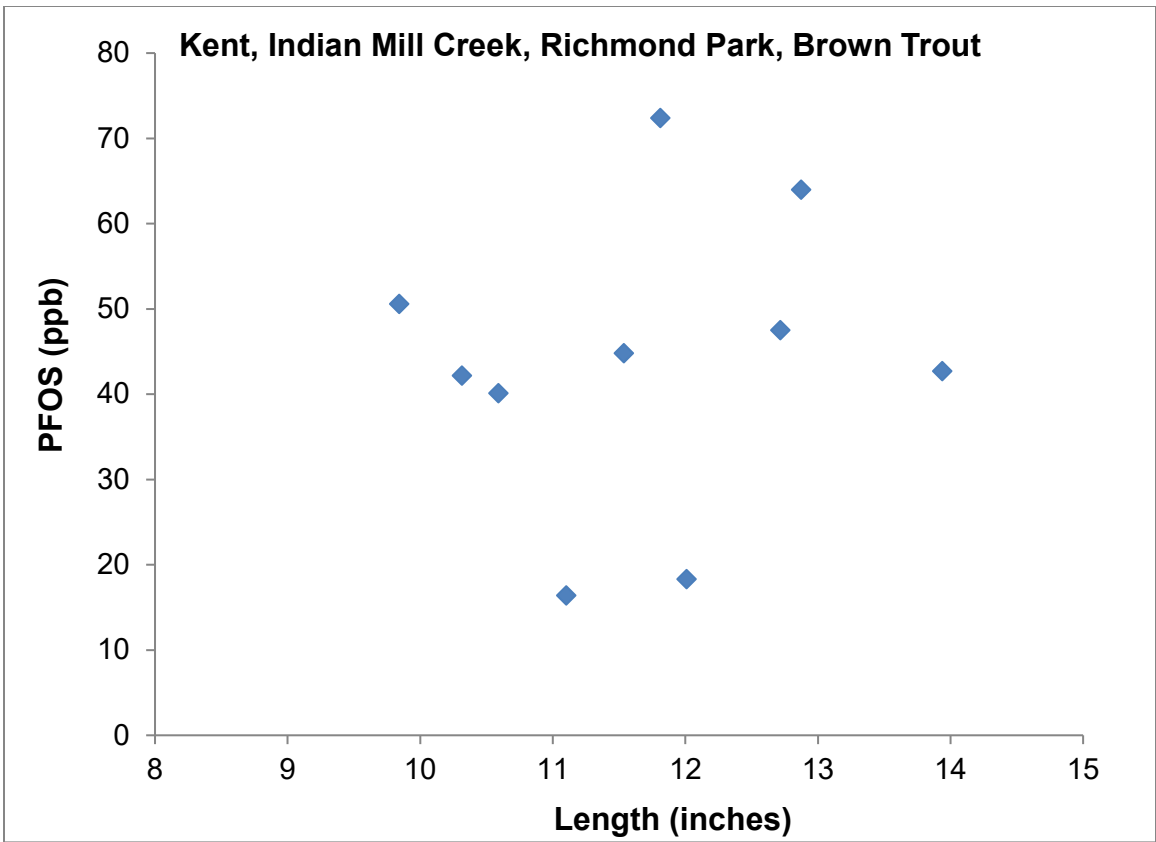
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	9.8	8	9.8	13.9
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.035	0.011	0.131	0.061	2
DDT	10	0.055	0.026	0.187	0.091	16
Chlordane	10	0.007	0.002	0.029	0.013	16
Toxaphene	10	ND	--	--	--	--
PFOS	10	43.9 ppb	16.4 ppb	72.4 ppb	56.3 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.020	0.002				
DDT	0.104	0.111				
Chlordane	0.253	0.090				
Toxaphene	--	--				
PFOS	0.023	0.016				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Brown trout from Indian Mill Creek in Kent County are currently covered under the statewide mercury guidance. No one should eat more than four meals per month of brown trout of any size.

Recommendation: No one should eat more than 2 meals per month of brown trout of any size from Indian Mill Creek in Kent County due to PFOS and PCBs. Mercury causes less restrictive guidance.







Rainbow Trout

Indian Mill Creek

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	8.0	10	8.0	9.1
Datasets available: 2021						
Chemical	Sample Size (All*)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.063	0.046	0.090	0.079	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.418	0.395				

Organics Analysis:

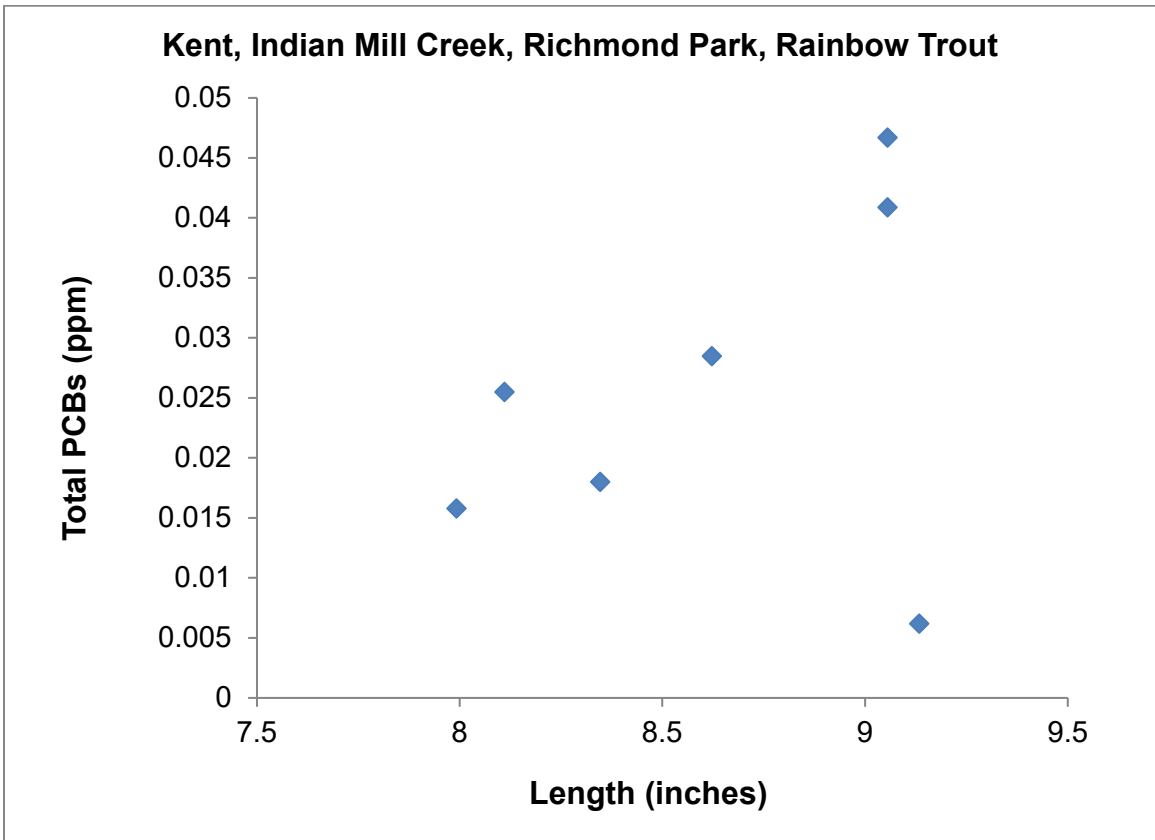
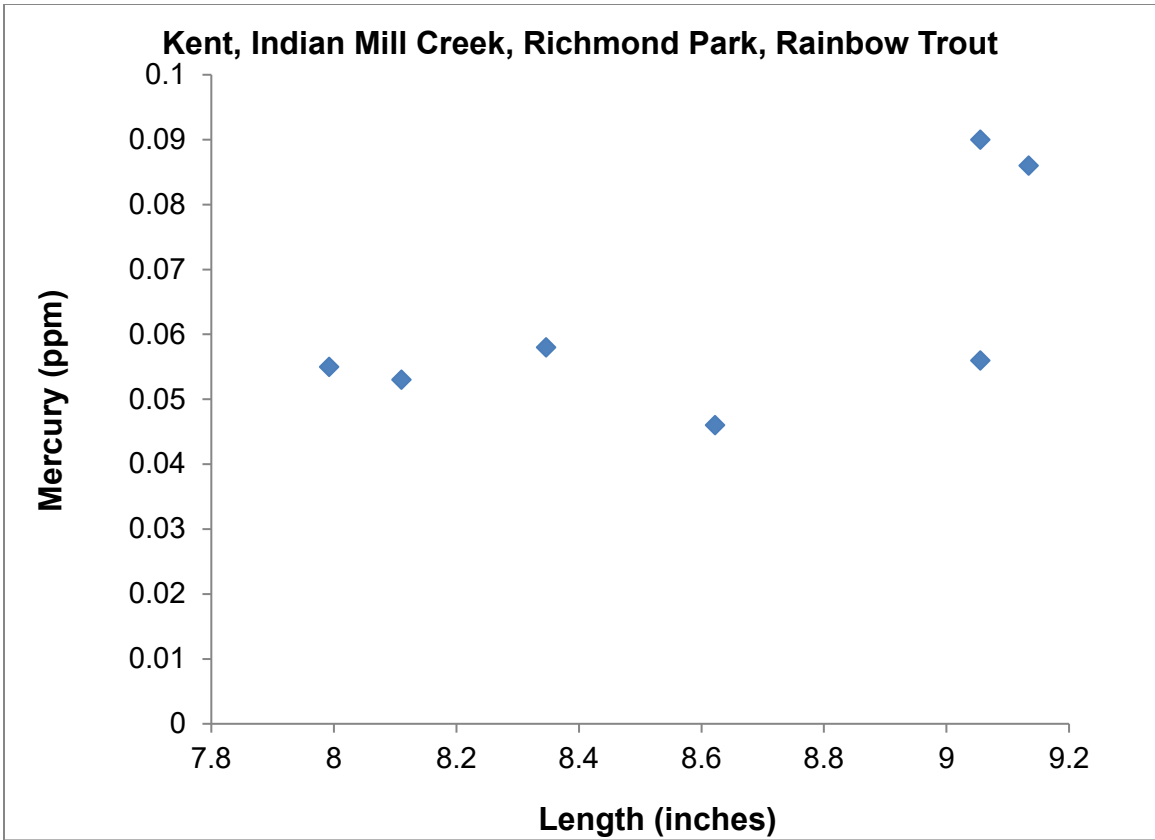
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	8.0	10	8.0	9.1
Datasets available: 2021						
Chemical	Sample Size (All*)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.026	0.006	0.047	0.039	4
DDT	7	0.033	0.004	0.072	0.054	16
Chlordane	7	0.010	<0.001	0.021	0.015	16
Toxaphene	7	ND	--	--	--	--
PFOS	7	28.9 ppb	11.9 ppb	53.9 ppb	56.3 ppb*	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.120	0.005				
DDT	0.156	0.000				
Chlordane	0.007	0.072				
Toxaphene	--	--				
PFOS	0.017	0.001				
Final meal category based on UCL:						2

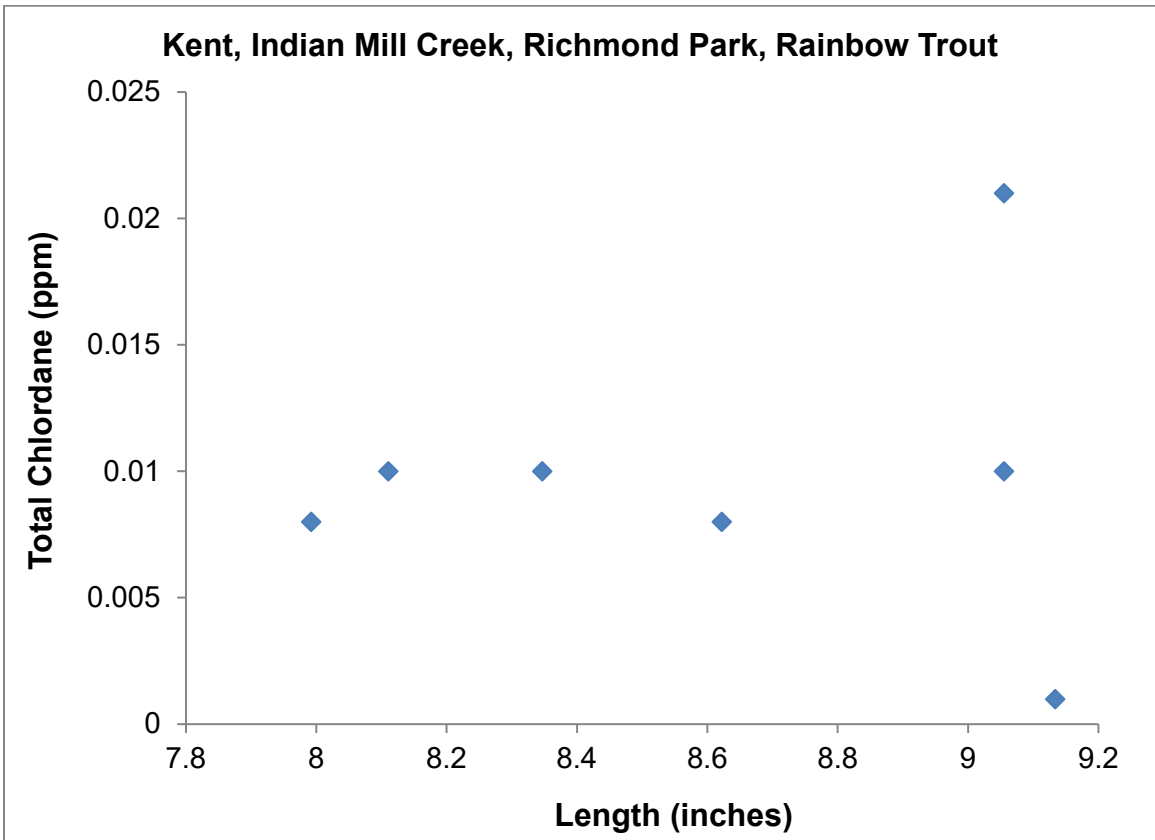
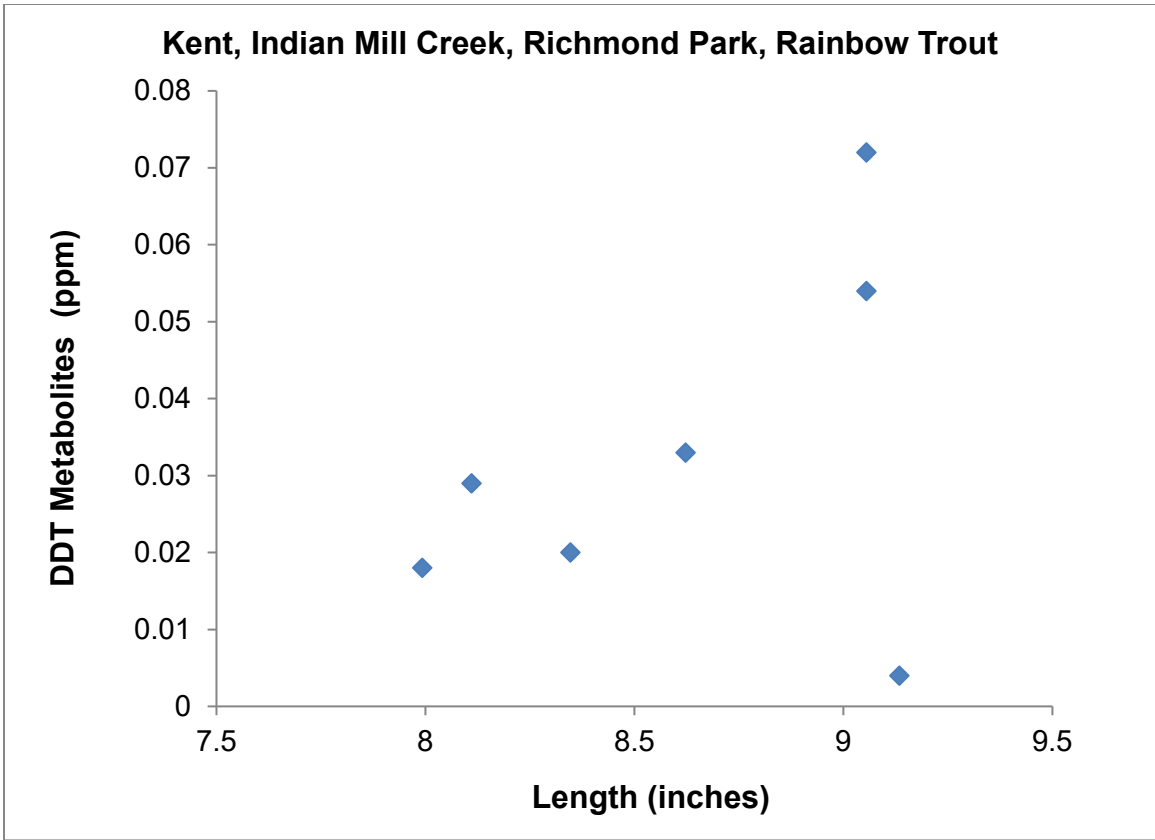
*Only sub-legal resident rainbow trout were collected. These were resident trout and not migratory steelhead. Therefore, all fish were included in the analysis.

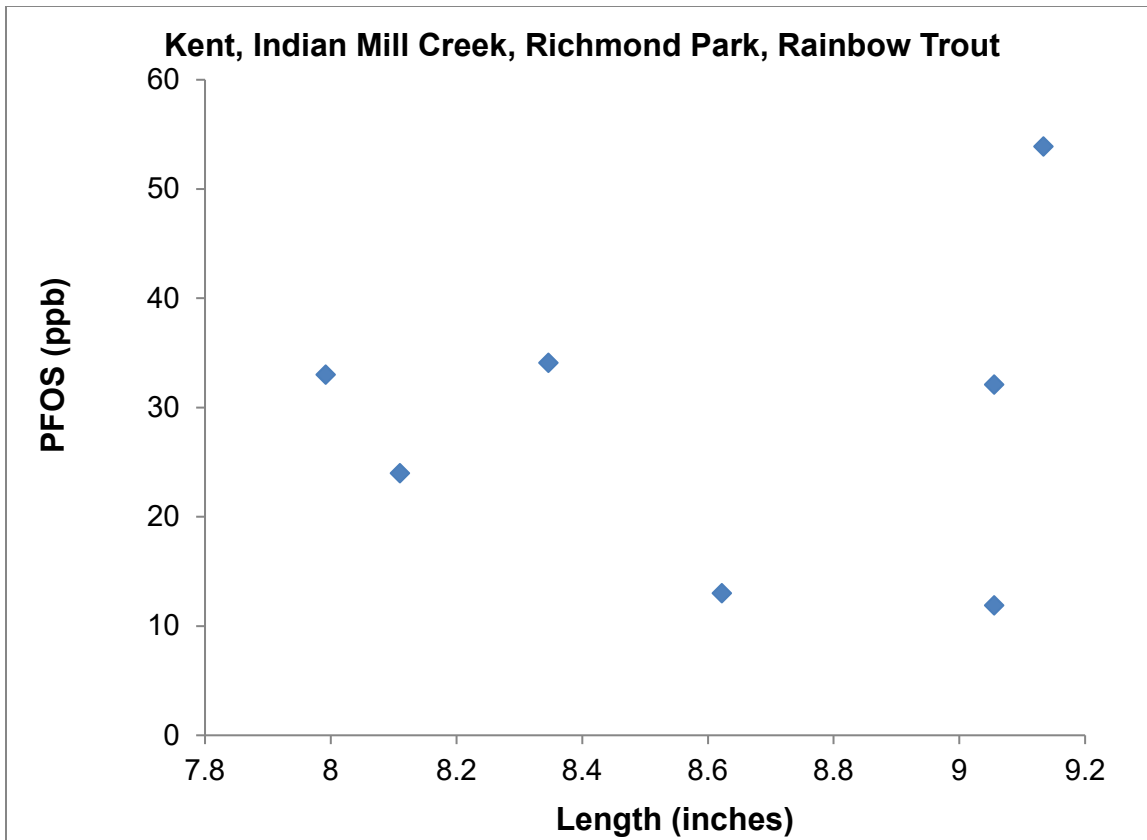
Existing MDHHS Advisory: Rainbow trout from Indian Mill Creek in Kent County are not currently covered under any consumption guidance.

Recommendation: No one should eat more than 2 meals per month of rainbow trout of any size from Indian Mill Creek in Kent County due to PFOS. Mercury and PCBs cause less restrictive guidance.

Note: Management decision was made to use the 95% UCL despite exceeding the maximum concentration.







Yellow Perch

Lake Bella Vista

Kent County

Hg Analysis:

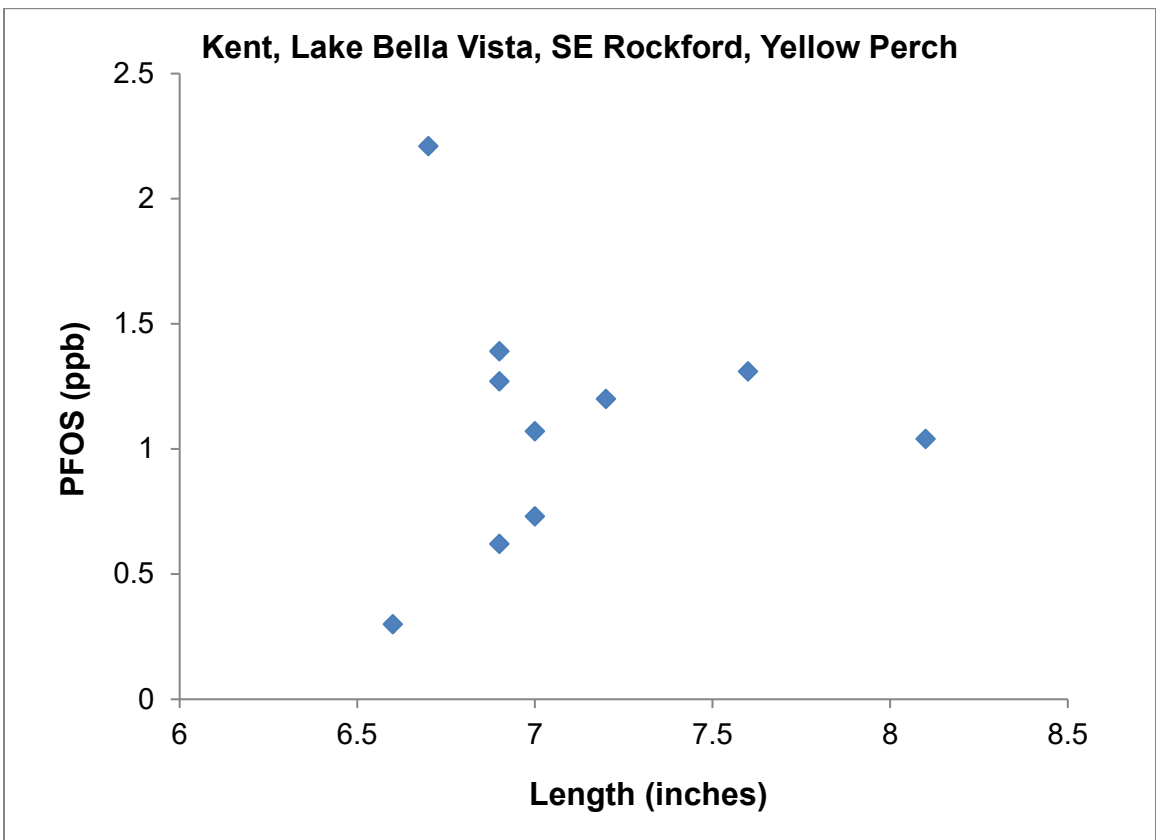
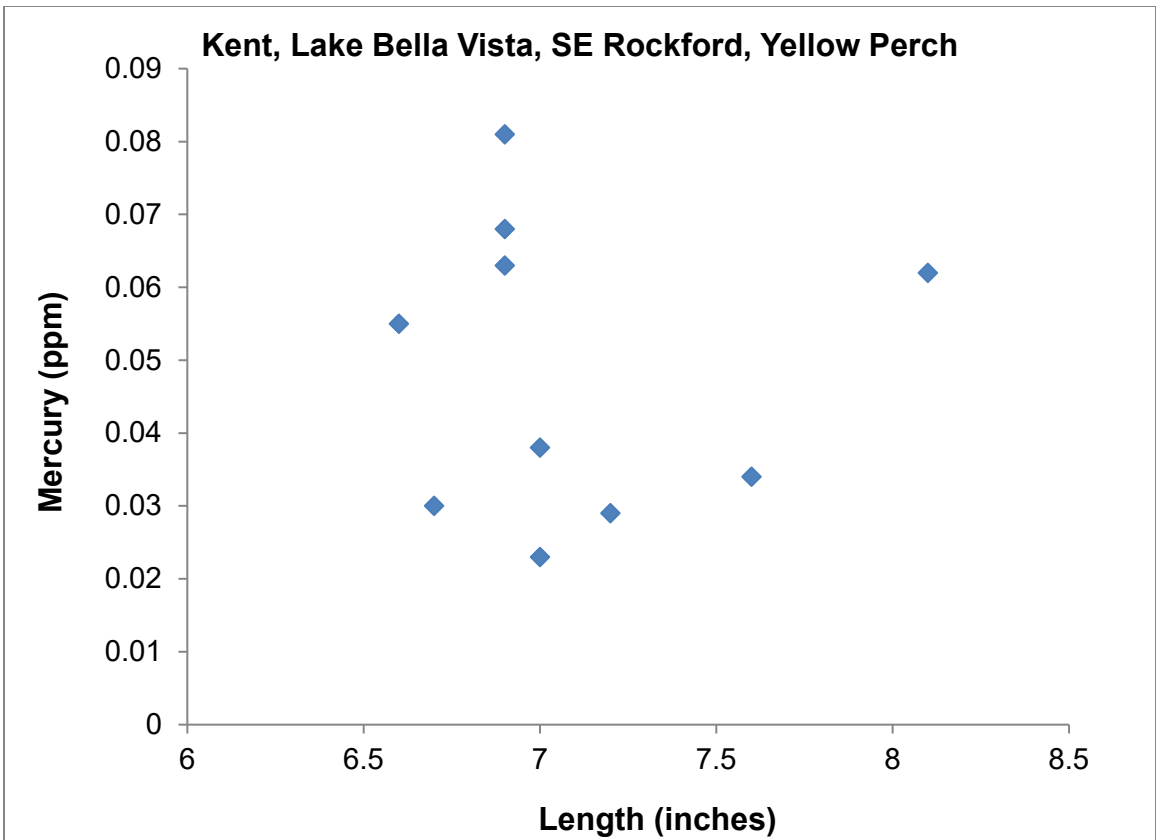
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	6.6	na	6.6	8.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.05	0.02	0.08	0.06	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.000	0.000				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	6.6	na	6.6	8.1
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	1.1 ppb	0.3 ppb	2.2 ppb	1.5 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.001	0.048	Final meal category based on UCL:			16

Existing MDHHS Advisory: Lake Bella Vista yellow perch are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of yellow perch of any size.

Recommendation: No one should eat more than 16 meals per month of yellow perch from Lake Bella Vista due to mercury.



Northern Pike

Lincoln Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	3	17.7	24	23.8	23.8
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.97	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.645	0.722				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	24	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Lincoln Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: Statewide guidelines apply to northern pike from Lincoln Lake. Dataset limited due to sample size. No one should eat more than 1 meal per month of northern pike over 30 inches or more than 2 meals per month of northern pike under 30 inches in length.

Rock Bass

Lincoln Lake

Kent County

Hg Analysis:

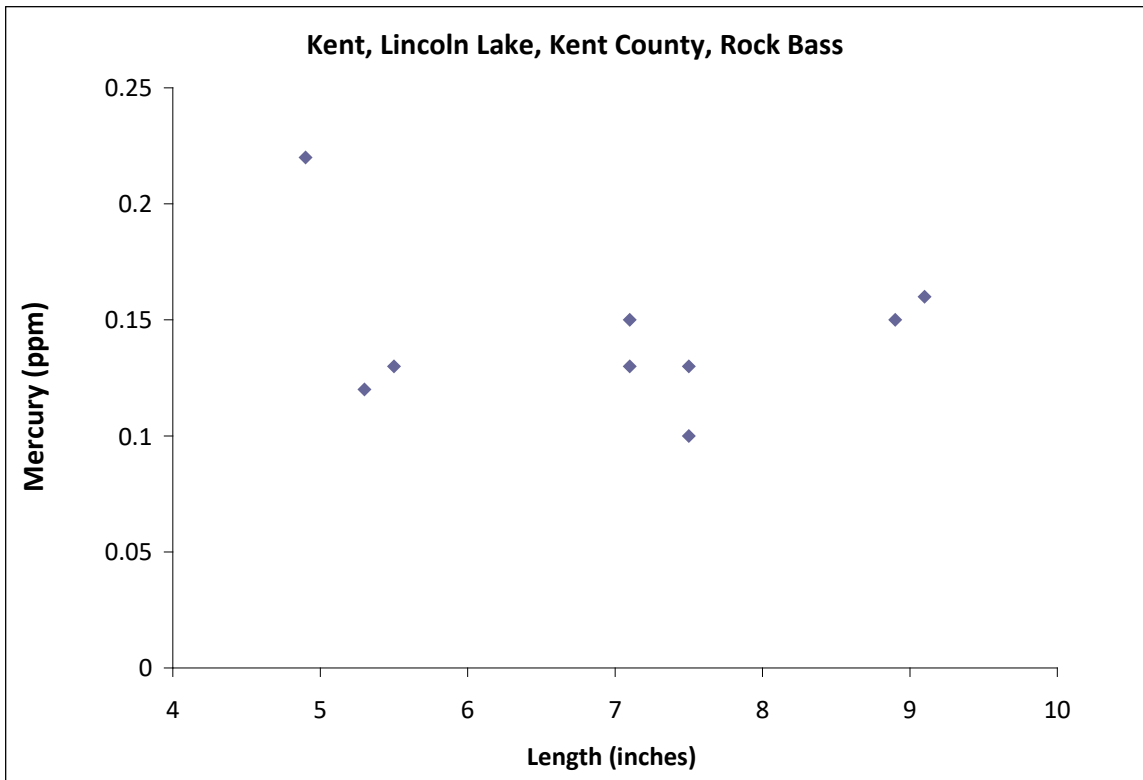
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	9	4.9	na	4.9	9.1
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.14	0.10	0.22	0.17	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.041	0.020				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						4

Existing Advisory: Lincoln Lake rock bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Lincoln Lake rock bass due to mercury.



Walleye

Lincoln Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	11.4	15	14.8	17.5
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.54	0.41	0.69	0.62	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.828	0.844				

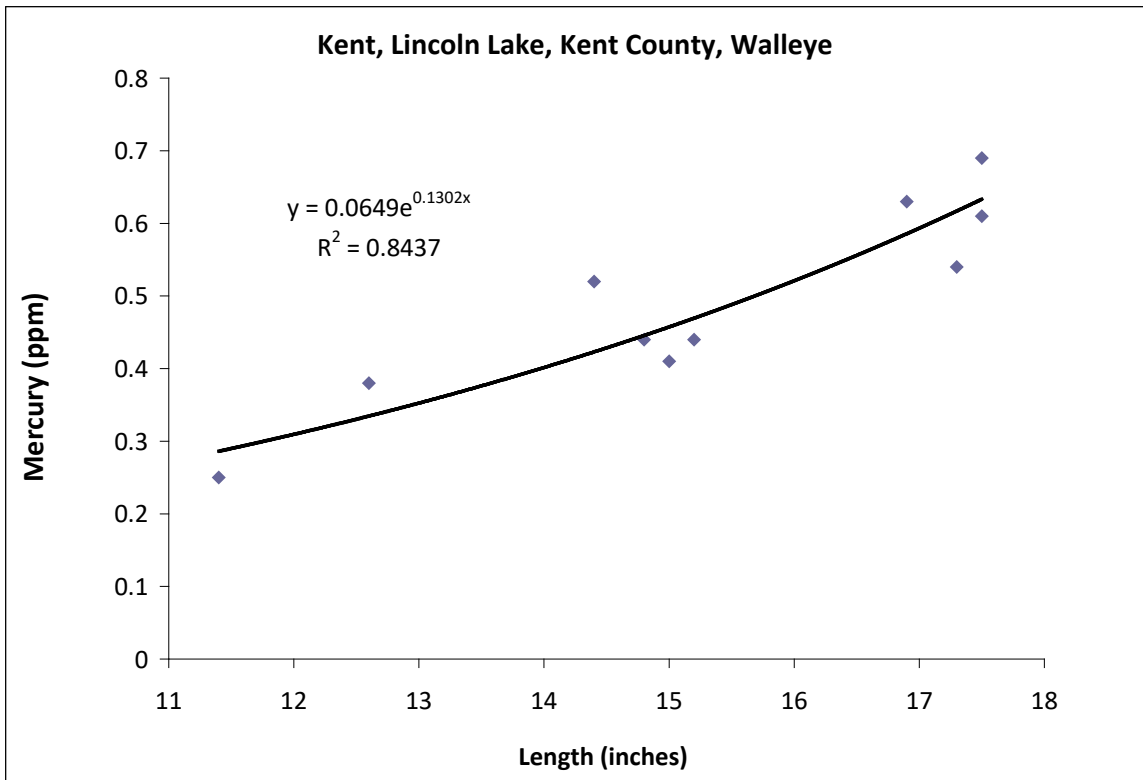
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	15	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Lincoln Lake walleye are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Lincoln Lake walleye under 18 inches or 6 meals per year over 18 inches due to mercury. Regression and upper length of the dataset used to set the length break.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.458	2
16	0.521	2
17	0.594	1
18	0.676	1
19	0.770	1
20	0.877	1
21	0.999	1
22	1.138	0.5
23	1.297	0.5
<i>Shaded area denotes extrapolated estimates</i>		



Black Crappie

Little Pine Island Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	9	7.4	na	7.4	9.5
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.06	0.05	0.12	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.876*	0.819*				

Organics Analysis:

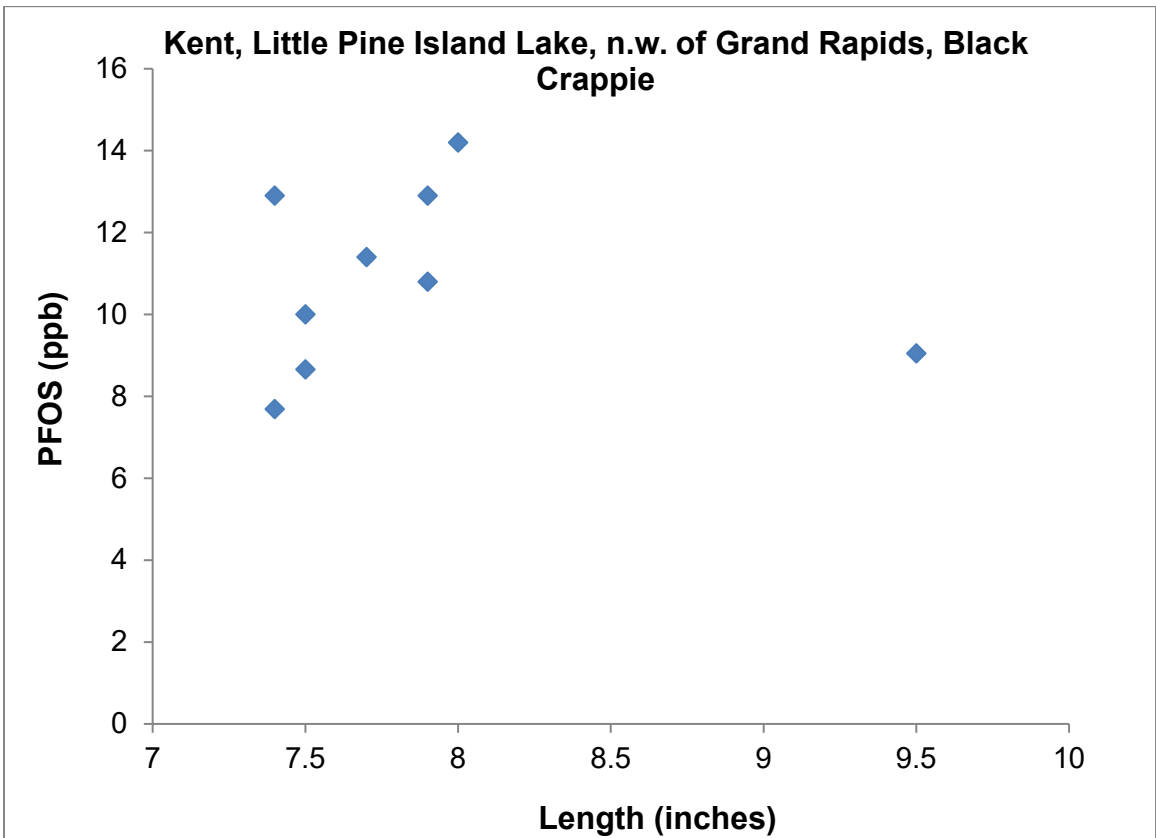
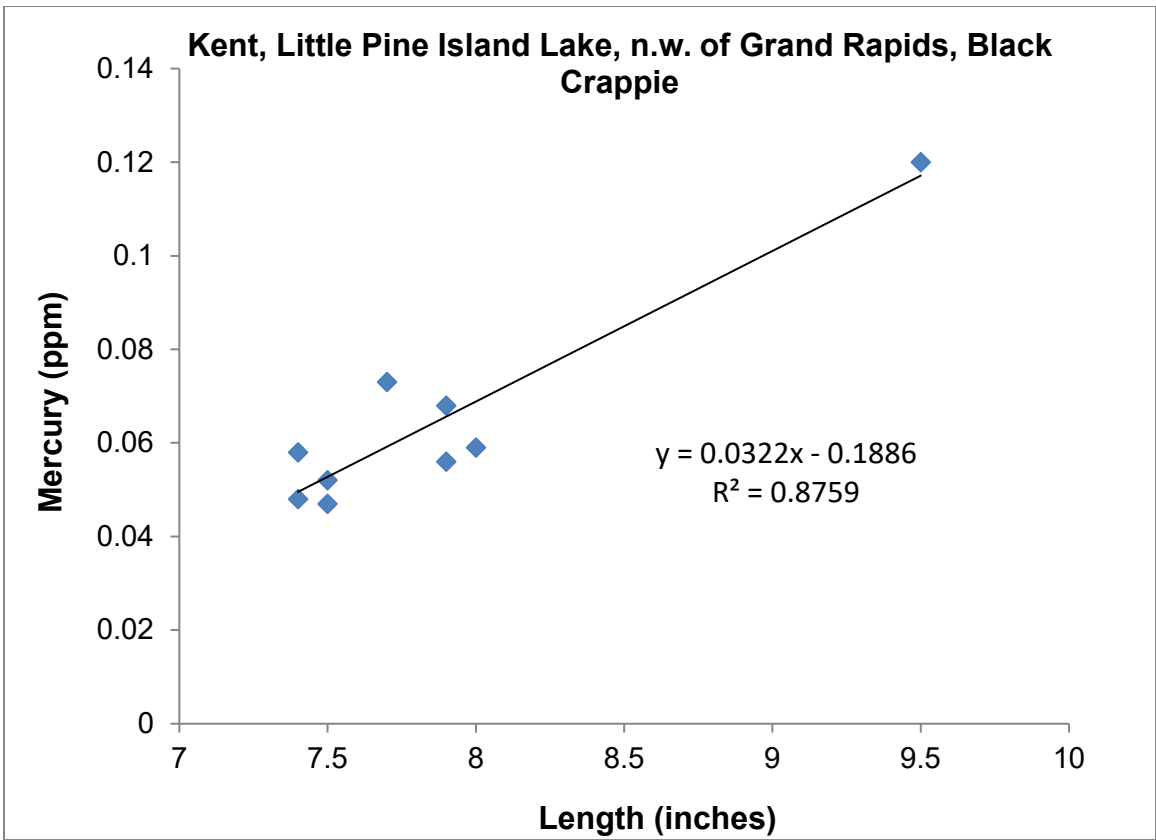
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	9	7.4	na	7.4	9.5
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	9	11 ppb	7 ppb	14 ppb	12 ppb	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.006	0.004				
Final meal category based on UCL:						12

Existing MDHHS Advisory: Little Pine Island Lake black crappie and white crappie are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of crappie of any size.

Recommendation: No one should eat more than 8 meals per month of Little Pine Island crappie of any size due to mercury. PFOS would cause an advisory. The Hg regression is driven by one point but suggests that an advisory more restrictive than 12 meals per month would be appropriate.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	0	16
7	0.04	16
8	0.07	16
9	0.1	8
10	0.13	8
11	0.17	4
<i>Shaded area denotes extrapolated estimates</i>		

Note: The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.



**Bluegill and
Pumpkinseed**

Little Pine Island Lake

Kent County

Hg Analysis:

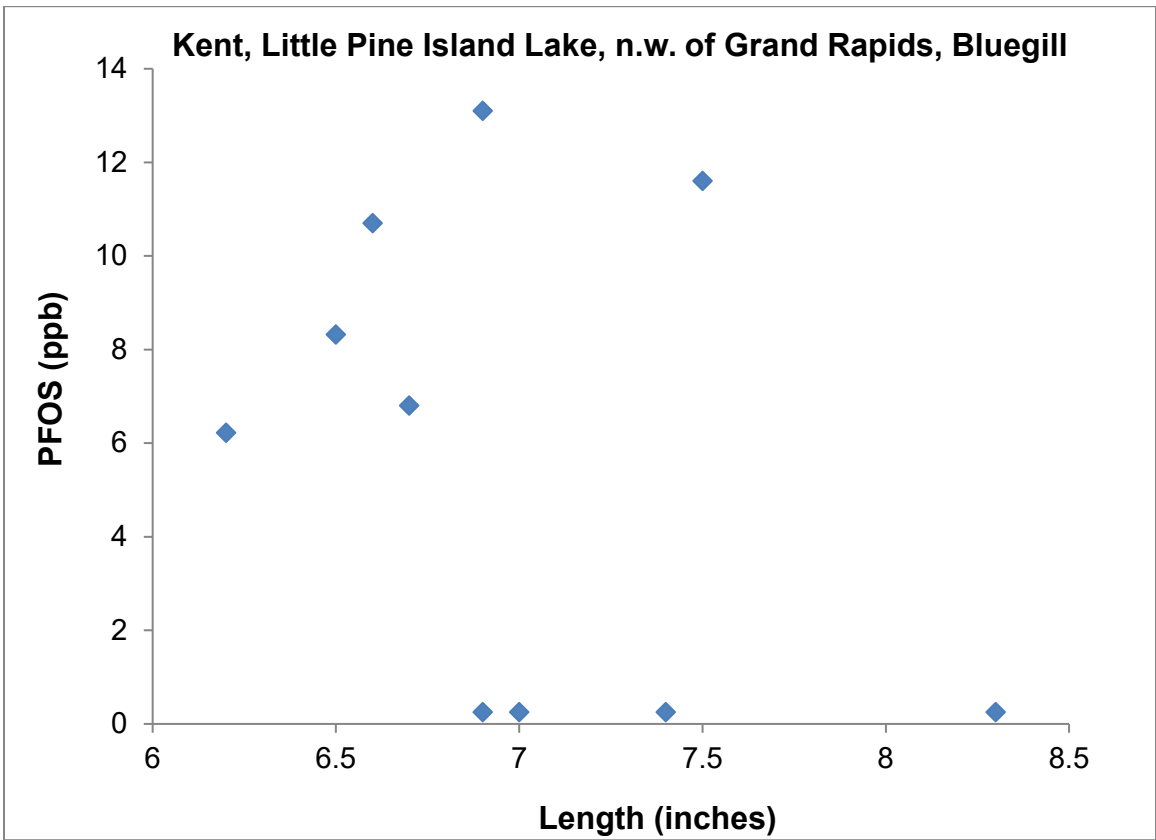
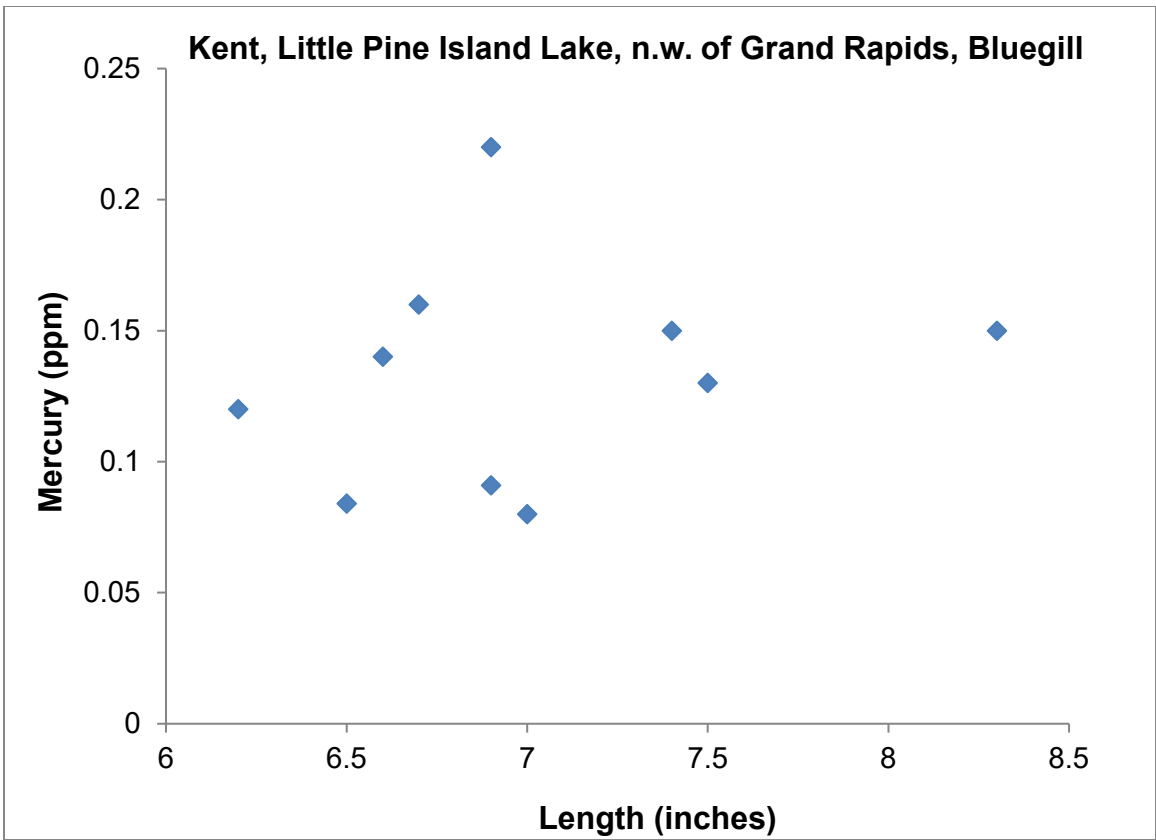
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	10	6.2	na	6.2	8.3
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.13	0.08	0.22	0.16	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.042	0.058				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	10	6.2	na	6.2	8.3
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	6 ppb	< 0.25 ppb	13 ppb	9.5 ppb	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.142	0.273				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Little Pine Island Lake bluegill and pumpkinseed (sunfish) are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 4 meals per month of Little Pine Island Lake bluegill or sunfish of any size due to mercury. PFOS would cause an advisory.



Largemouth Bass

Long Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2006	2006	10	12.3	14	14.2	14.8	
Datasets available: 2006							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	6	0.485	0.37	0.62	0.58	2	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.113	0.109					

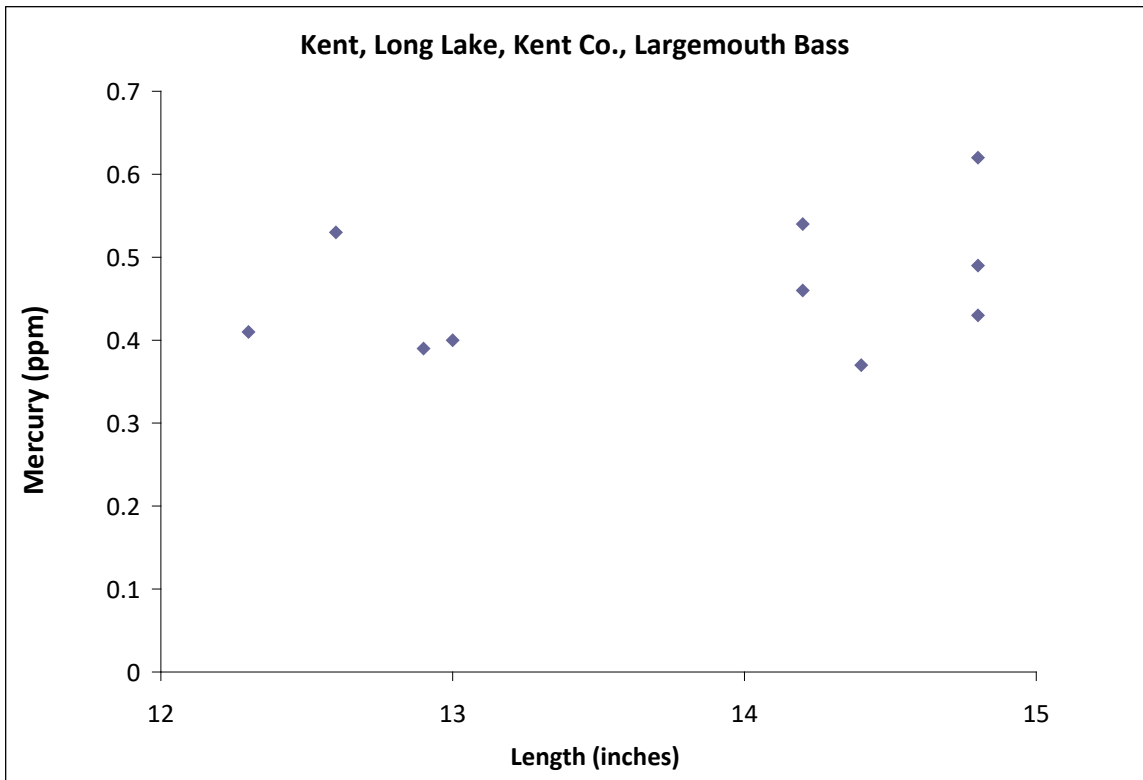
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
--	--	0	--	14	--	--	
Datasets available: --							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
Final meal category based on UCL:							2

Existing Advisory: Long Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of legal size largemouth or smallmouth bass under 18 inches or more than 1 meal per month of largemouth or smallmouth bass over 18 inches. Statewide length break applied.

Note: The data set consists of a small number of legal size fish in a narrow length range but the 95% UCL is consistent with the statewide advice for these species.



Black Crappie

Myers Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	8.5	na	8.5	10.2
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.06	0.05	0.065	0.067	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.010	0.011				

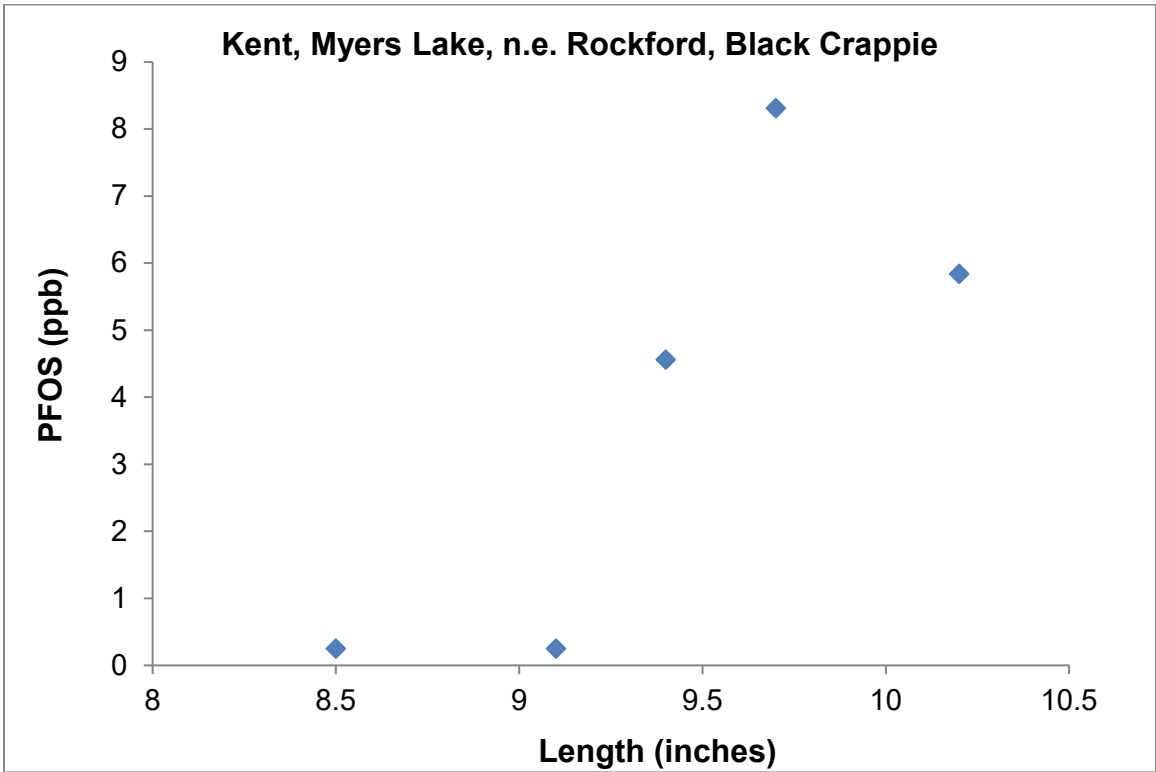
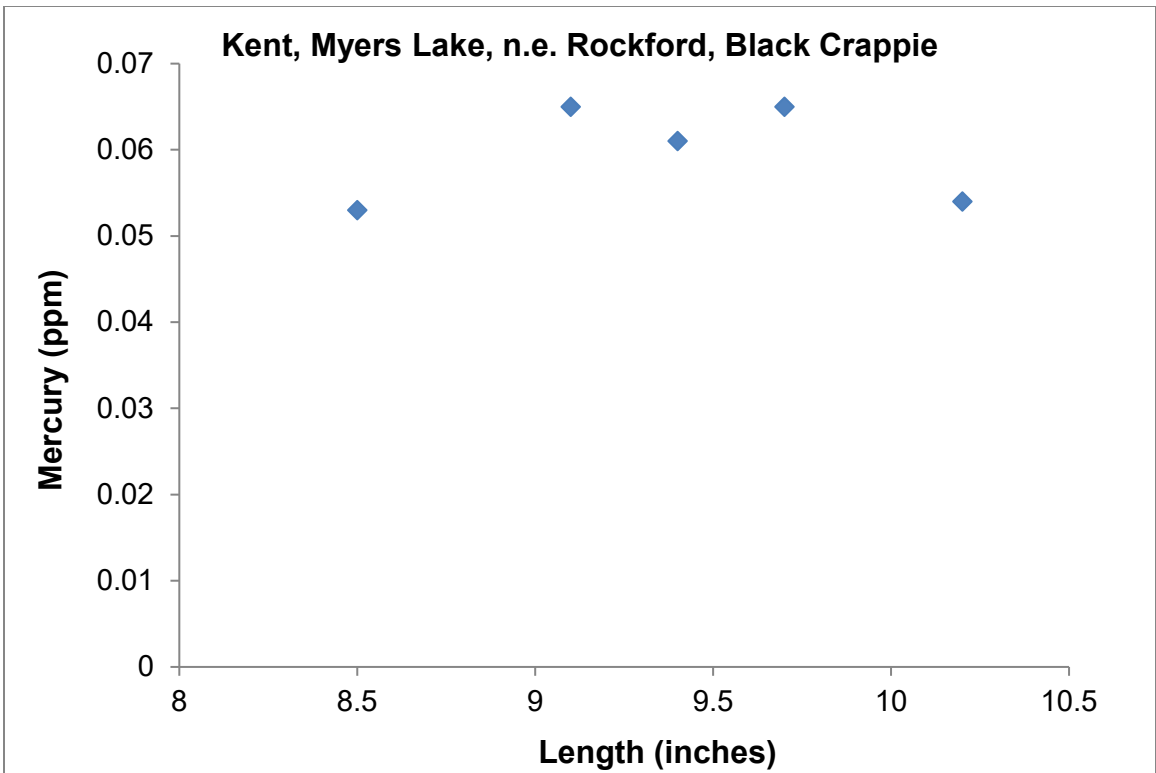
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	8.5	na	8.5	10.2
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	5	4 ppb	<0.25 ppb	8 ppb	8 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.642*	0.704*				
*- regression not reliable, driven by non-detects						
Final meal category based on UCL:						16^

Existing MDHHS Advisory: Myers Lake black crappie are covered by the statewide advisory. No one should eat more than 4 meals per month of black crappie of any size due to mercury.

Recommendation: No one should eat more than 8 meals per month of Myers Lake black or white crappie of any size due to mercury. Management decision used to set this guideline.

^ The bluegill collected from this lake indicated restricted consumption due to mercury was warranted for that species (one category more relaxed than the statewide advisory). The meal category of 8 meals per month is recommended for crappie as it is one category more relaxed than the statewide advisory. Crappie are a slightly higher trophic level than bluegill indicating that they are more likely to contain higher levels of mercury. Although the minimum sample size was met, additional samples are needed in order to set a data-based guideline.



Bluegill

Myers Lake

Kent County

Hg Analysis:

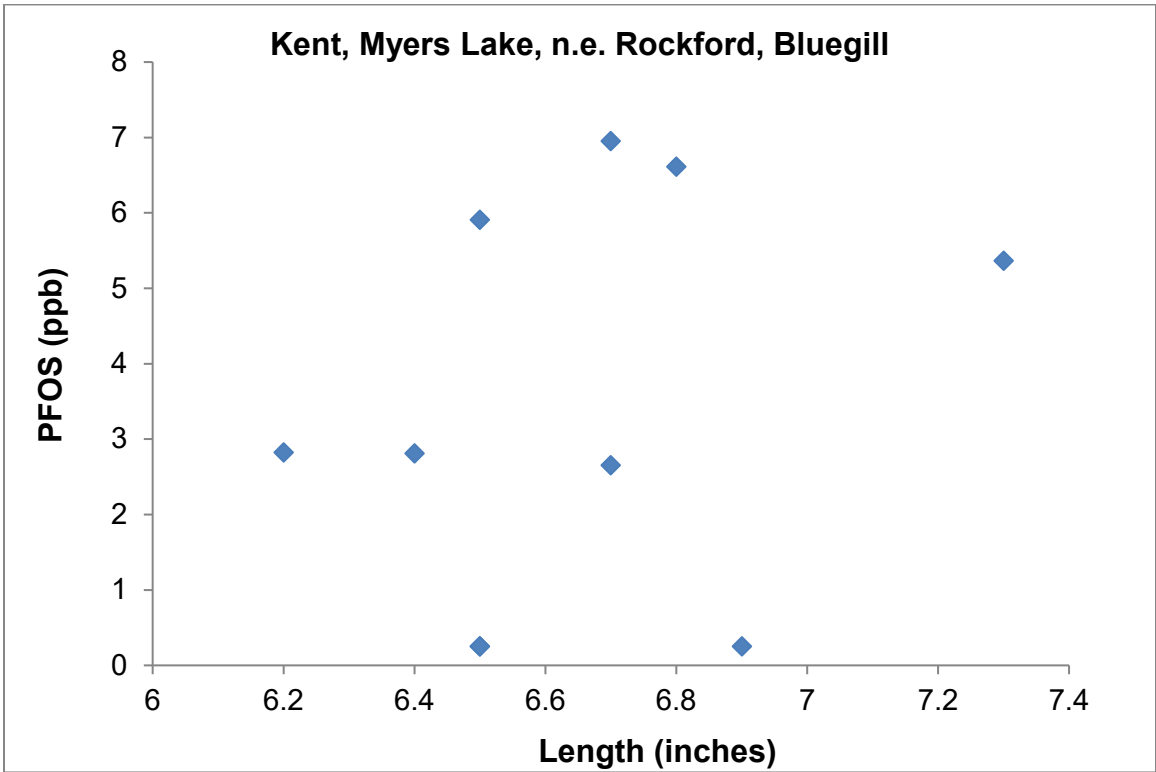
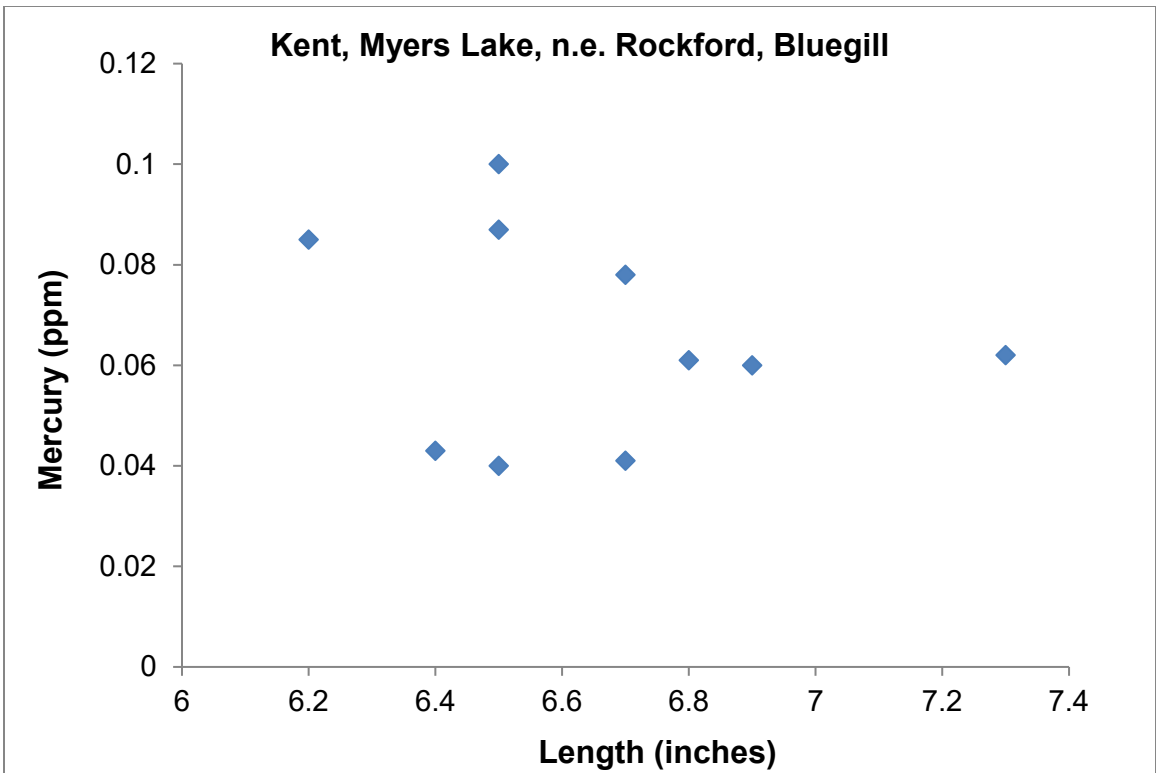
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	6.2	na	6.2	7.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.07	0.04	0.10	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.047	0.019				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	6.2	na	6.2	7.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	3 ppb	<0.25 ppb	7 ppb	5 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.080	0.023				
Final meal category based on UCL:						12

Existing MDHHS Advisory: Myers Lake bluegill are covered by the statewide advisory. No one should eat more than 8 meals per month of bluegill of any size due to mercury.

Recommendation: No one should eat more than 12 meals per month of Myers Lake bluegill of any size due to mercury.



Largemouth Bass

Myers Lake

Kent County

Hg Analysis:

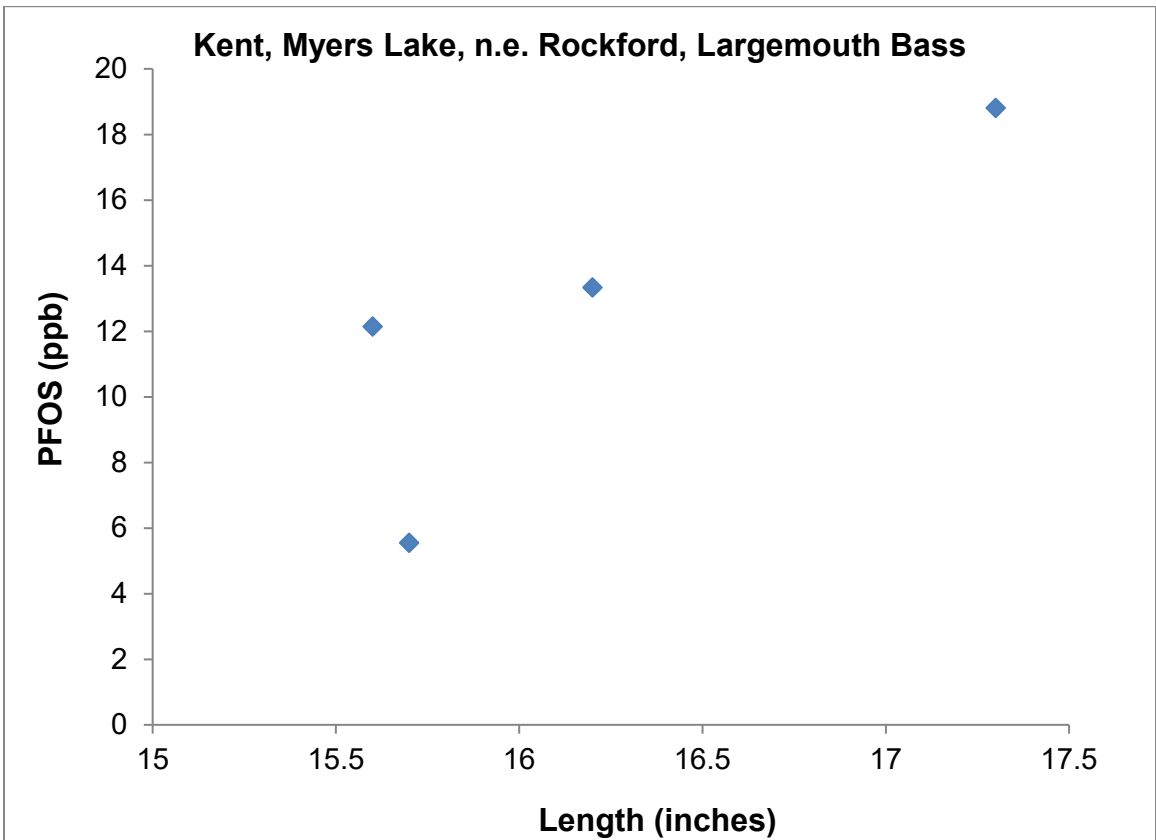
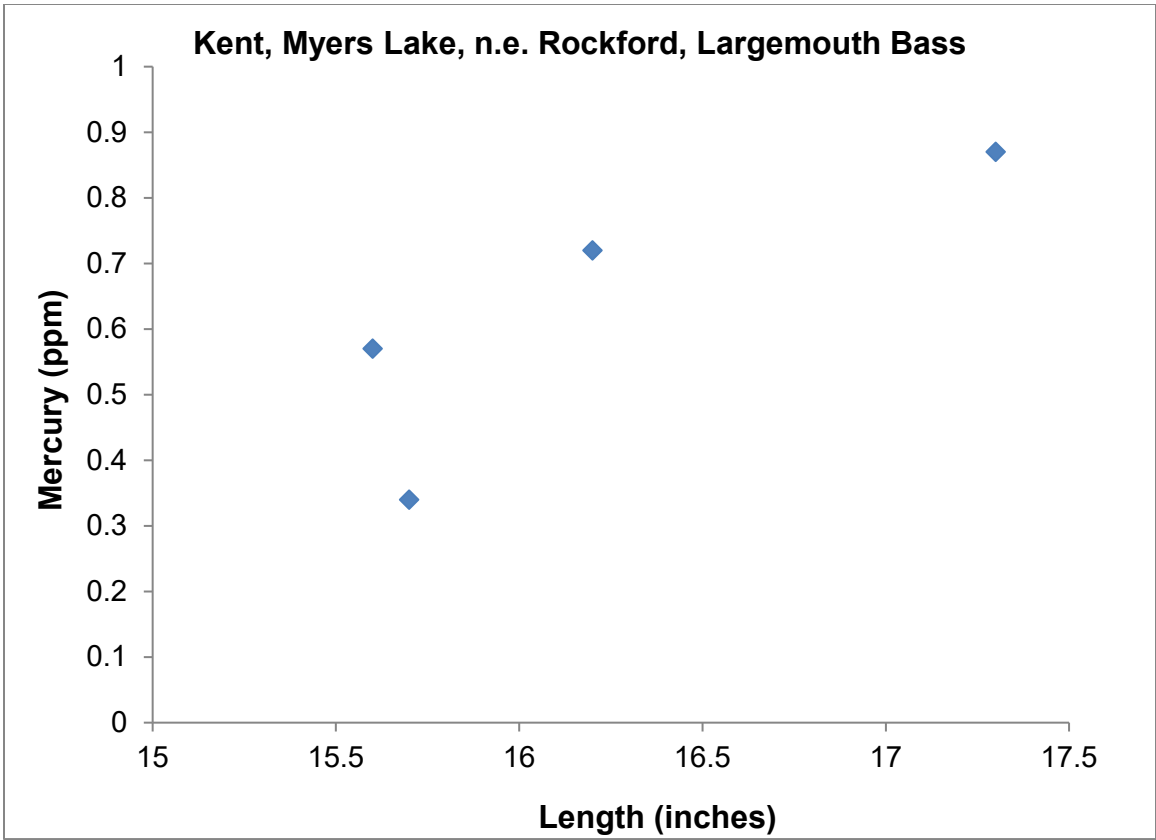
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2018	2018	4	15.6	14	15.6	17.3	
Datasets available: 2018							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	4	0.62	0.34	0.87	--	--	
Chemical	Linear Regression	Exponential Regression	* due to the small sample number, regression not used				
	R ²	R ²					
Mercury	0.710*	0.580					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2018	2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
PFOS	4	12 ppb	6 ppb	19 ppb	--	--	
Chemical	Linear Regression	Exponential Regression	* due to the small sample number, regression not used				
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	0.698*	0.524					
Final meal category based on UCL:							--

Existing MDHHS Advisory: Myers Lake largemouth bass and smallmouth bass are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Recommendation: No change is recommended. Additional samples should be collected to fully evaluate this fish population. The range of mercury detected is within the 2 and 1 meals per month category. The maximum PFOS level would result in a meal category less restrictive than the meal category for mercury.



Rock Bass

Plaster Creek

Kent County

Hg Analysis:

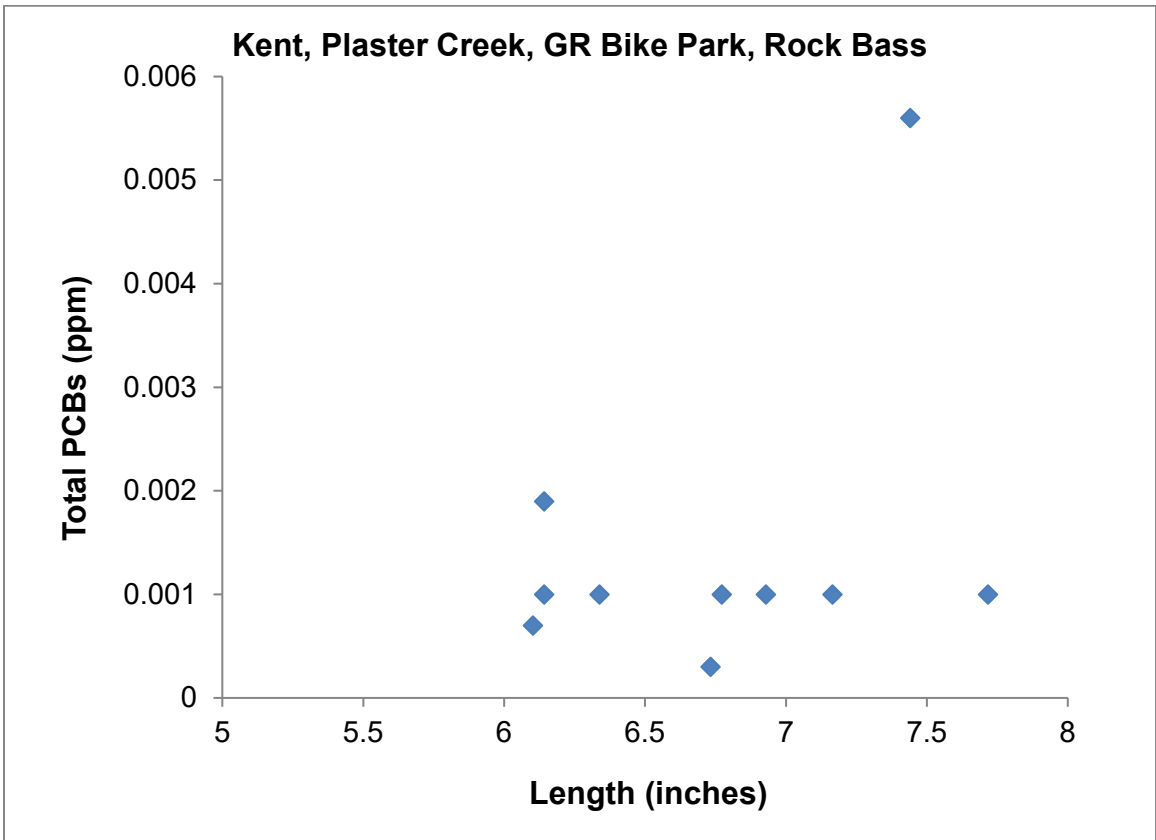
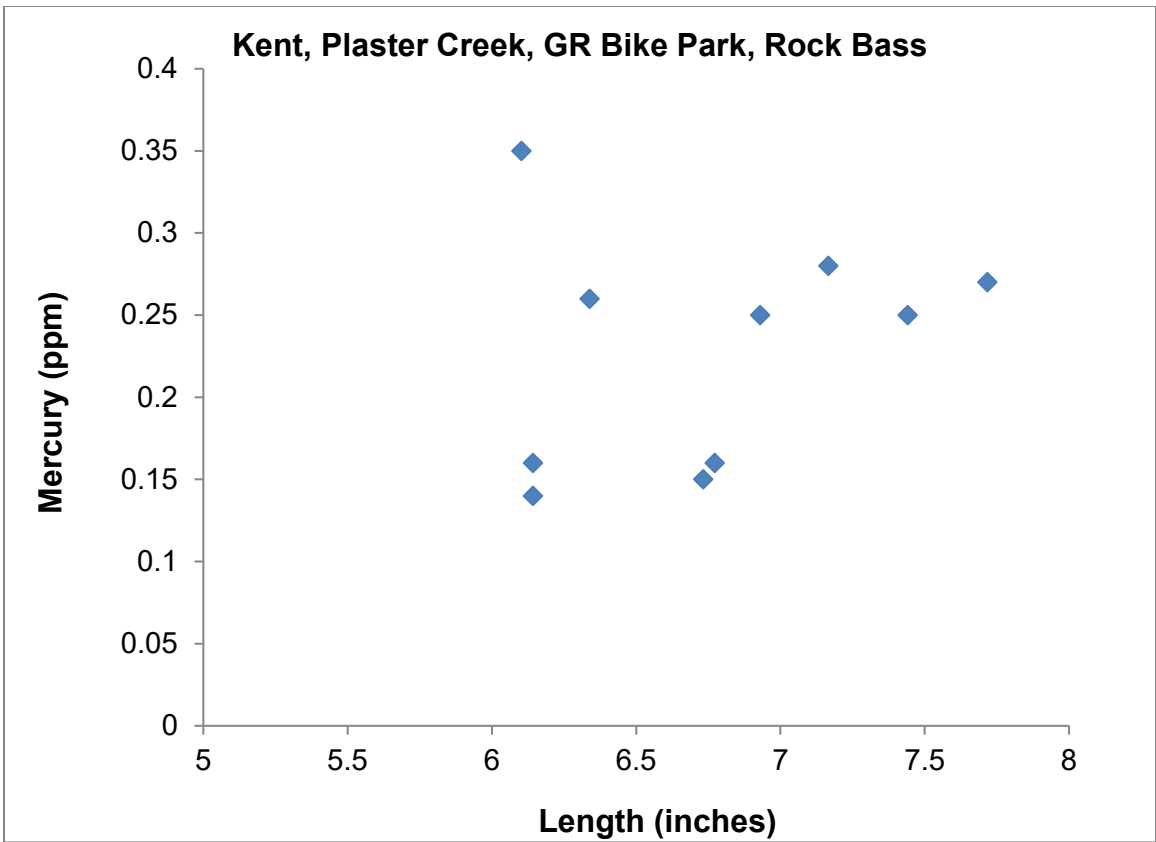
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	6.1	NA	6.1	7.7
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.227	0.140	0.350	0.277	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.054	0.094				

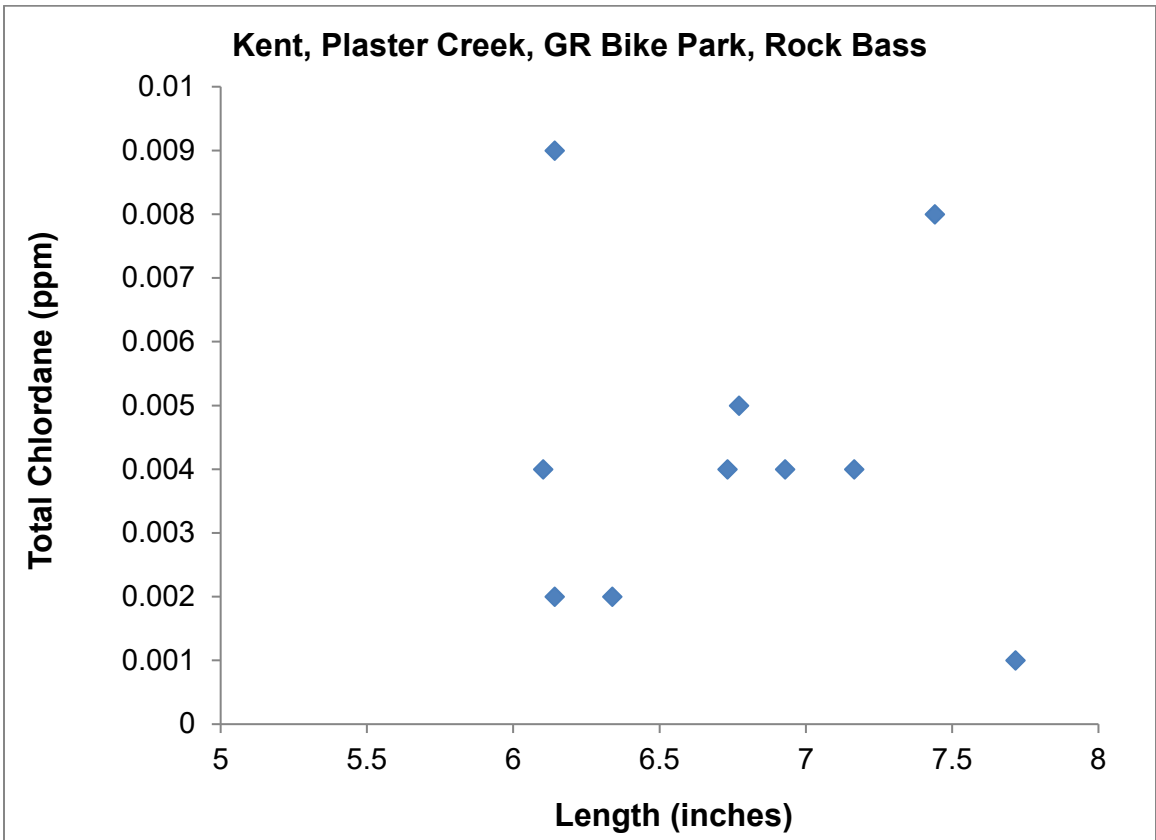
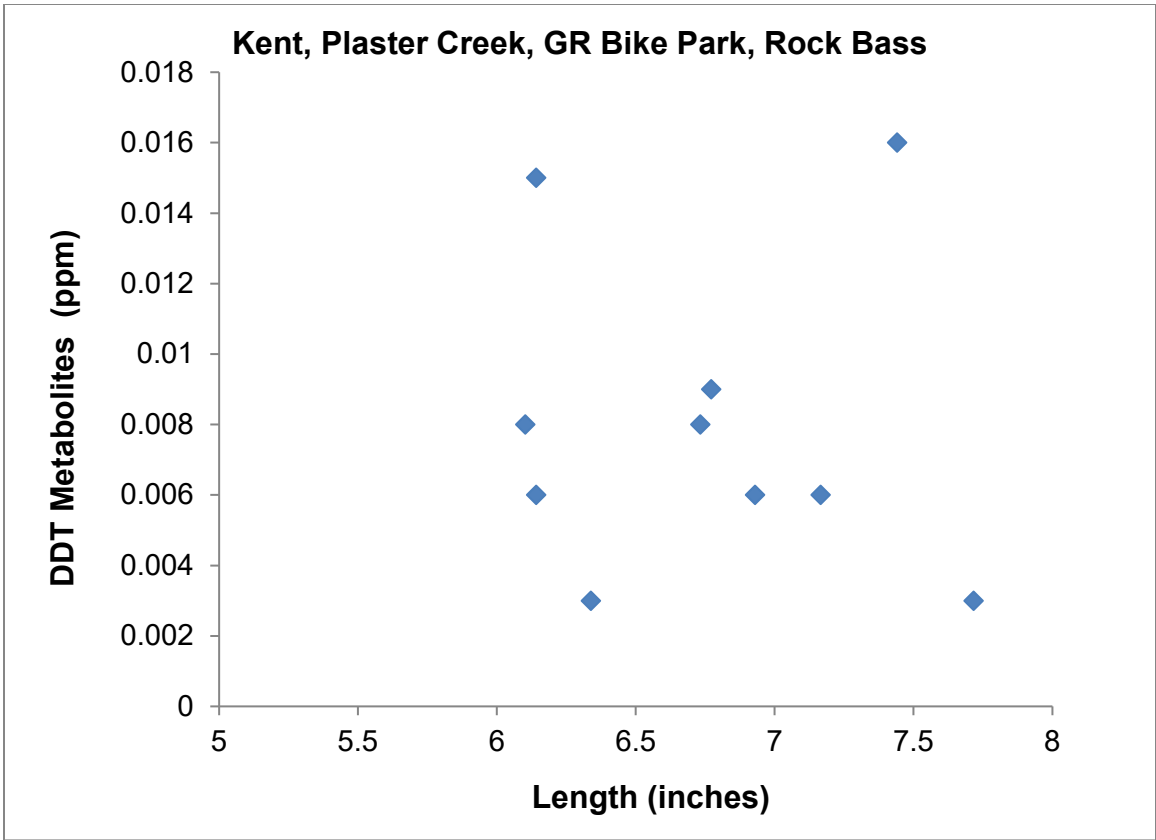
Organics Analysis:

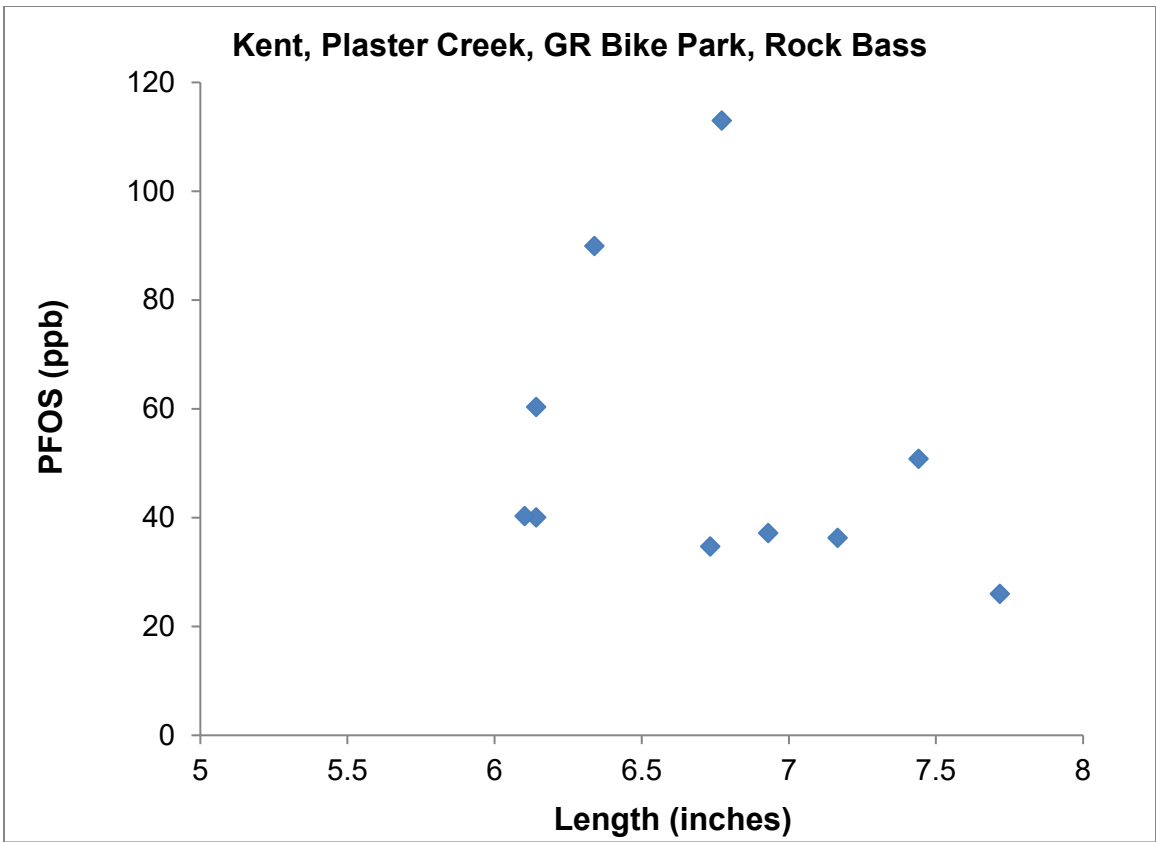
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	6.1	NA	6.1	7.7
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.001	<0.001	0.006	0.003	16
DDT	10	0.008	0.003	0.016	0.011	16
Chlordane	10	0.004	<0.001	0.009	0.006	16
Toxaphene	10	ND	--	--	--	--
PFOS	10	52.9 ppb	26.0 ppb	113.0 ppb	72.7 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.134	0.077				
DDT	0.004	0.023				
Chlordane	0.007	0.036				
Toxaphene	--	--				
PFOS	0.076	0.136				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Rock bass from Plaster Creek in Kent County are currently covered under the statewide mercury guidance. No one should eat more than four meals per month of rock bass of any size.

Recommendation: No one should eat more than two meals per month of rock bass of any size from Plaster Creek in Kent County due to mercury and PFOS.







Largemouth Bass

Reeds Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	10	13	14	14	19.1
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.32	0.19	0.55	0.43	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.954	0.975				

Organics Analysis:

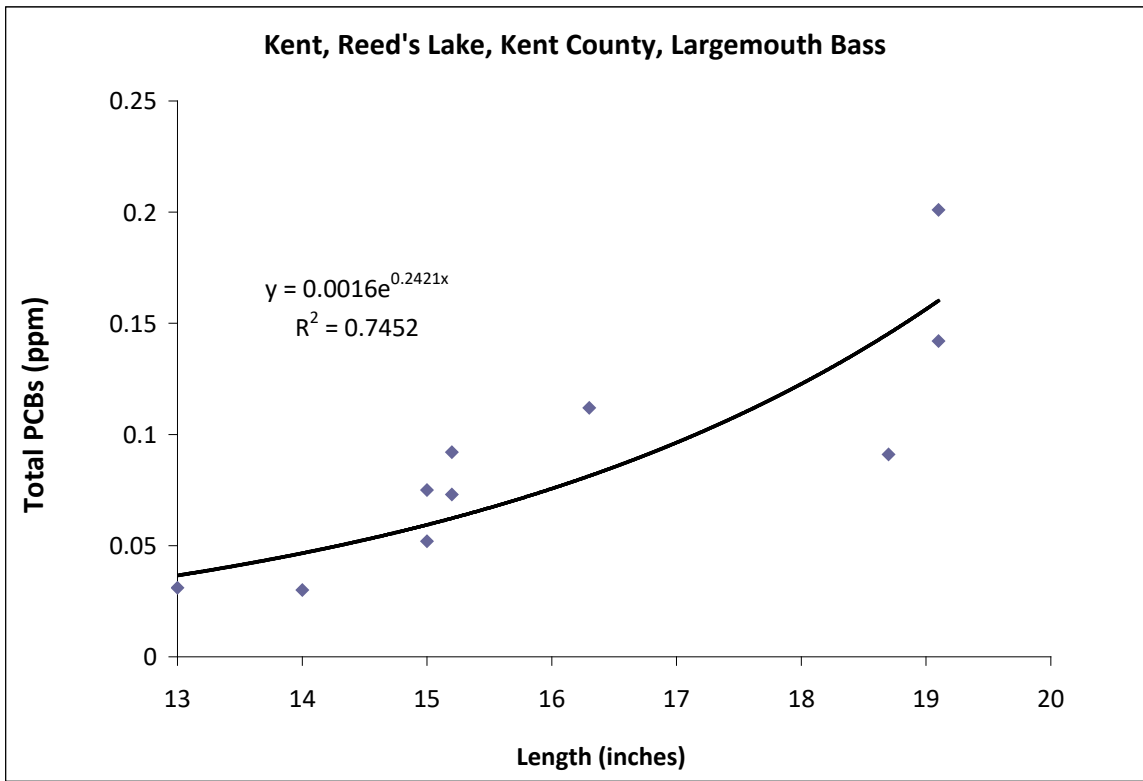
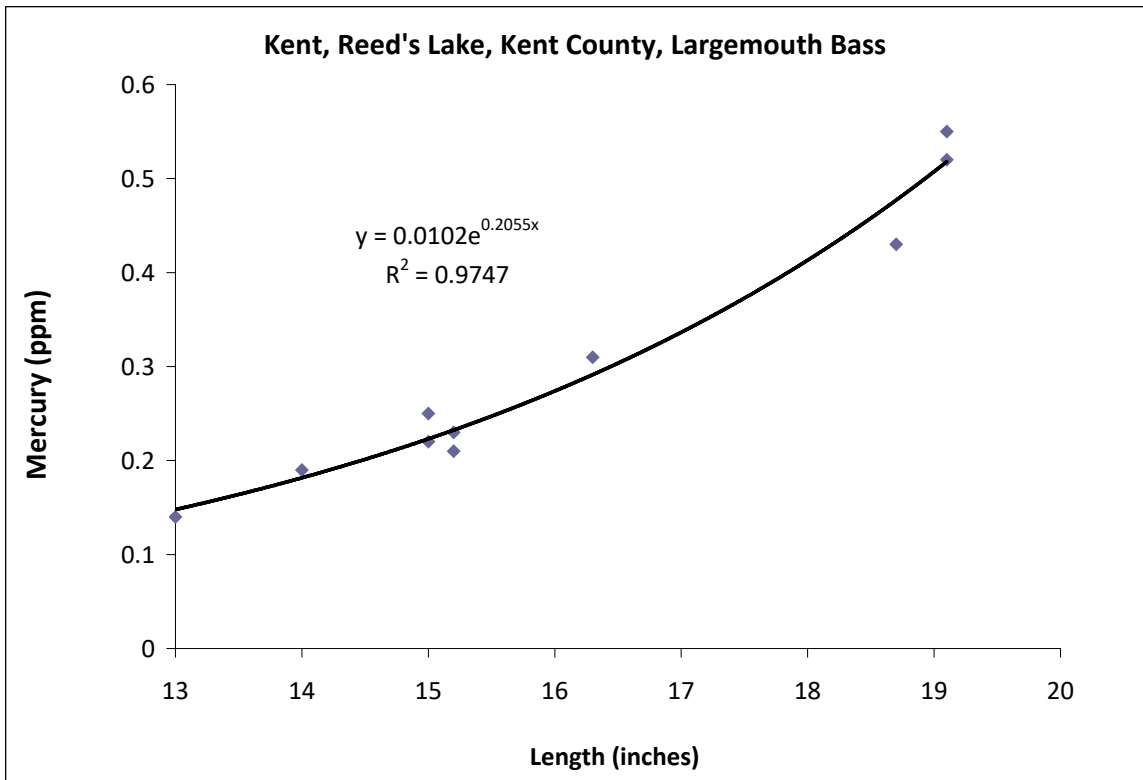
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	1989	10	13	14	14	19.1
Datasets available: 1989						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.096	0.03	0.20	0.14	1
DDT	9	0.728	0.14	1.65	1.11	1
Chlordane	9	0.038	0.004	0.09	0.06	--
Toxaphene	9	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.681	0.667				
DDT	0.688	0.678				
Chlordane	0.669	0.588				
Toxaphene	--	--				
Final meal category based on UCL:						1*

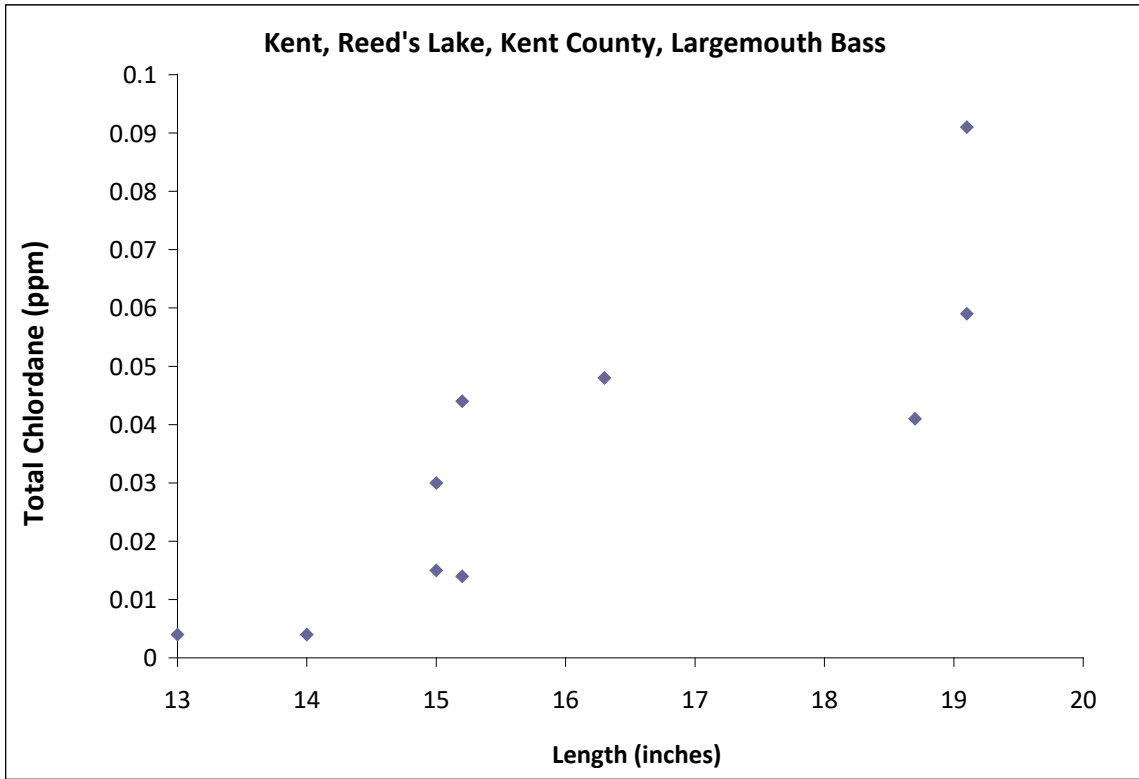
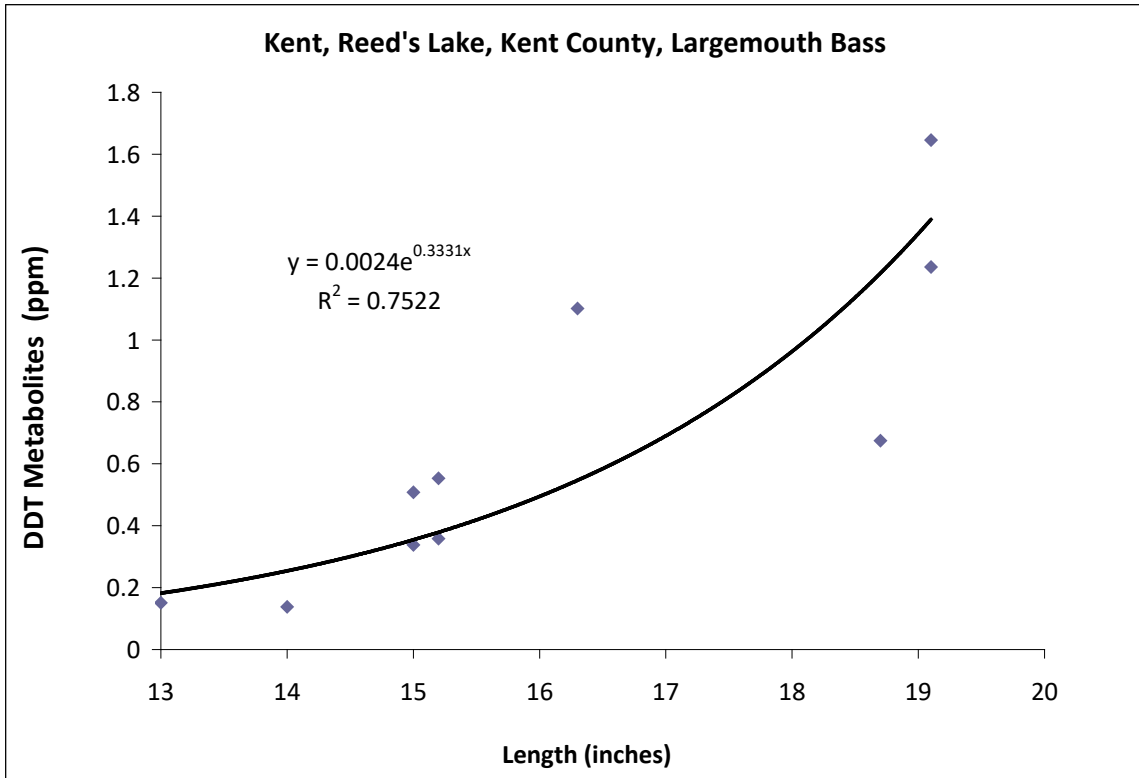
Length (Inches)	Hg		PCB*		DDT*	
	Regression Equation Estimate (ppm)	Meal Category	Regression Equation Estimate (ppm)	Meal Category	Regression Equation Estimate (ppm)	Meal Category
14	0.18	4	0.05	4	0.25	4
15	0.22	4	0.06	2	0.36	4
16	0.27	4	0.08	2	0.50	2
17	0.34	2	0.10	2	0.69	2
18	0.41	2	0.12	1	0.96	1
19	0.51	2	0.16	1	1.34	1
20	0.62	1	0.20	1	1.88	0.5
21	0.76	1	0.26	0.5	2.62	0.5
22	0.94	1	0.33	0.5	3.65	0.5

Shaded area denotes extrapolated estimates

Existing Advisory: Women and children should not eat more than one meal per week of Reeds Lake largemouth bass due to PCBs.

Recommendation: No one should eat more than 2 meals per month of largemouth or smallmouth bass from Reeds Lake smaller than 18 inches due to mercury, PCBs, and DDT. No more than 1 meals per month of those fish between greater than 18 inches due to mercury, PCBs, and DDT. Dataset is limited due to the age of the data. *Based on the EGLE Fish Contaminant Monitoring Program, PCB and DDT concentrations ≥ 15 years old would be expected to have declined if atmospheric inputs were the dominant process involved. Reed Lake has atypically high concentrations of DDT and PCBs in northern pike, largemouth bass, and walleye, which suggest that non-atmospheric inputs may be involved and as such no temporal reduction with time can be used.





Northern Pike

Reeds Lake

Kent County

Hg Analysis:

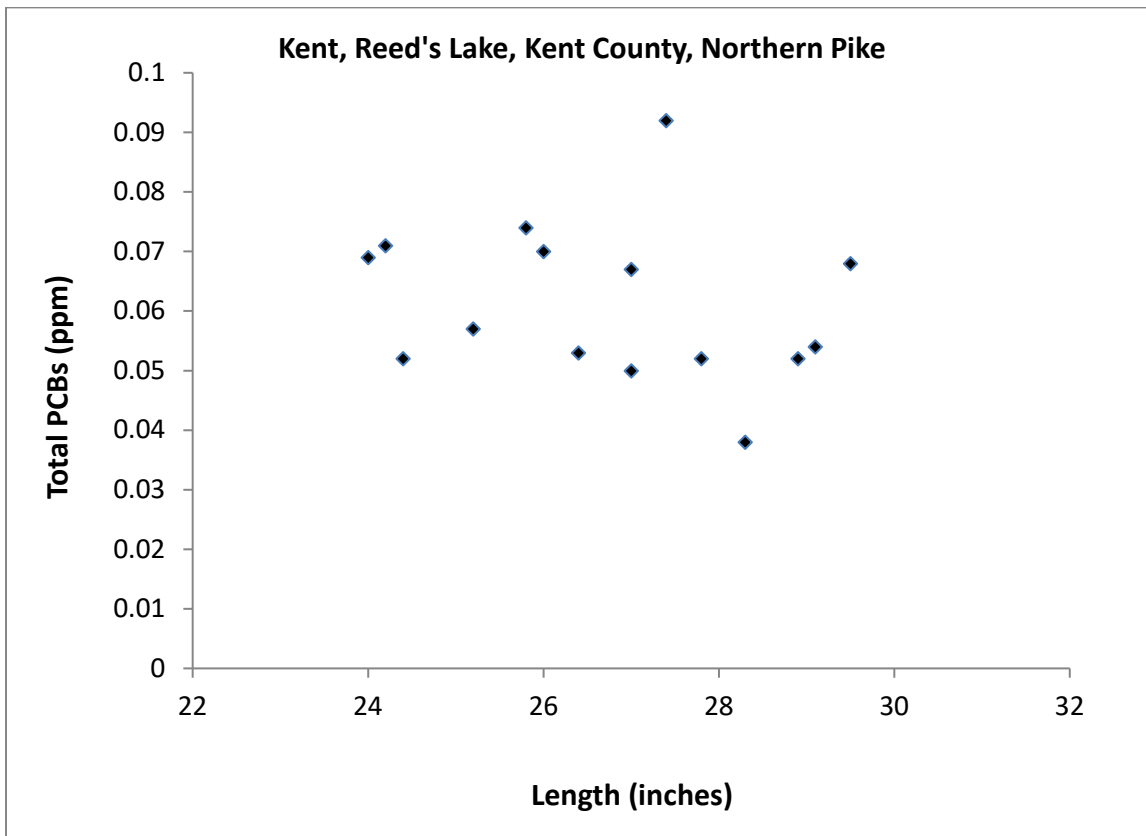
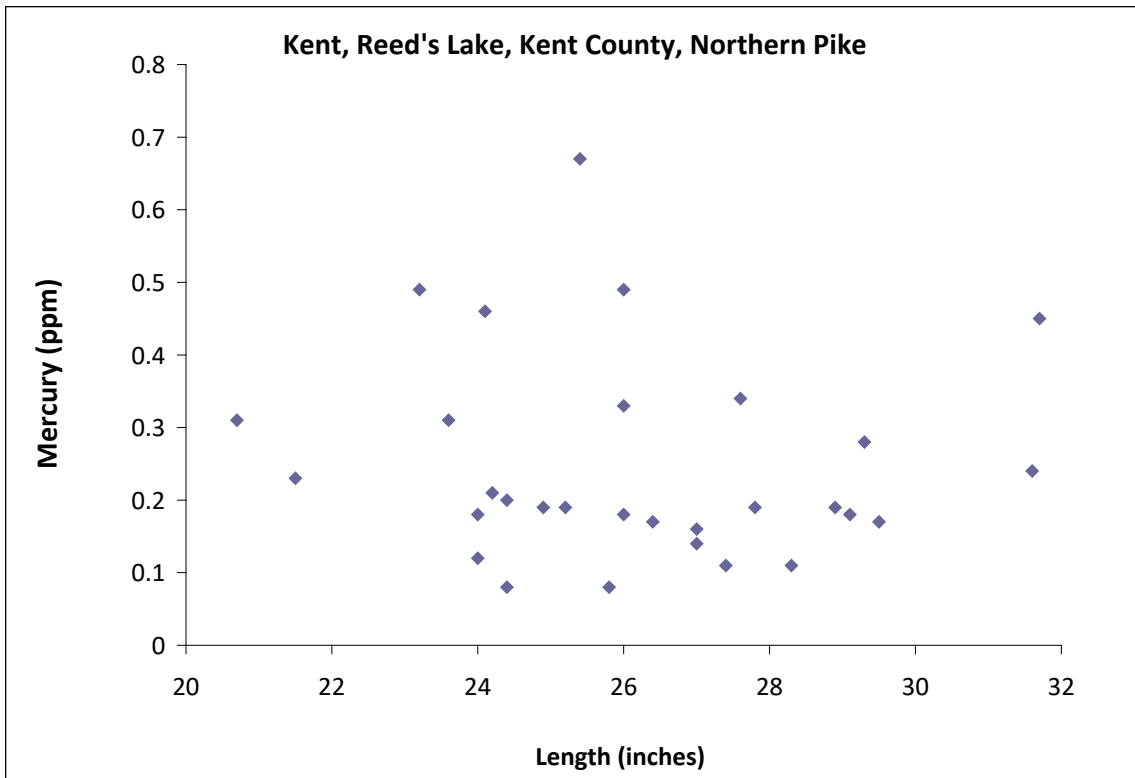
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1989	2009	30	20.7	24	23.6	31.7
Datasets available: 1989, 1998, 2009						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	27	0.24	0.08	0.67	0.29	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.007	0.004				

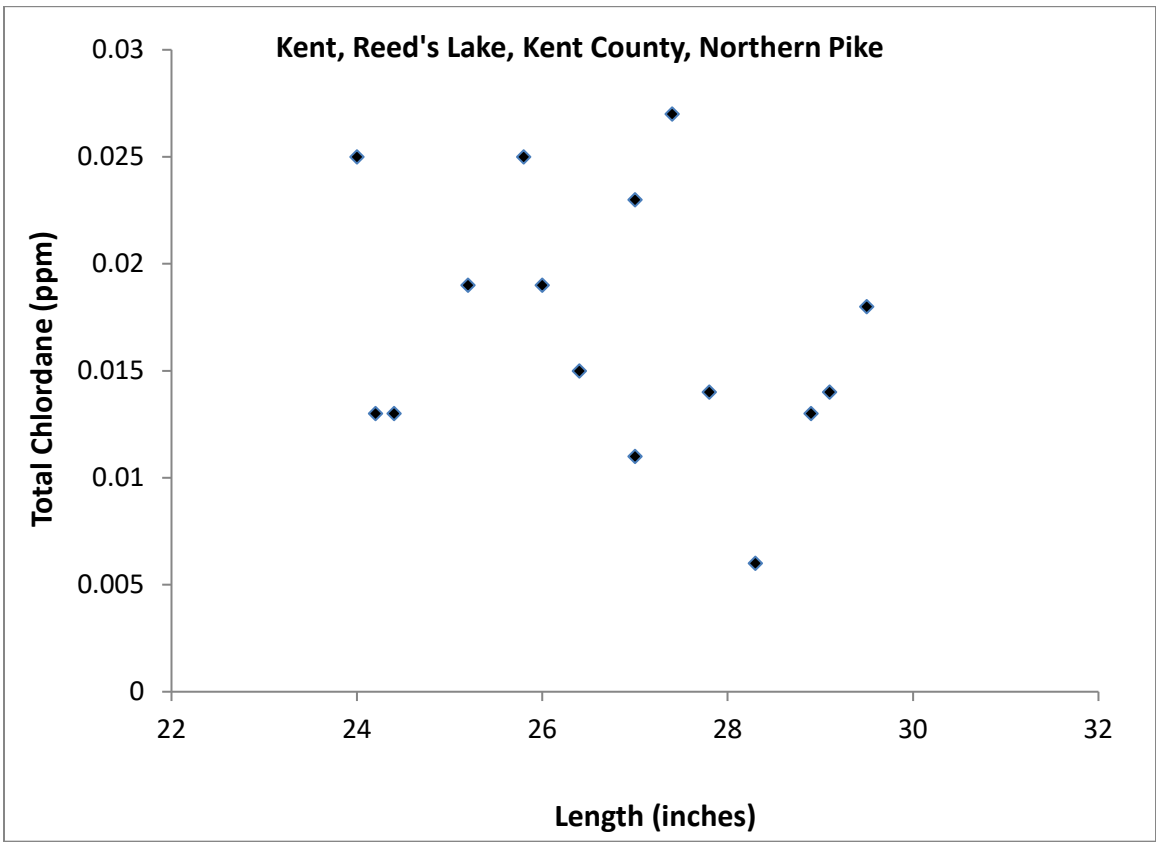
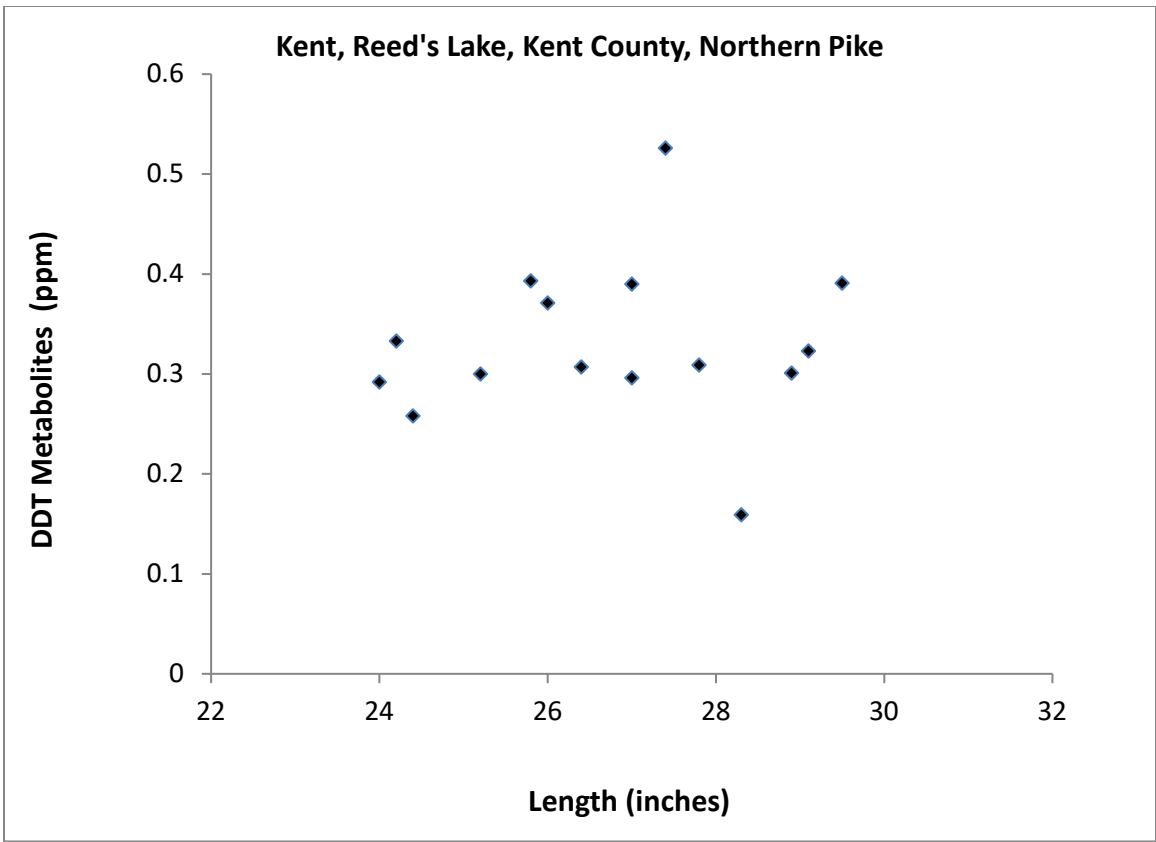
Organics Analysis:

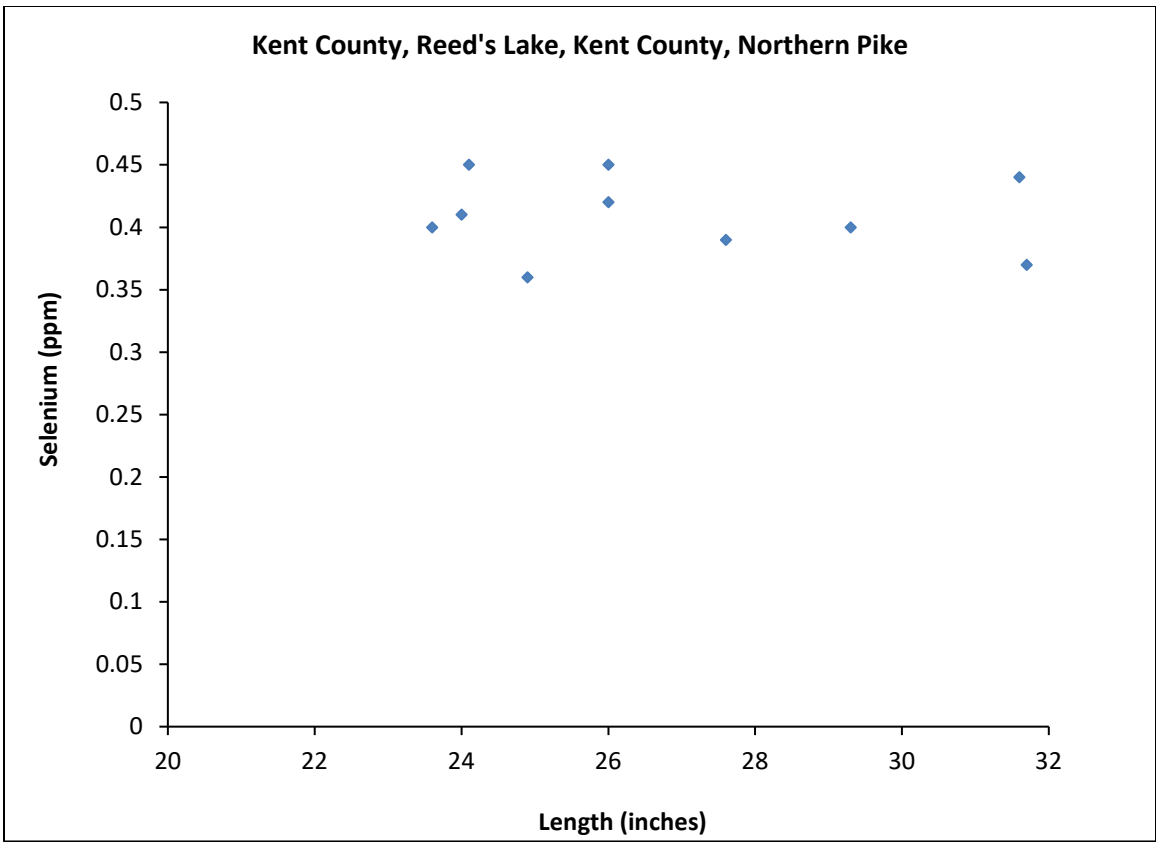
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	15	20.7	24	24.2	29.5
Datasets available: 1989, 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	15	0.06	0.04	0.09	0.07	2*
DDT	15	0.33	0.16	0.53	0.37	4*
Chlordane	15	0.02	0.006	0.03	0.02	--
Toxaphene	15	ND	--	--	--	--
Selenium	10	0.41	0.36	0.45	0.43	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.056	0.073				
DDT	0.007	0.000				
Chlordane	0.072	0.079				
Toxaphene	--	--				
Selenium	0.017	0.017				
Final meal category based on UCL:						2

Existing Advisory: Women and children should not eat more than one meal per week of Reeds Lake northern pike due to PCBs.

Recommendation: No one should eat more than 1 meal per month of Reeds Lake northern pike over 30 inches due to mercury or more than 2 meals per month of northern pike under 30 inches in length due to mercury and PCBs. DDT would cause an advisory. Statewide length break applied. *Based on the EGLE Fish Contaminant Monitoring Program, PCB and DDT concentrations ≥15 years old would be expected to have declined if atmospheric inputs were the dominant process involved. Reed Lake has atypically high concentrations of DDT and PCBs in northern pike, largemouth bass, and walleye, which suggest that non-atmospheric inputs may be involved and as such no temporal reduction with time can be used.







Walleye

Reeds Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	14	16.5	15	16.5	26.8
Datasets available: 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.269	0.060	0.570	0.340	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.582	0.667				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1998	1998	10	16.5	15	16.5	26.8
Datasets available: 1998						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	14	0.14	0.04	0.31	0.19	1*
DDT	14	0.68	0.16	1.54	0.93	1*
Chlordane	14	0.05	0.009	0.12	0.07	--
Toxaphene	14	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.004	0.035				
DDT	0.010	0.071				
Chlordane	0.003	0.076				
Toxaphene	--	--				
Final meal category based on UCL:						1*

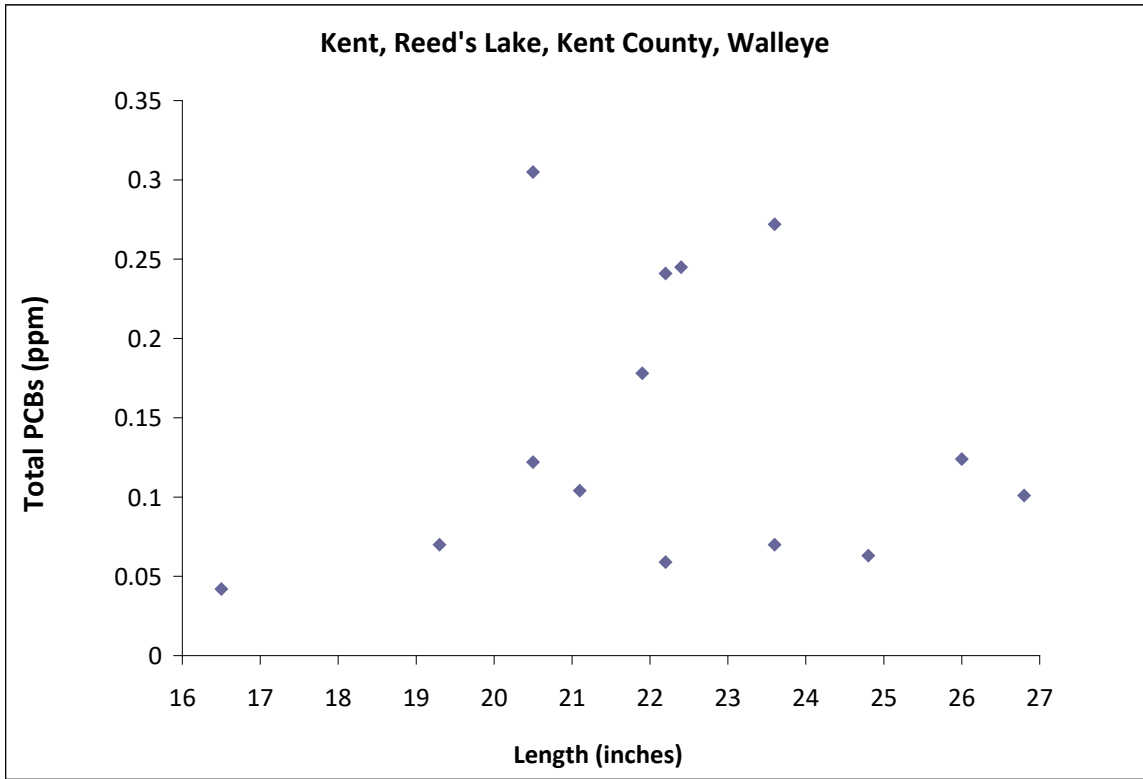
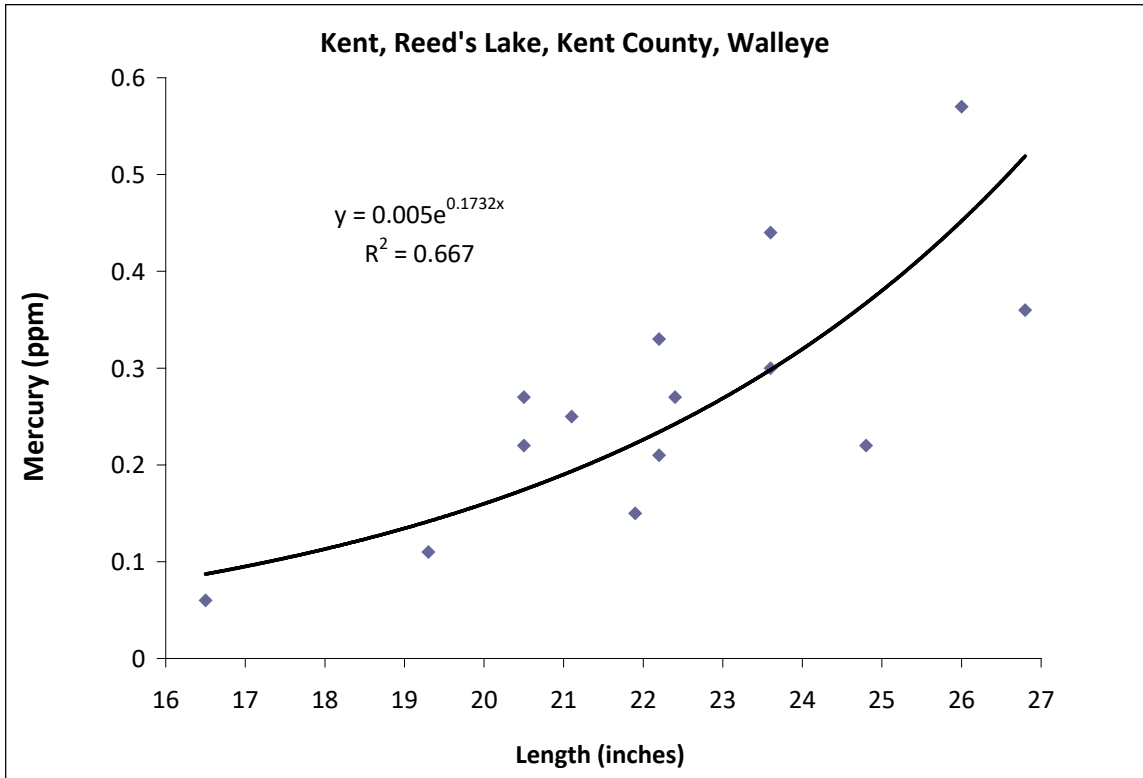
Existing Advisory: Women and children should not eat more than one meal per week of Reeds Lake walleye due to PCBs.

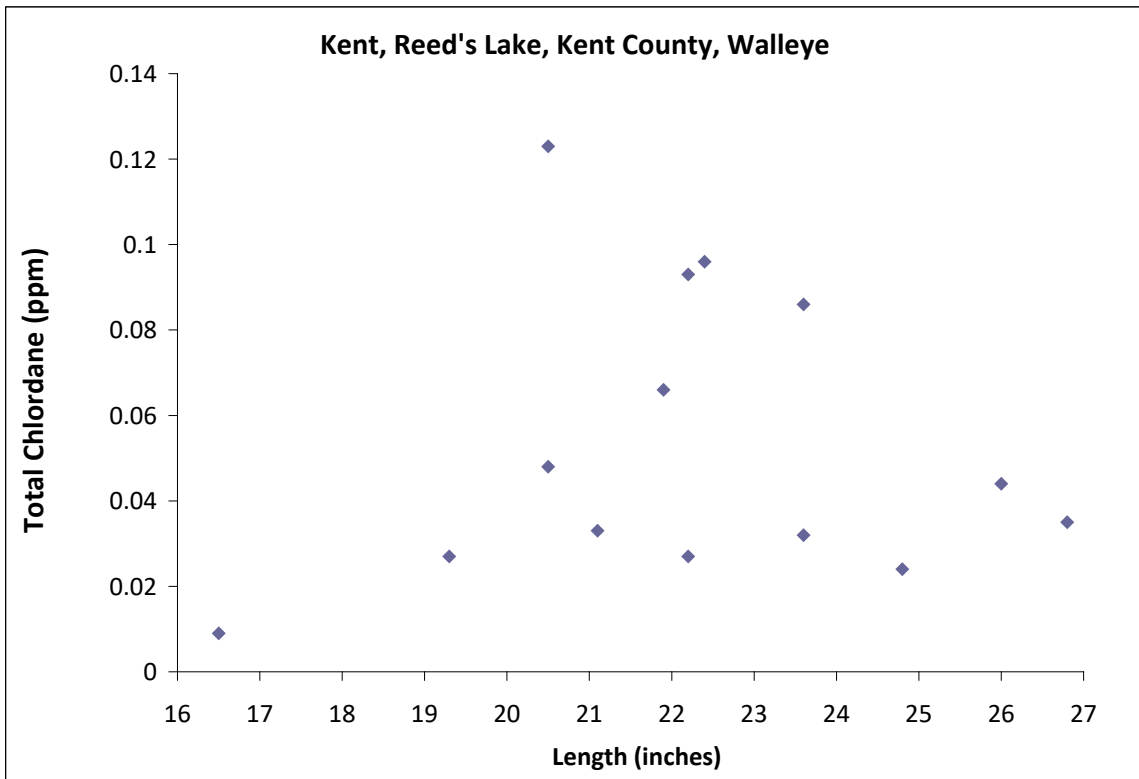
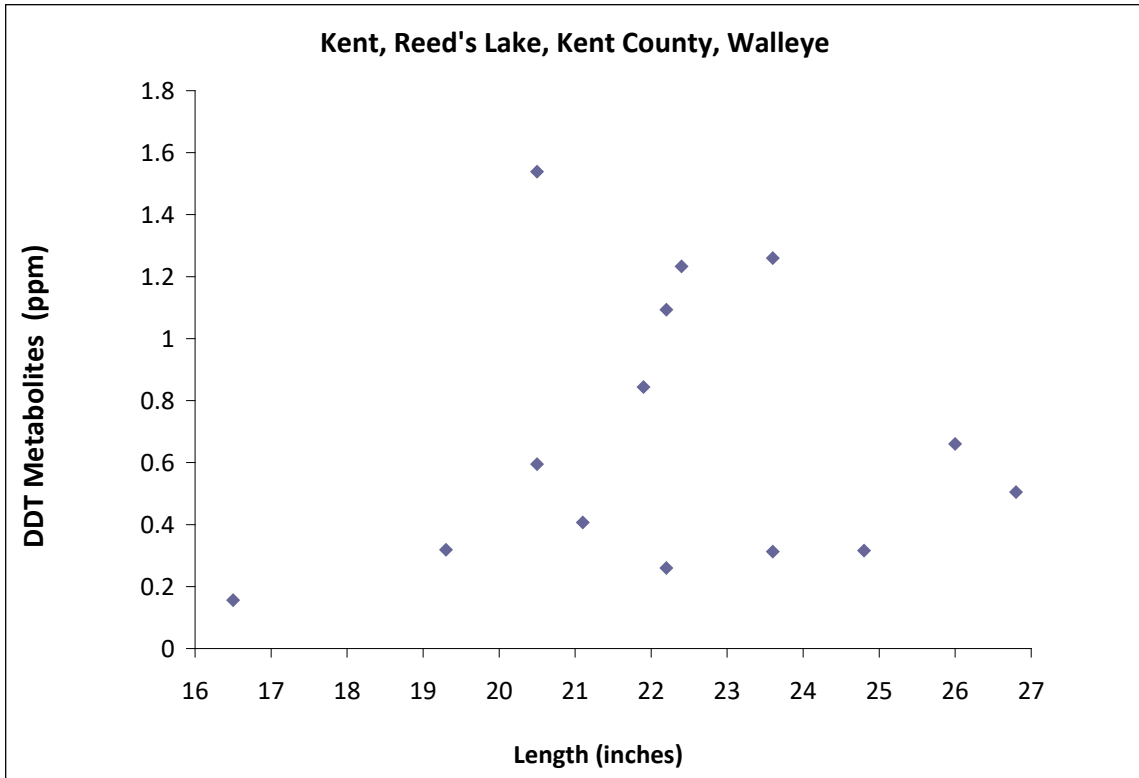
Recommendation: No one should eat more than 1 meals per month of Reeds Lake walleye under 26 inches due PCBs and DDT, or more than 1 meal per month of those fish over 26 inches due to mercury, PCBs and DDT. The quality of this dataset is limited due to the age of the data. *Based on the EGLE Fish Contaminant Monitoring Program, PCB and DDT concentrations ≥15 years old would be expected to have declined if atmospheric inputs were the dominant process involved.

Reed Lake has atypically high concentrations of DDT and PCBs in northern pike, largemouth bass, and walleye, which suggest that non-atmospheric inputs may be involved and as such no temporal reduction with time can be used.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.06	16
16	0.08	12
18	0.11	8
20	0.16	4
22	0.23	4
24	0.32	2
26	0.45	2
28	0.64	1
30	0.90	1

Shaded area denotes extrapolated estimates





Bluegill

Versluis Lake

Kent County

Hg Analysis:

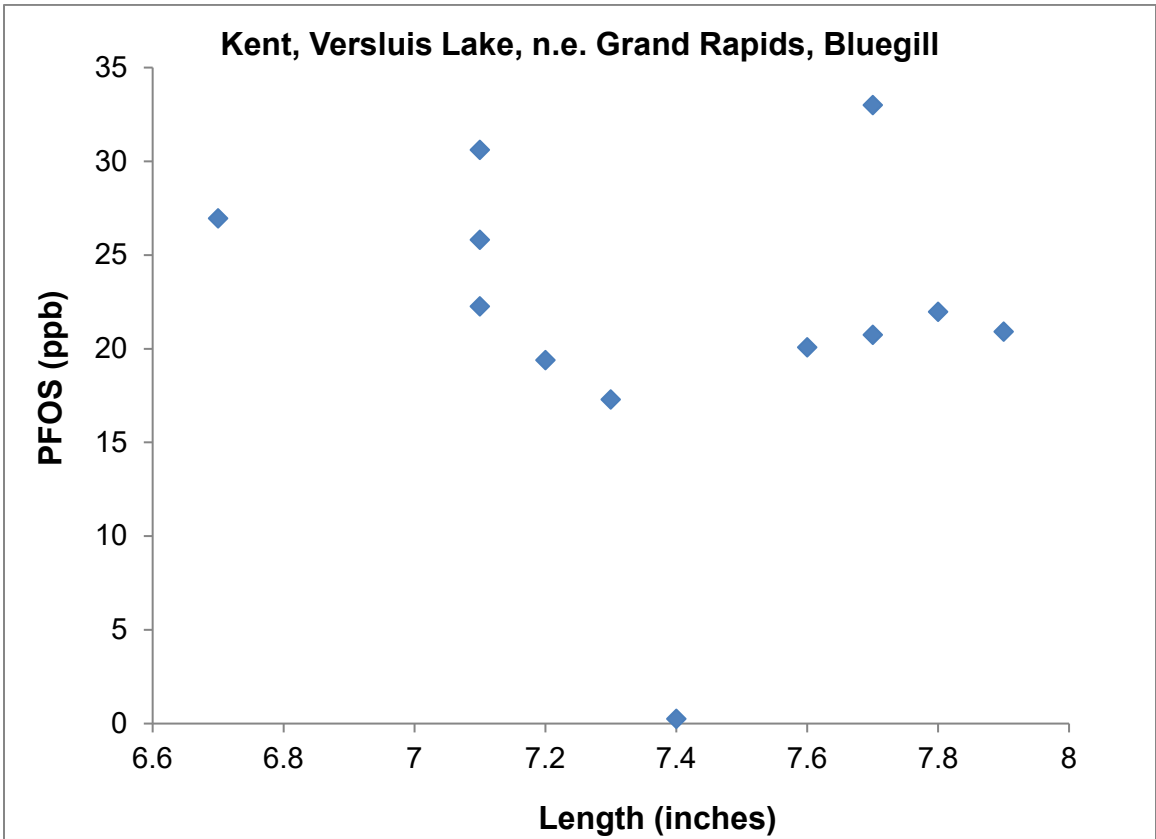
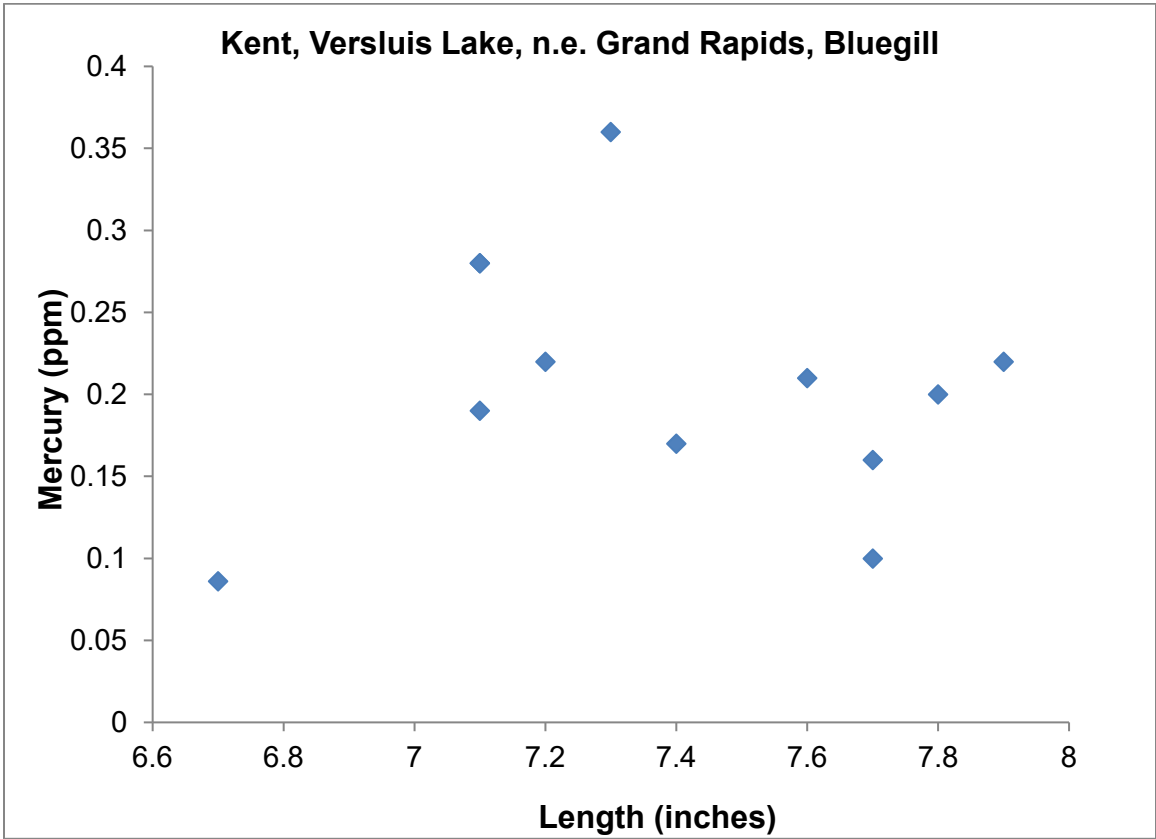
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2017	12	6.7	na	6.7	7.9
Datasets available: 2016, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	12	0.21	0.09	0.36	0.26	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.002	0.004				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2017	12	6.7	na	6.7	7.9
Datasets available: 2016, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	12	22 ppb	< 0.25 ppb	33 ppb	27 ppb	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.018	0.002				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Bluegill and sunfish from Versluis Lake in Kent County are covered under the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 4 meals of Versluis Lake bluegill or sunfish of any size due to mercury and PFOS.



**Largemouth and
Smallmouth Bass**

Versluis Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2017	4	14.6	14	14.6	16.4	
Datasets available: 2016, 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	4	0.66	0.56	0.78	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	(0.749)	(0.735)					

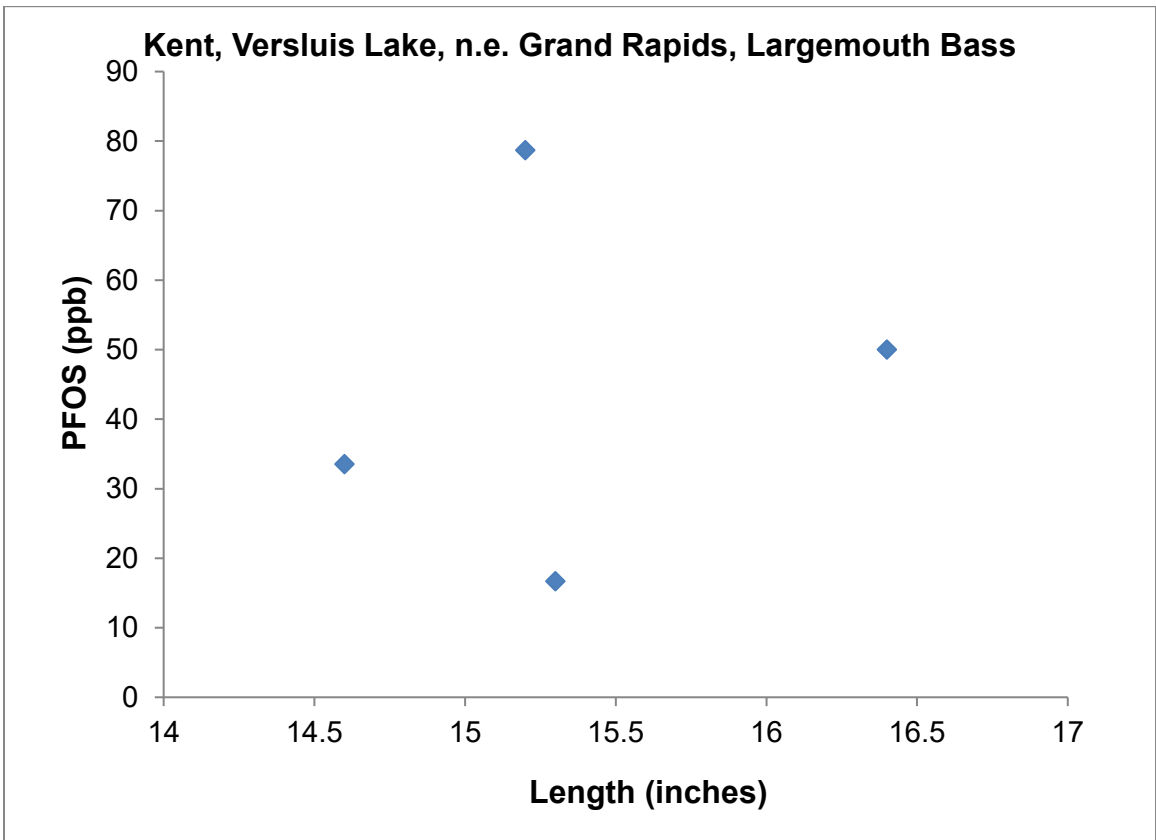
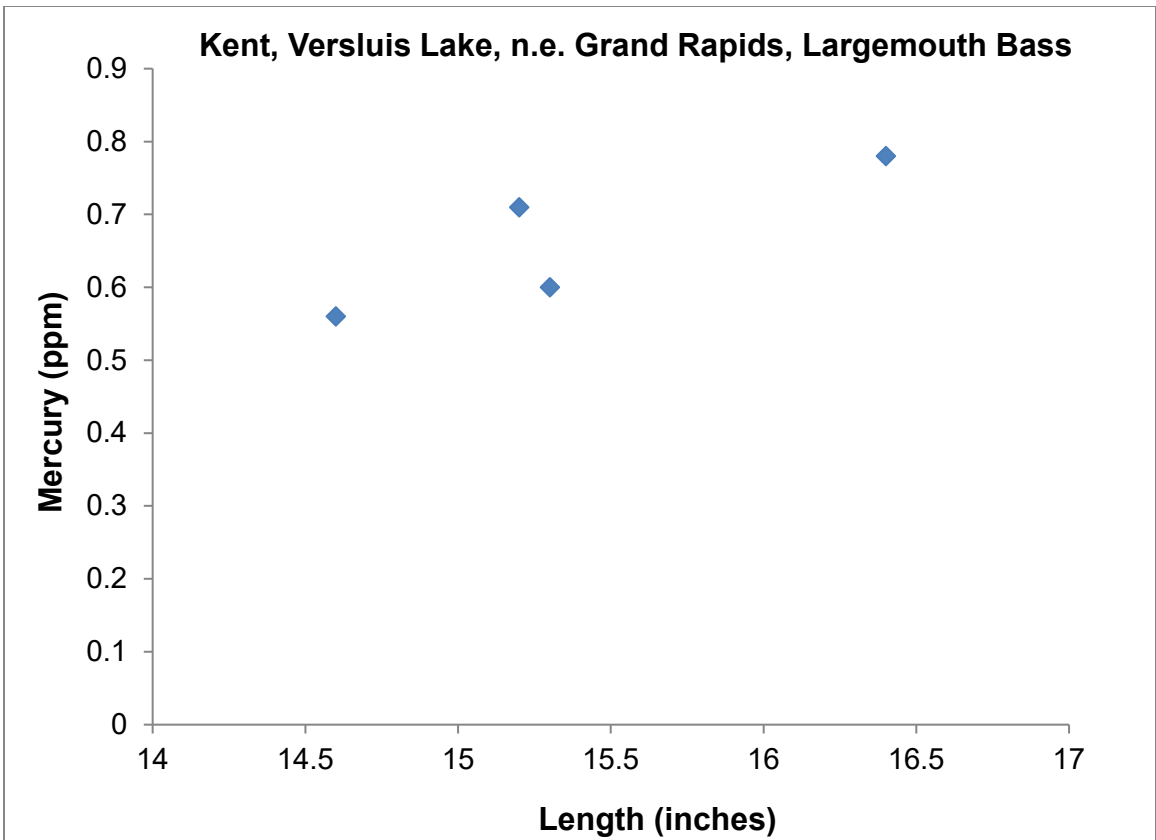
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2017	4	14.6	14	14.6	16.4	
Datasets available: 2016, 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	2	0.001	< 0.001	0.002	--	--	
DDT	2	0.002	0.001	0.002	--	--	
Chlordane	2	ND	< 0.001	< 0.001	--	--	
Toxaphene	2	ND	< 0.05	< 0.05	--	--	
PFOS	4	45 ppb	17 ppb	79 ppb	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	(0.030)	(0.045)	Final meal category based on UCL:				--

Existing MDHHS Advisory: Largemouth bass and smallmouth bass from Versluis Lake in Kent County are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Recommendation: No change is recommended. MDHHS prefers a minimum of five legal size fish samples to evaluate the need for waterbody specific fish consumption advisories.

Note: Maximum levels of PFOS and mercury are in the 1 meal per month category.



Northern Pike

Versluis Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2017	15	18.5	24	23.8	26.7	
Datasets available: 2016, 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)		
Mercury	4	0.54	0.35	0.69	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.227	0.258					

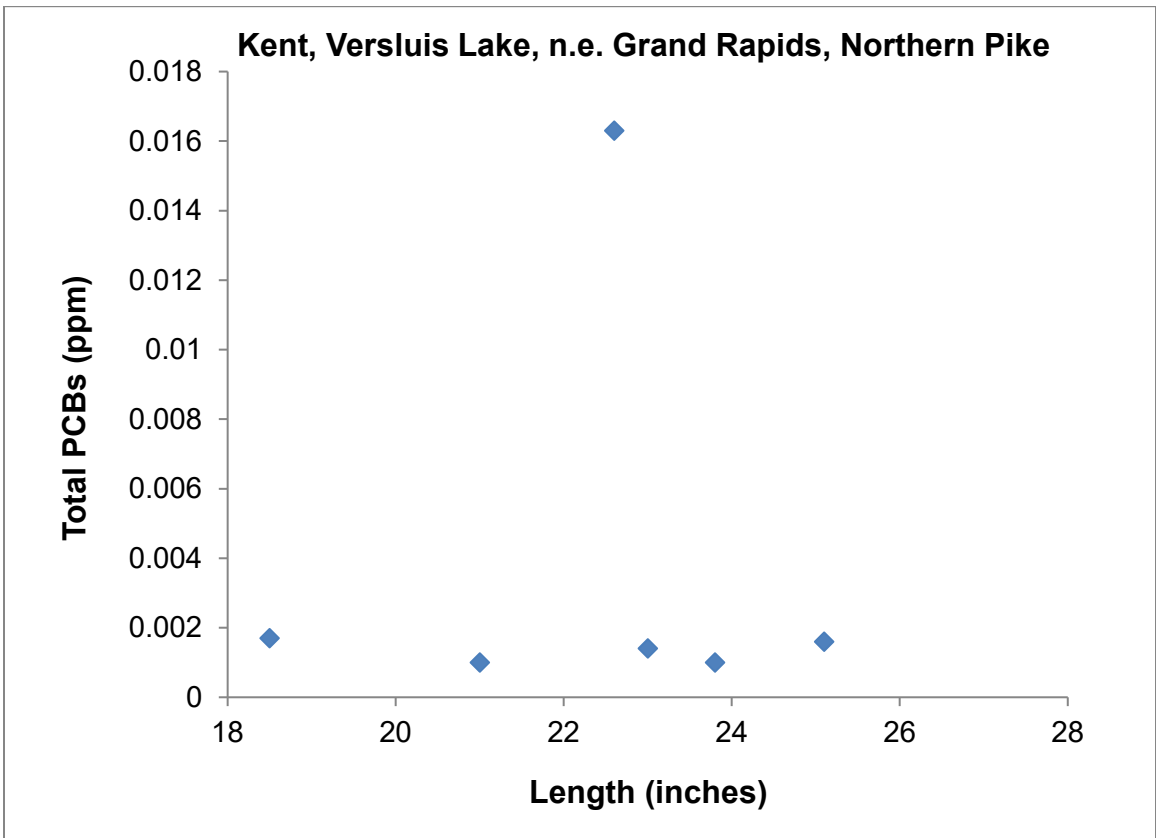
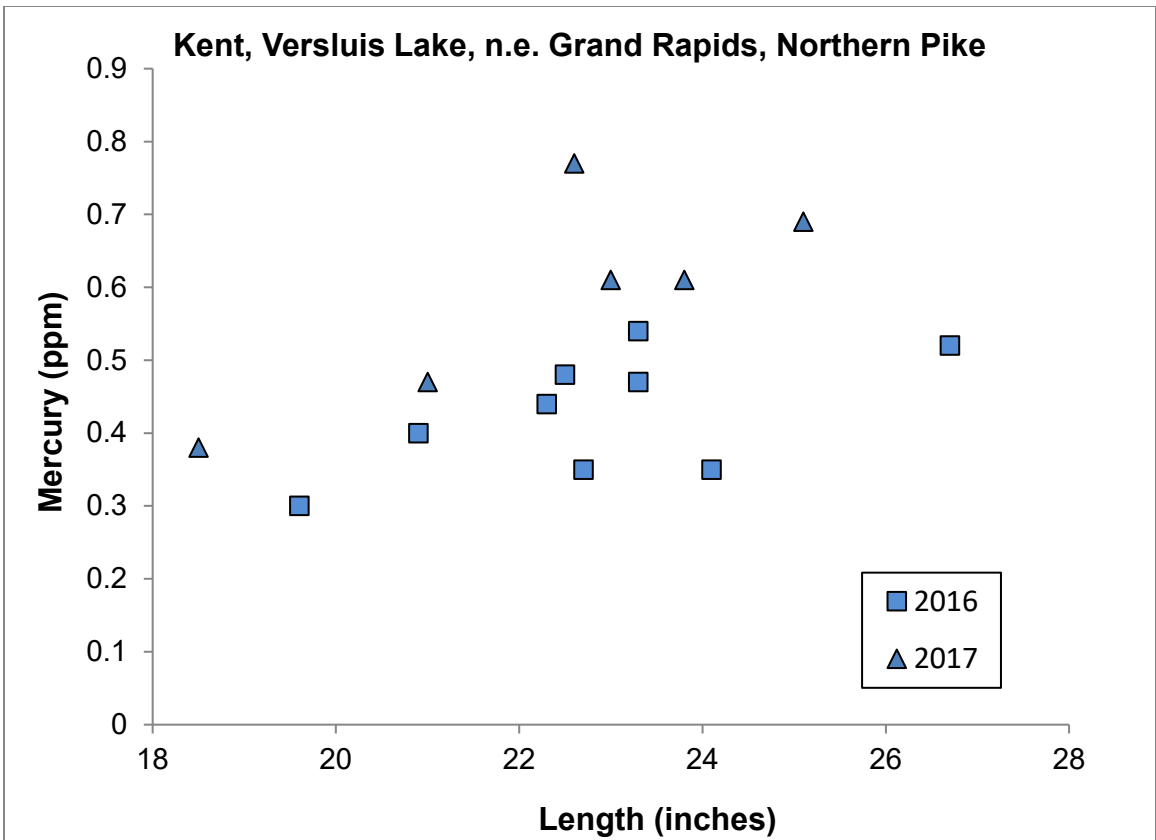
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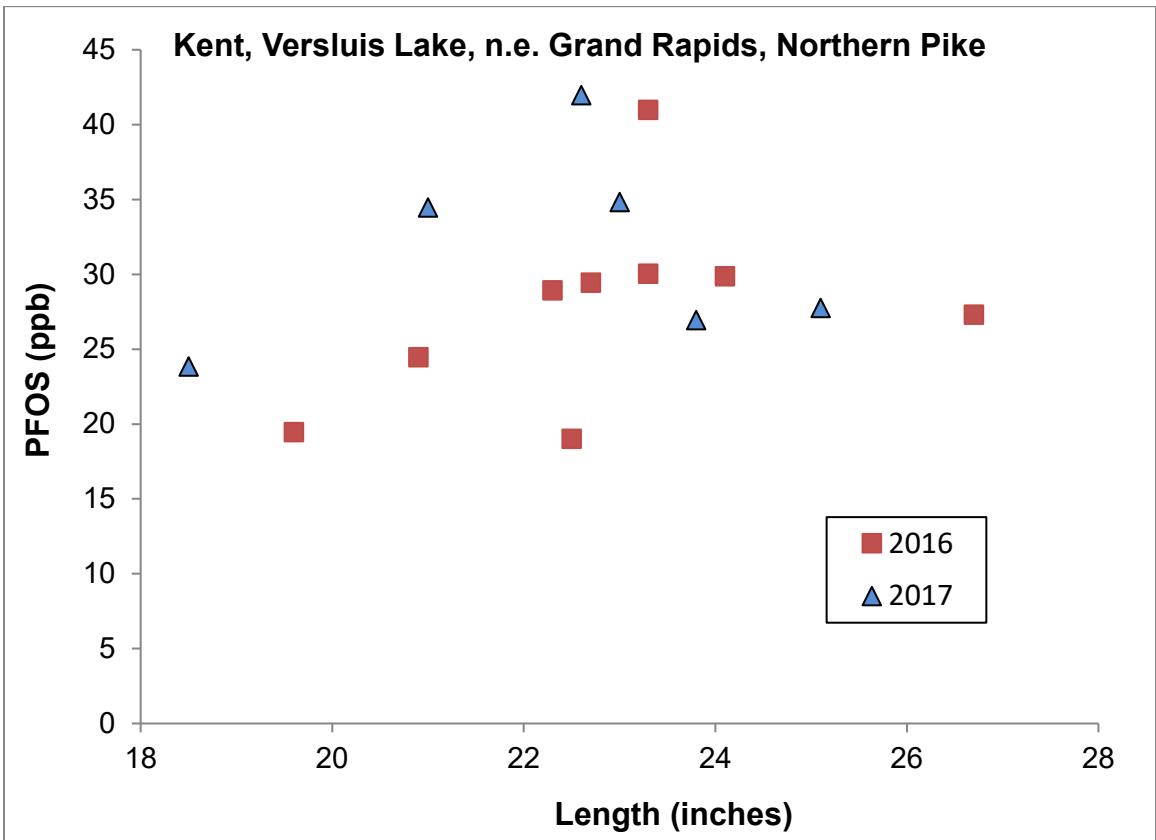
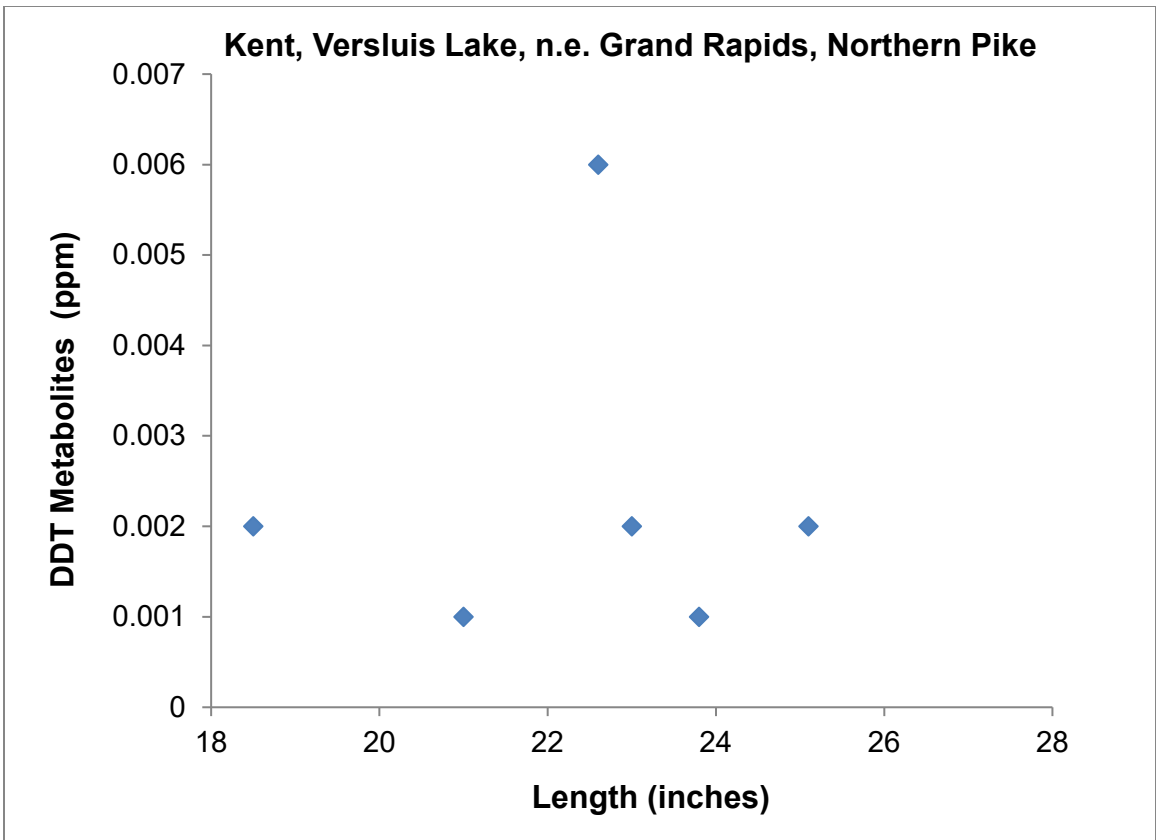
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2017	15	18.5	24	23.8	26.7	
Datasets available: 2016, 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)		
PCB	2	0.001	0.001	0.002	--	--	
DDT	2	0.002	0.001	0.002	--	--	
Chlordane	2	ND	--	--	--	--	
Toxaphene	2	ND	--	--	--	--	
PFOS	4	28 ppb	27 ppb	30 ppb	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.002	0.000					
DDT	0.002	0.001					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	0.068	0.093					
Final meal category based on UCL:							

Existing MDHHS Advisory: Northern pike from Versluis Lake in Kent County are covered under the statewide advisory due to mercury: No one should eat more than 2 meals per month of Versluis Lake northern pike smaller than 30 inches or more than 1 meal per month of those fish larger than 30 inches due to mercury. PFOS would cause an advisory.

Recommendation: No change is recommended. MDHHS requires a minimum of five legal size fish samples to evaluate the need for waterbody specific fish consumption advisories.

Note: Maximum level of mercury is in the 1 meal per month category and maximum level of PFOS is in the 4 meals per month category.





Rock Bass

Versluis Lake

Kent County

Hg Analysis:

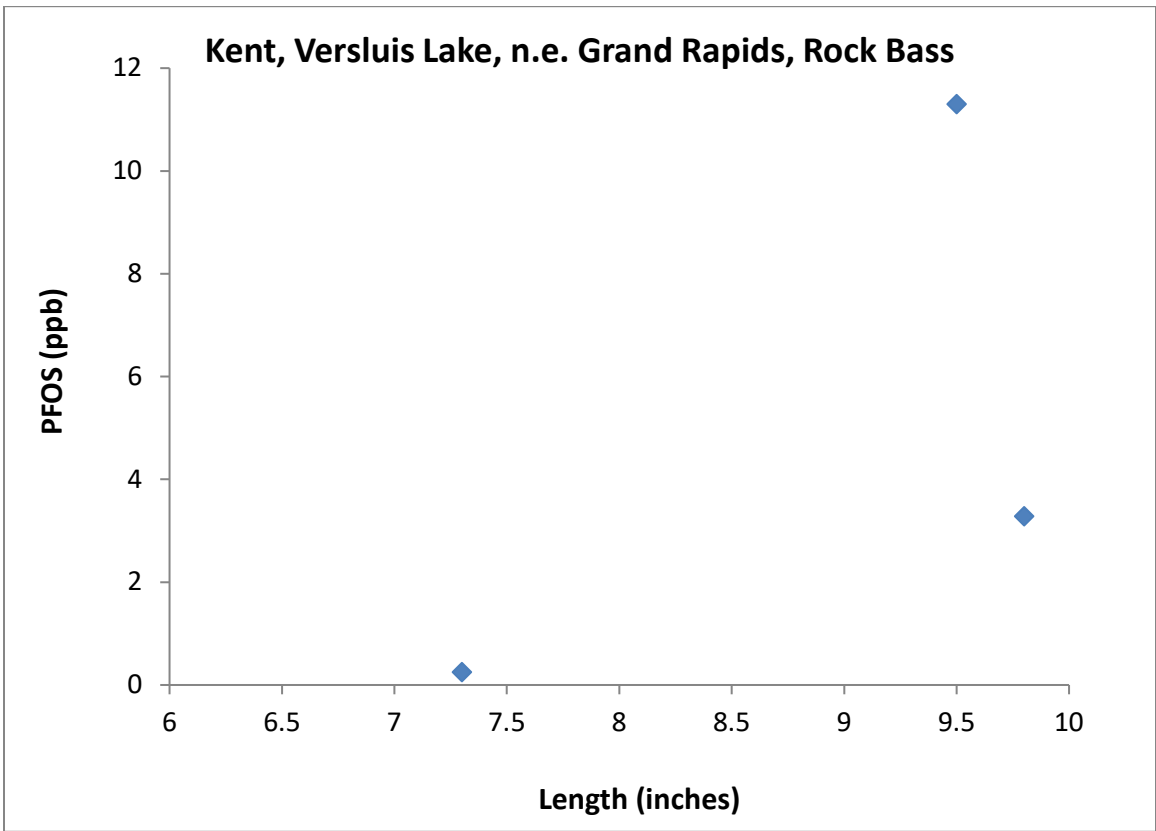
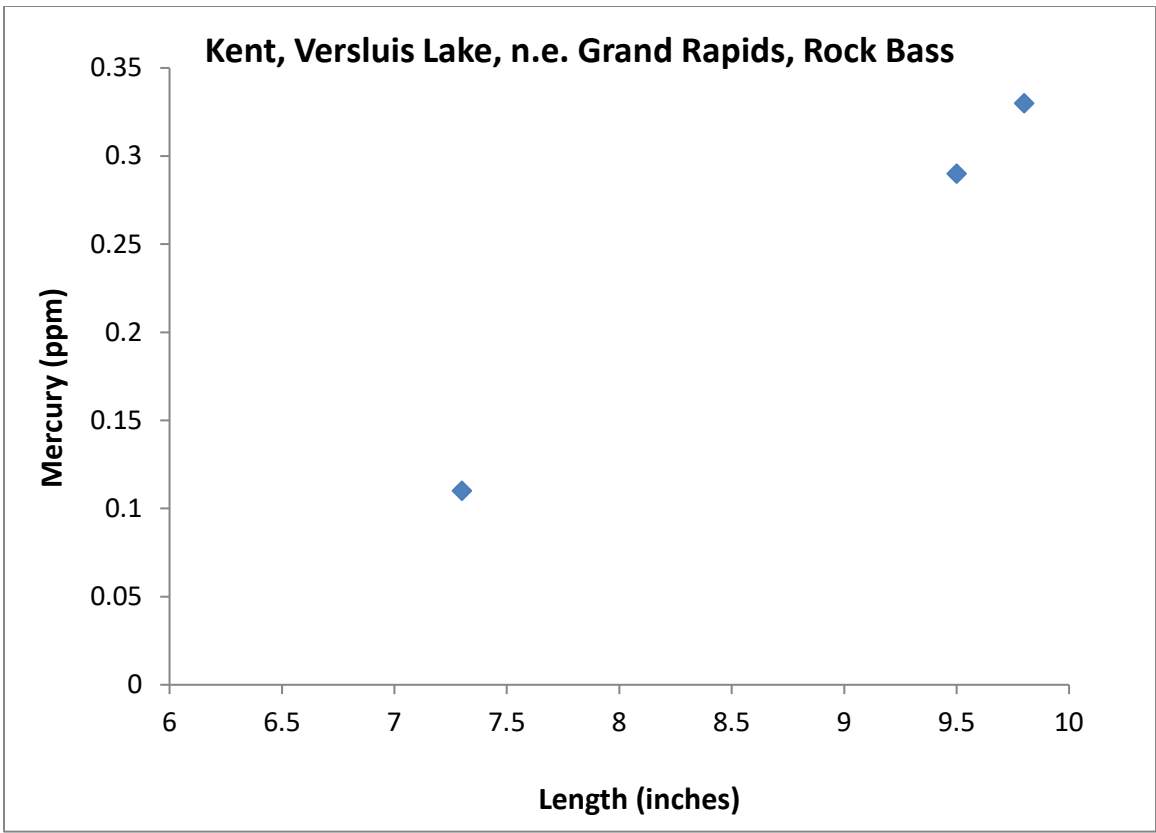
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2016	3	7.3	na	7.3	9.8
Datasets available: 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.24	0.11	0.33	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2016	2016	3	7.3	na	7.3	9.8
Datasets available: 2016						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	3	5 ppb	<0.25 ppb	11 ppb	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	--	--				
Final meal category based on UCL:						--

Existing MDHHS Advisory: Rock bass from Versluis Lake in Kent County are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of rock bass of any size.

Recommendation: No change is recommended. MDHHS requires a minimum of five legal size fish samples to evaluate the need for waterbody specific fish consumption advisories. Additional sample collection and PFOS analysis is planned.



Walleye

Versluis Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples			
Earliest	Most Recent				Min	Max		
2017	2017	2	20	15	20	24.2		
Datasets available:		2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category		
Mercury	2	1.3	0.88	1.7	6.5	--		
Chemical	Linear Regression	Exponential Regression						
	R ²	R ²						
Mercury	--	--						

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent				Min	Max			
2017	2017	2	20	15	20	24.2			
Datasets available:		2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category			
PCB	2	0.007	0.003	0.01	--	--			
DDT	2	0.004	0.002	0.005	--	--			
Chlordane	2	0.001	0.001	0.001	--	--			
Toxaphene	2	ND	< 0.05	< 0.05	--	--			
PFOS	2	54 ppb	51 ppb	58 ppb	--	--			
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
PCB	--	--							
DDT	--	--							
Chlordane	--	--							
Toxaphene	--	--							
PFOS	--	--							
						Final meal category based on UCL:	--		

Existing MDHHS Advisory: Walleye from Versluis Lake in Kent County are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of walleye smaller than 20 inches or more than 1 meal per month of those fish larger than 20 inches.

Recommendation: No change is recommended. MDHHS requires a minimum of five legal size fish samples to evaluate the need for waterbody specific fish consumption advisories.

Largemouth Bass

Wabasis Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	12	13.0	14	14.1	19.3
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.68	0.51	0.93	0.81	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.874	0.884				

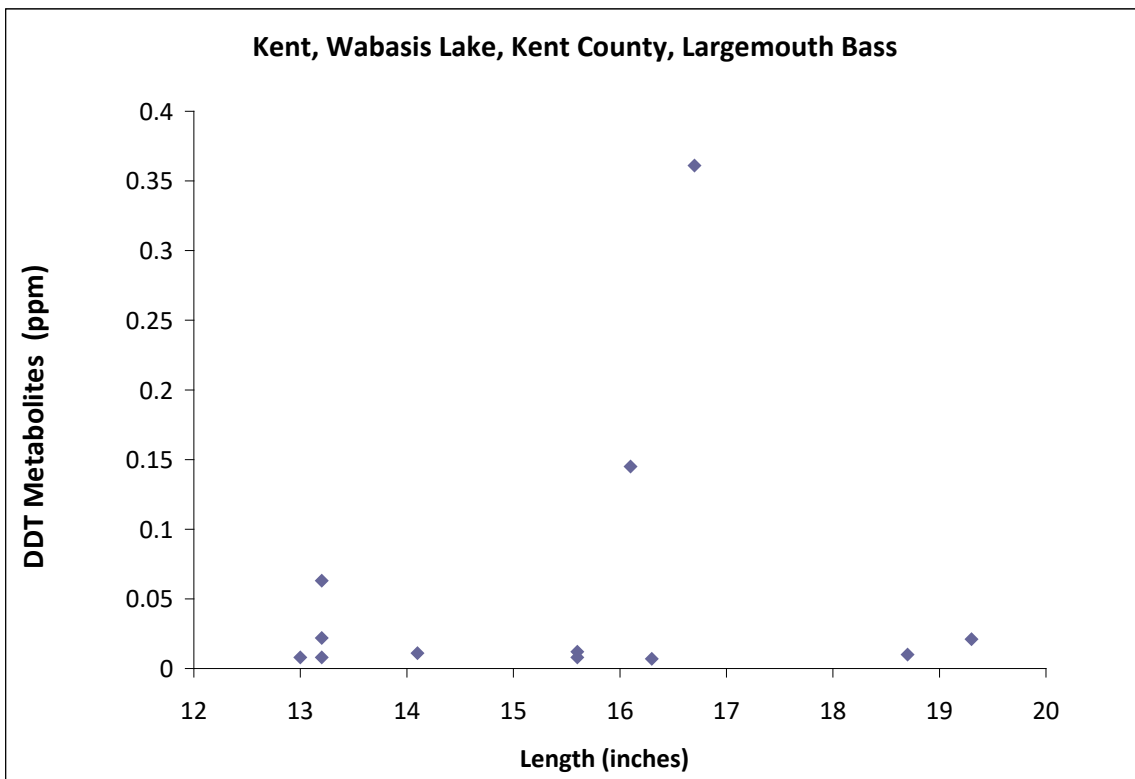
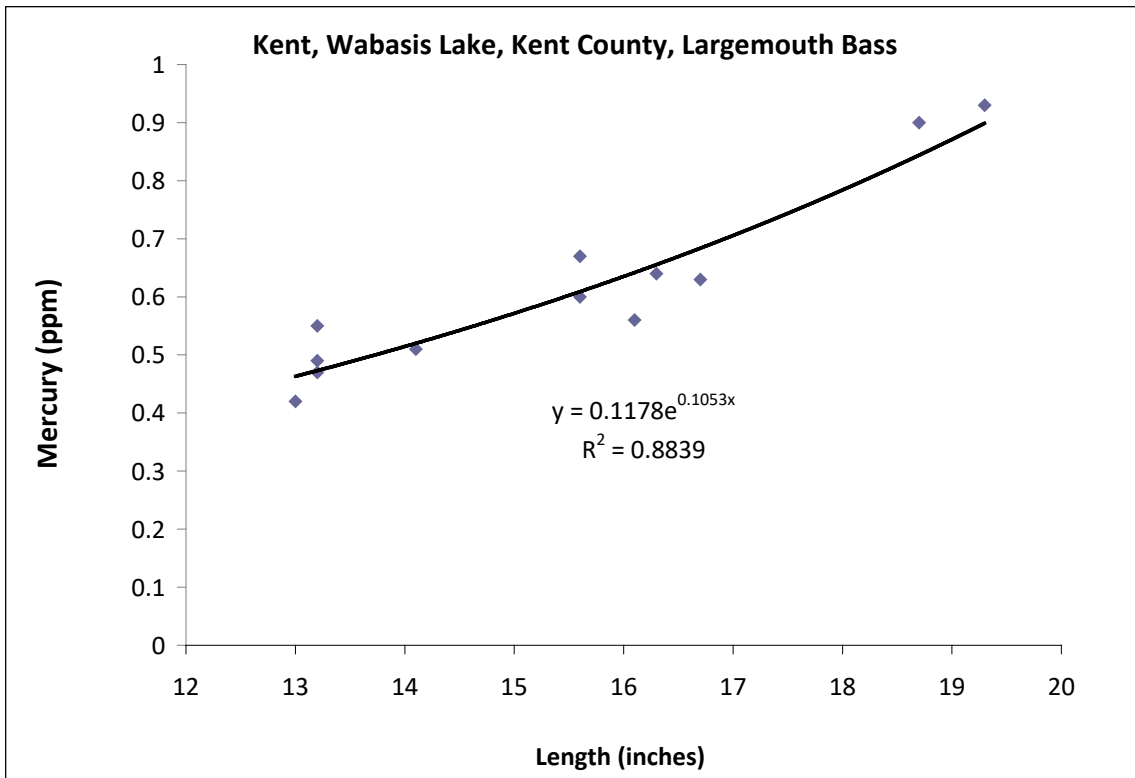
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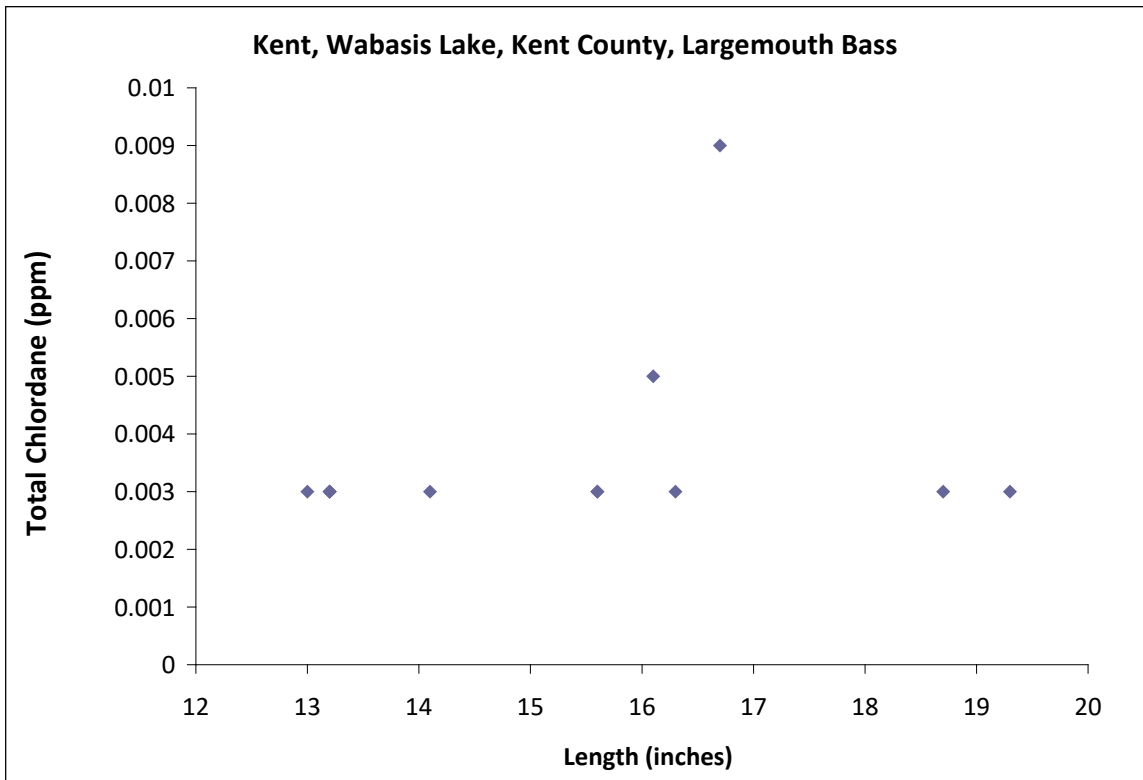
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	12	13.0	14	14.1	19.3
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	8	ND	--	--	--	--
DDT	8	0.07	0.007	0.36	0.18	8*
Chlordane	8	0.004	0.003	0.009	0.01	--
Toxaphene	8	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.033	0.018				
Chlordane	0.046	0.048				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Wabasis Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Wabasis Lake largemouth or smallmouth bass under 18 inches or 6 meals per year over 18 inches due to mercury. *Based on the EGLE Fish Contaminant Monitoring Program, DDT concentrations ≥15 years old are expected to have declined to a concentration that would not likely cause an advisory.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.514	2
15	0.572	1
16	0.635	1
17	0.706	1
18	0.784	1
19	0.871	1
20	0.968	1
21	1.075	1
22	1.195	0.5
<i>Shaded area denotes extrapolated estimates</i>		





Northern Pike

Wabasis Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	3	21.5	24	25.4	26
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.86	0.79	0.92	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	3	21.5	24	25.4	26
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	ND	--	--	--	--
DDT	2	0.04	0.02	0.06	--	--
Chlordane	2	0.004	0.003	0.004	--	--
Toxaphene	2	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Wabasis Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: Statewide guidelines apply to northern pike from Wabasis Lake: No one should eat more than 1 meal per month of northern pike over 30 inches or more than 2 meals per month of northern pike under 30 inches in length. Dataset is limited due to sample size and age of data, which is insufficient to set a waterbody-species specific guideline.

**Bluegill and
Pumpkinseed
Hg Analysis:**

Walden Lake

Kent County

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	10	6.2	na	6.2	7.9
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.18	0.07	0.29	0.23	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.595	0.694				

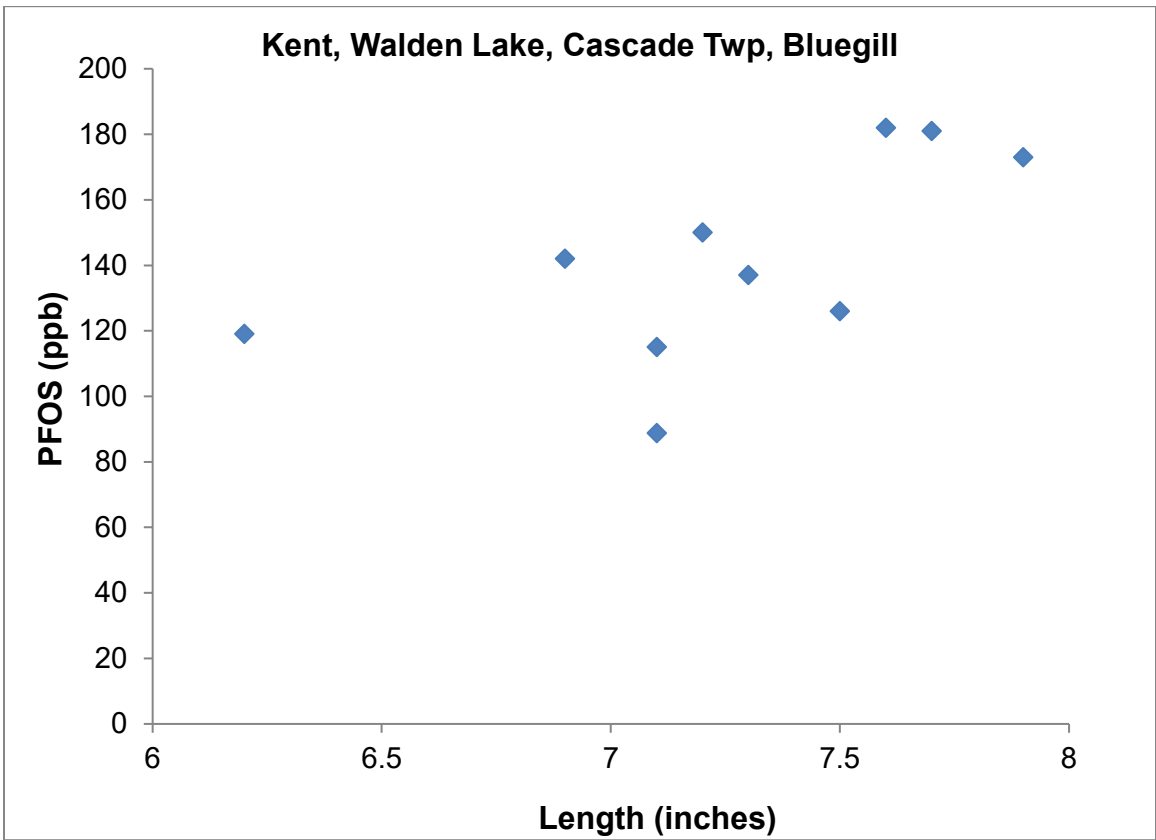
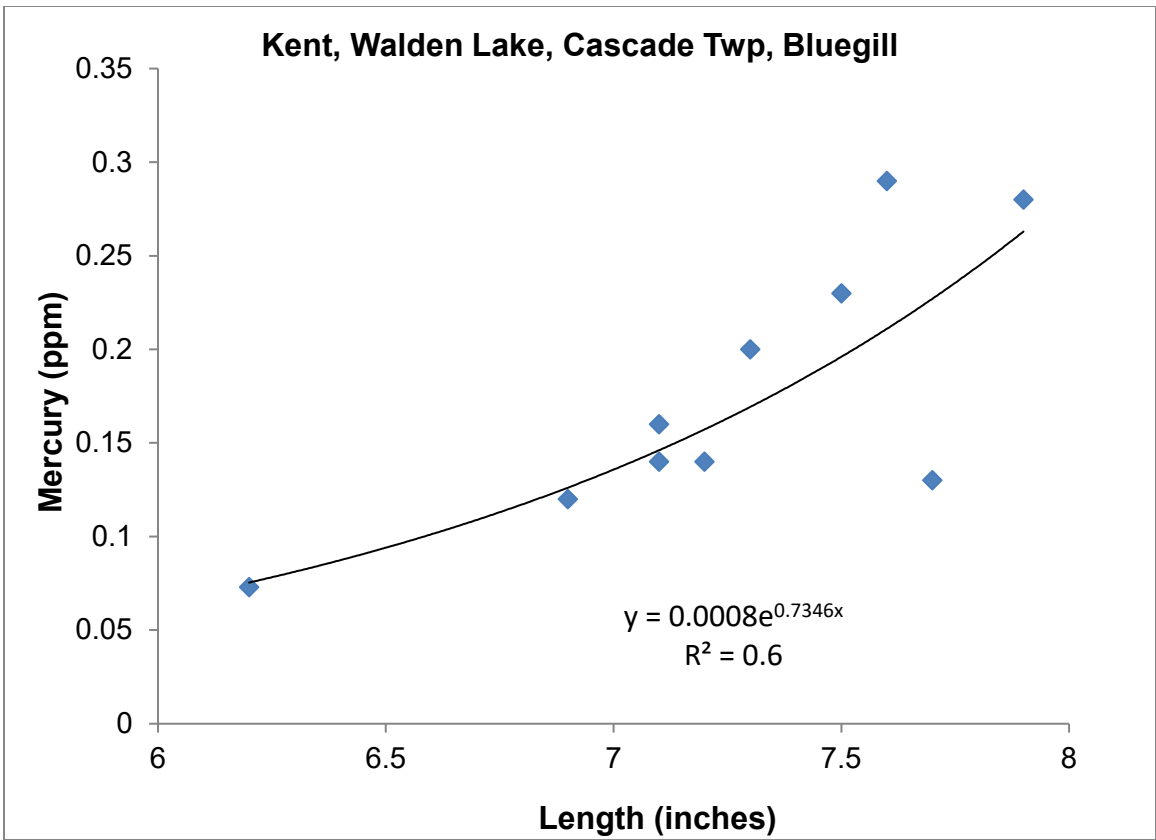
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	10	6.2	na	6.2	7.9
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	141 ppb	89 ppb	182 ppb	163 ppb	0.5
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.390	0.343				
Final meal category based on UCL:						0.5

Existing MDHHS Advisory: Walden Lake bluegill and pumpkinseed (sunfish) are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 6 meals per year of Walden Lake bluegill or sunfish of any size due to PFOS. Mercury would cause an advisory.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
5	0.03	16
6	0.07	16
7	0.14	4
8	0.29	2
9	0.59	1
<i>Shaded area denotes extrapolated estimates</i>		



Largemouth Bass

Walden Lake

Kent County

Hg Analysis:

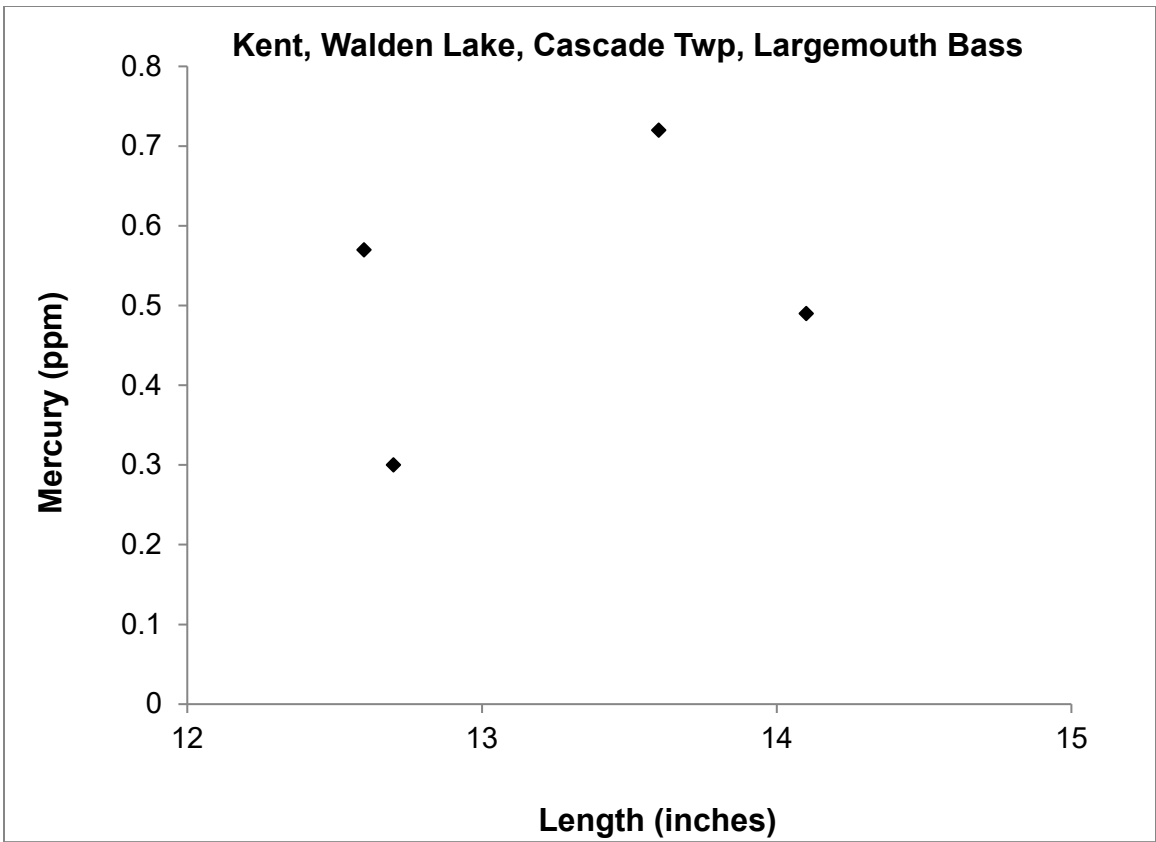
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of All Samples		
Earliest	Most Recent				Min	Max	
2014	2014	4	12.6	14	12.6	14.1	
Datasets available:		2014					
Chemical	Sample Size (All)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.52		0.30	0.72	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.123	0.145					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of All Samples		
Earliest	Most Recent				Min	Max	
2014	2014	4	12.6	14	12.6	14.1	
Datasets available:		2014					
Chemical	Sample Size (All)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	ND		--	--	--	--
DDT	4	ND		--	--	--	--
Chlordane	4	ND		--	--	--	--
Toxaphene	4	ND		--	--	--	--
TEQ	0	--		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
TEQ	--	--					
Final meal category based on UCL:							--

Existing Advisory: Walden Lake largemouth bass are covered by the statewide mercury advisory: No one should eat more than 2 meals per month of largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Recommendation: As the dataset was limited, a management determination was made. No one should eat more than 1 meal per month of Walden Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. Due to the limited sample size and limited sizes of fish, the statewide length break was applied.



Yellow Bullhead

Walden Lake

Kent County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2014	2014	2	10	na	10	10.5	
Datasets available: 2014							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.12		0.08	0.16	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	--	--					

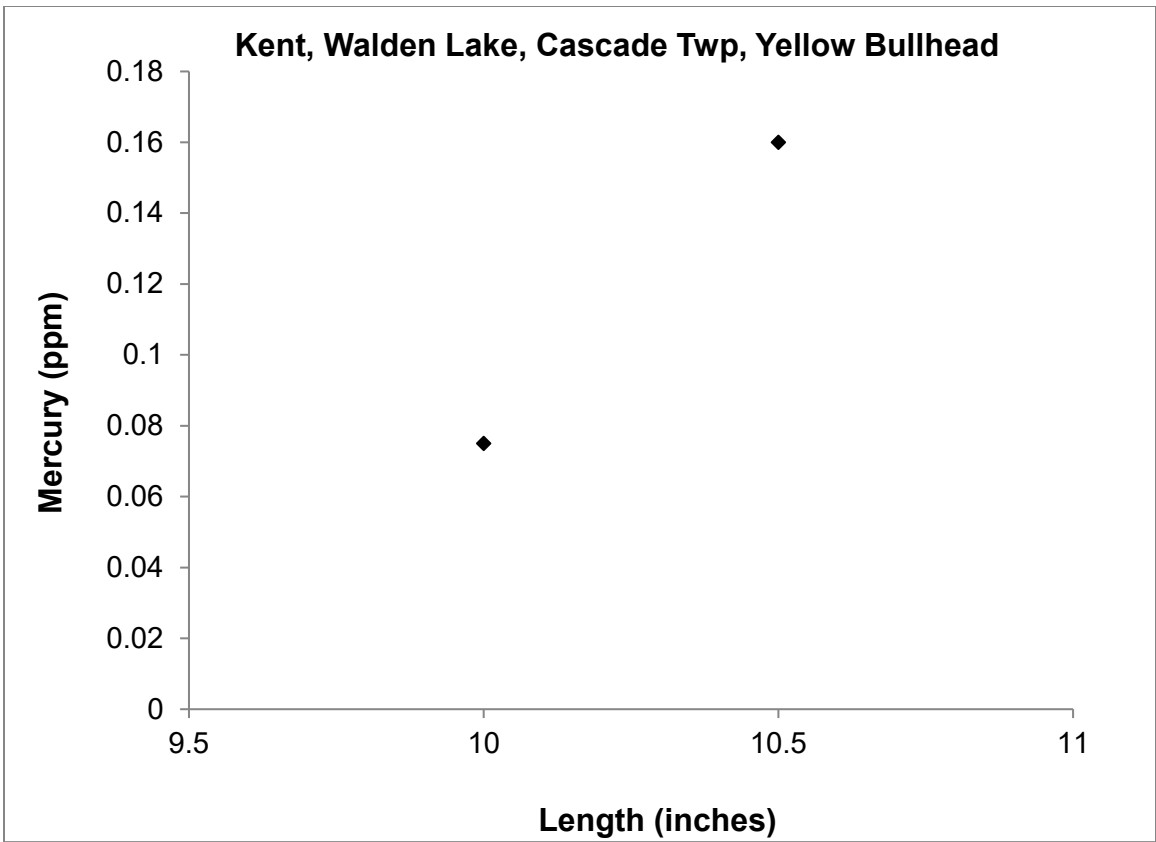
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2014	2014	2	10	na	10	10.5	
Datasets available: 2014							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	ND		--	--	--	--
DDT	2	ND		--	--	--	--
Chlordane	2	ND		--	--	--	--
Toxaphene	2	ND		--	--	--	--
TEQ	0	--		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
TEQ	--	--					
Final meal category based on UCL:							--

Existing Advisory: Walden Lake bullhead are covered by the statewide advisory due to mercury**. No one should eat more than 4 meals per month of bullhead from inland waters.

Recommendation: No change is recommended.

** - see draft guidelines for bullhead



Yellow Perch

Walden Lake

Kent County

Hg Analysis:

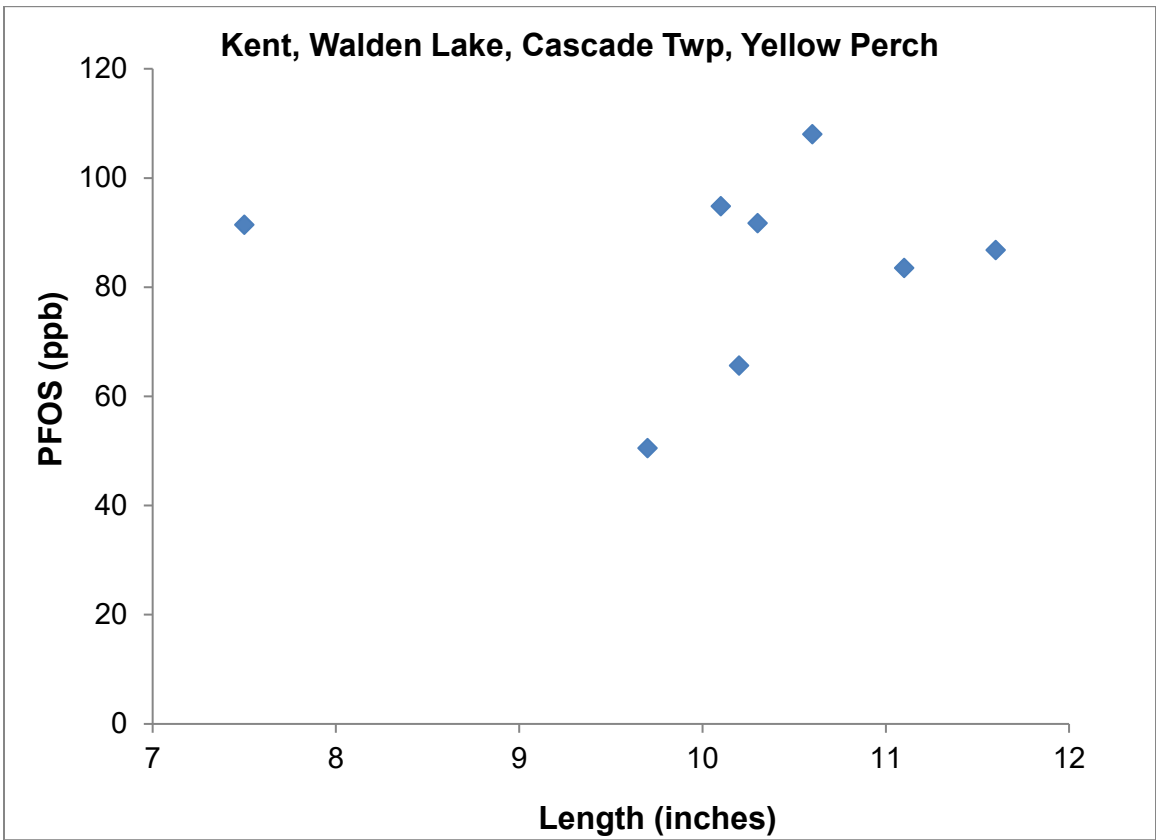
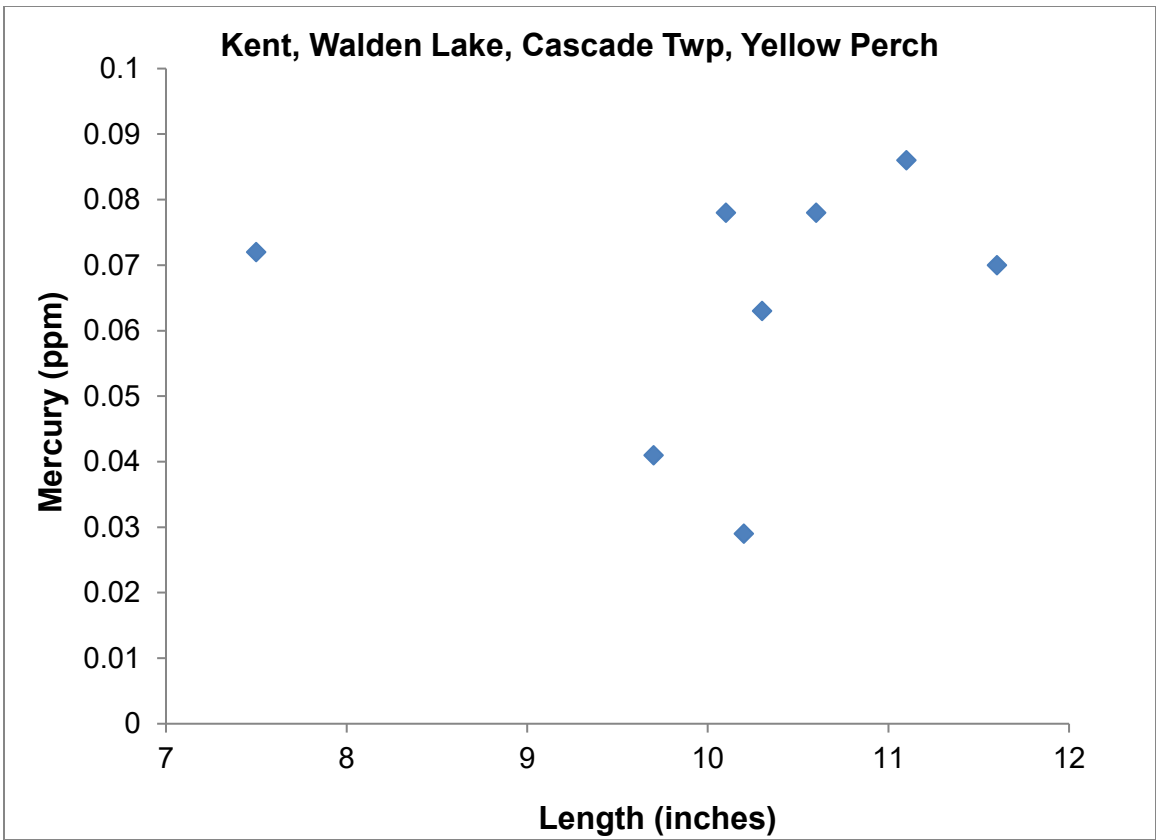
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	8	7.5	na	7.5	11.6
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.06	0.03	0.09	0.08	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.018	0.011				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2019	2019	8	7.5	na	7.5	11.6
Datasets available: 2019						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	8	84 ppb	50 ppb	108 ppb	99 ppb	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.004	0.005				
Final meal category based on UCL:						1

Existing MDHHS Advisory: Walden Lake yellow perch are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of yellow perch of any size.

Recommendation: No one should eat more than 1 meal per month of Walden Lake yellow perch of any size due to PFOS. Mercury would cause an advisory.



Maple River
Clinton, Gratiot, Ionia, and Shiawassee
Counties

Carp

**Maple River
u/s Matherton**

**Clinton, Gratiot, Ionia, Shiawassee
Counties**

Hg Analysis:

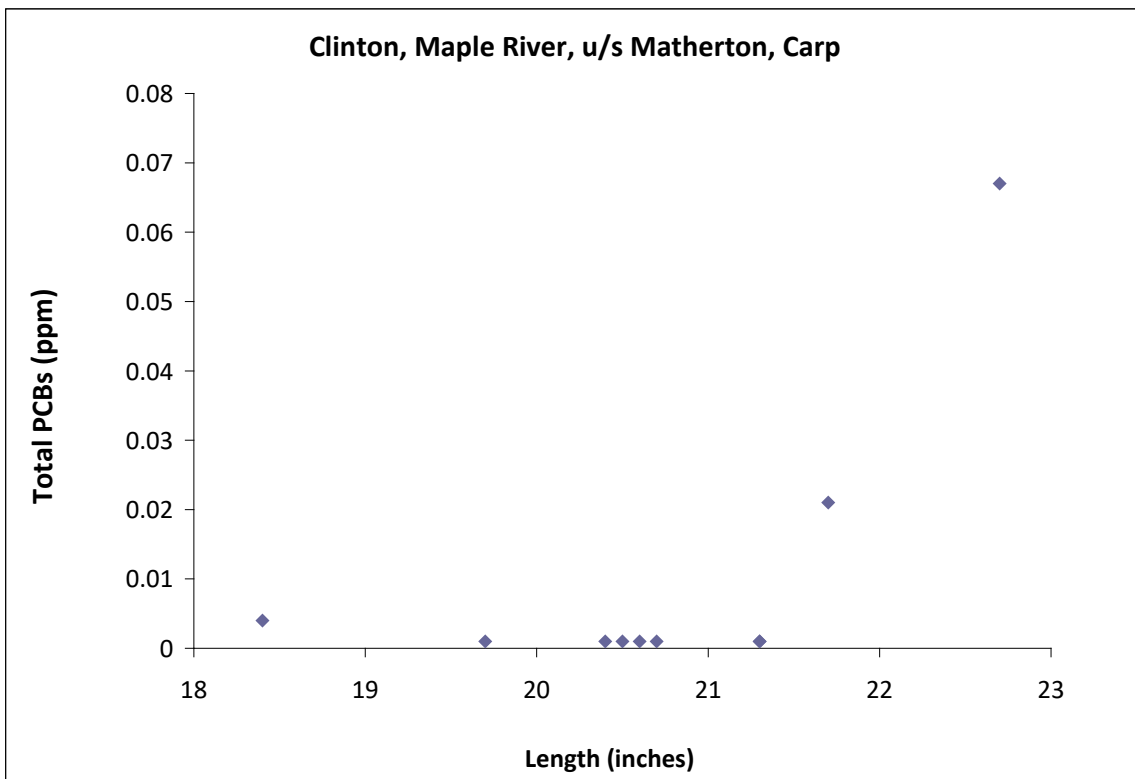
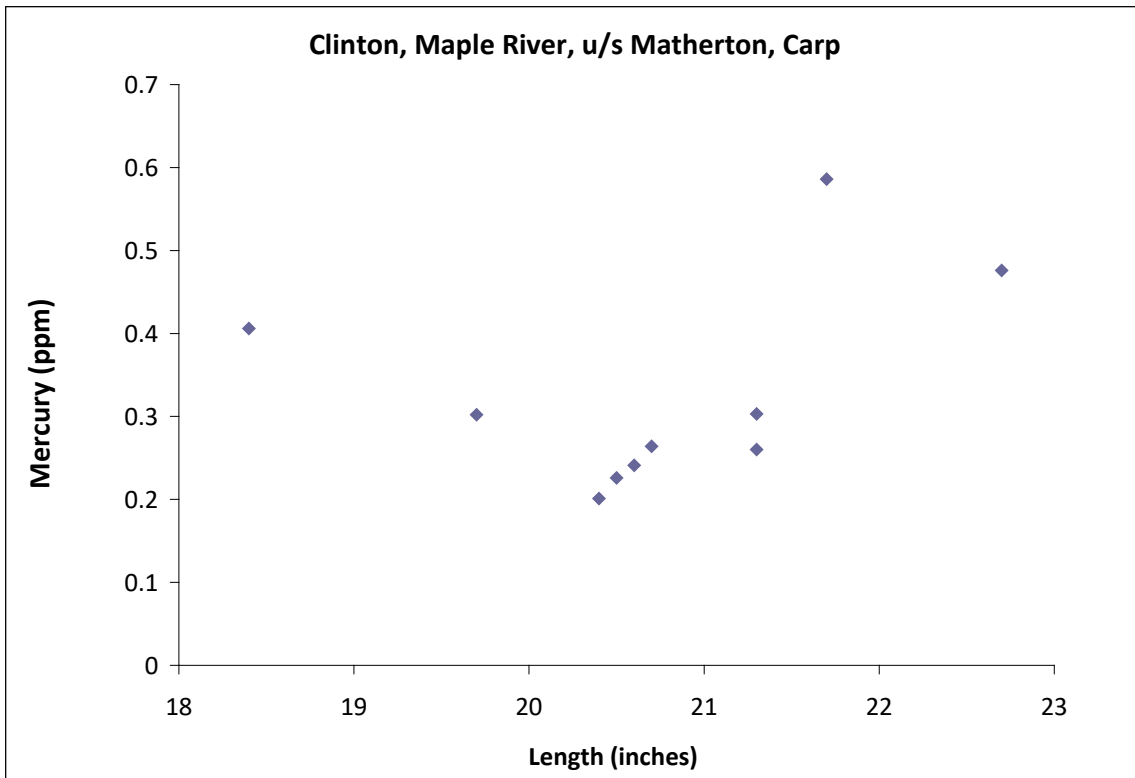
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
2006	2006	10	18.4	NA	18.4	22.7
Datasets available: 2006						
Chemical	Sample Size	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.327	0.201	0.586	0.420	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.101	0.077				

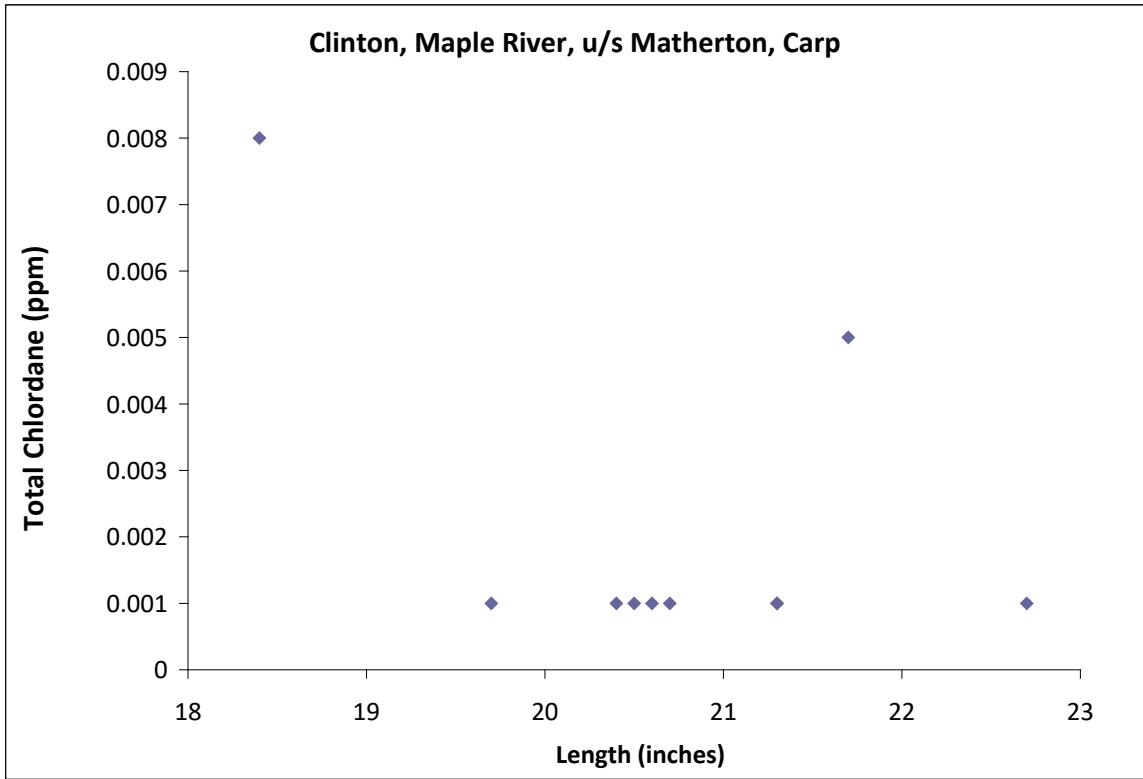
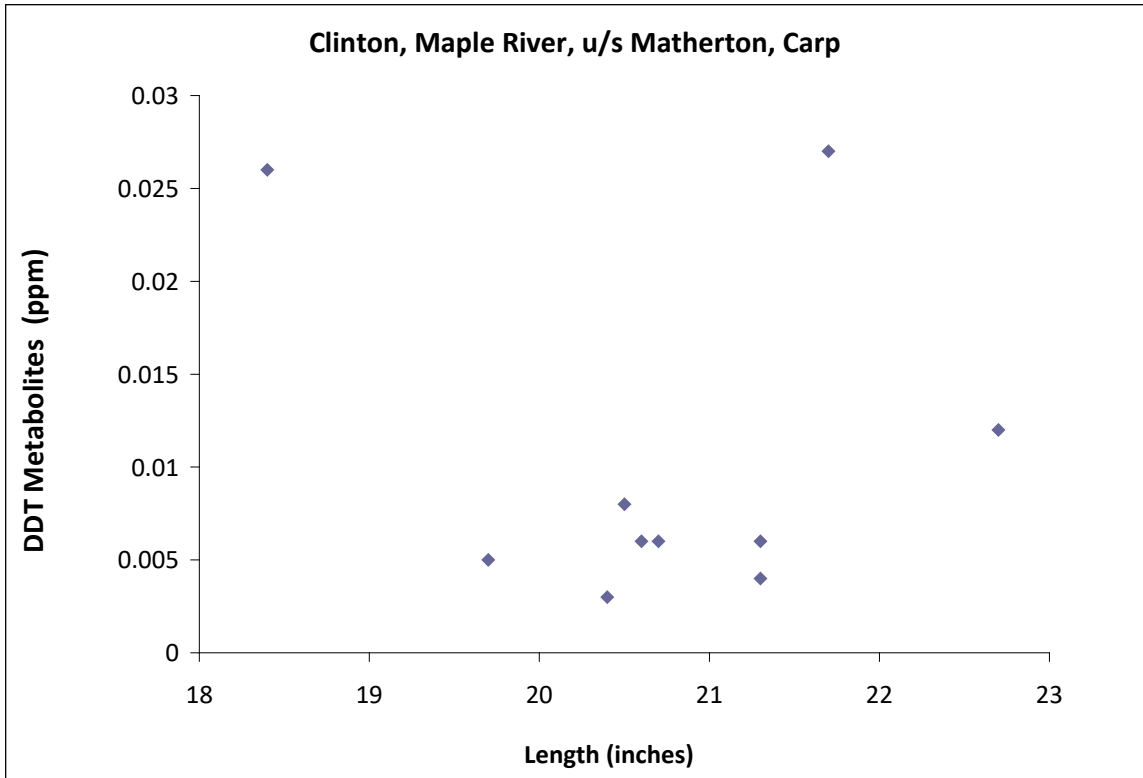
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
2006	2006	10	18.4	NA	18.4	22.7
Datasets available: 2006						
Chemical	Sample Size	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.010	0.001	0.067	0.020	12
DDT	10	0.010	0.003	0.026	0.020	16
Chlordane	10	0.002	0.001	0.008	0.000	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.421	0.247				
DDT	0.023	0.004				
Chlordane	0.241	0.160				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Women and children should eat no more than one meal per week of Maple River carp greater than 22 inches in length due to PCBs.

Recommendation: No one should eat more than 2 meals of Maple River carp per month due to mercury. PCBs would cause an advisory.





Mecosta County

Largemouth Bass

Chippewa Lake

Mecosta County

Hg Analysis:

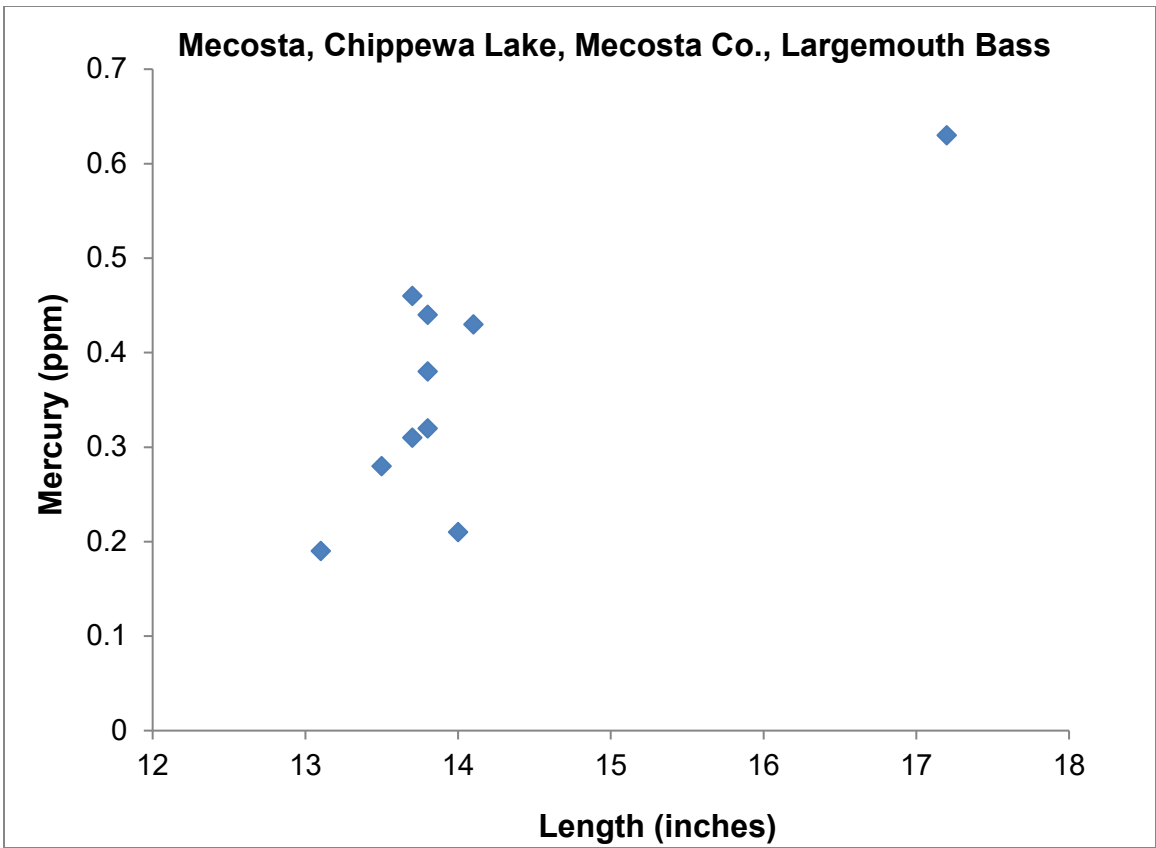
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2017	2017	10	13.1	14	13.5	17.2	
Datasets available: 2017							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	9	0.38	0.21	0.63	0.48	2	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.591	0.436					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
--	--	0	--	--	--	--	
Datasets available: --							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
TEQ	0	--	--	--	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
TEQ	--	--					
Final meal category based on UCL:							2

Existing MDHHS Advisory: Chippewa Lake largemouth bass are covered by the statewide advisory due to mercury: No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Recommendation: No one should eat more than 2 meals per month of Chippewa Lake largemouth or smallmouth bass less than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury. The statewide length break was applied since the size range in the sample was limited.



Pumpkinseed

Chippewa Lake

Mecosta County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	6.2	na	6.2	7.3
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.05	0.03	0.07	0.06	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.088	0.110				

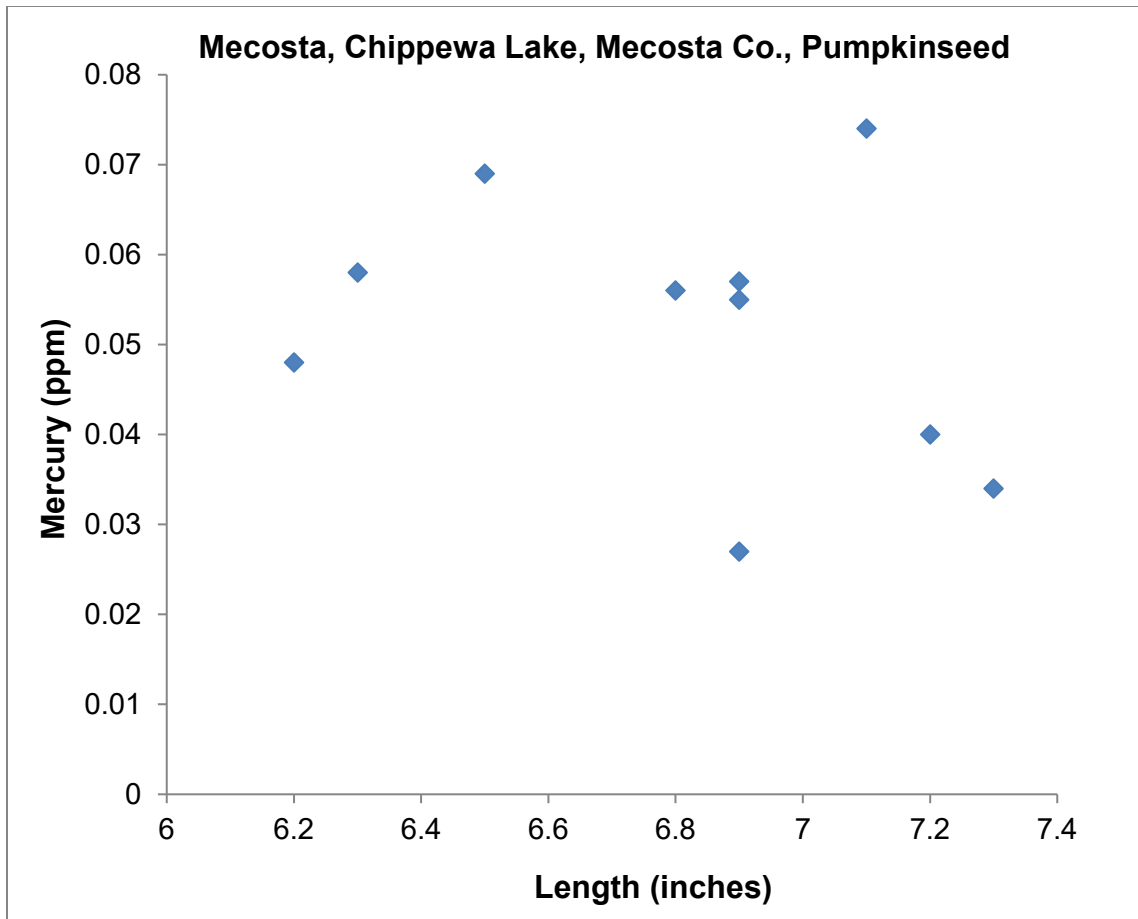
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
TEQ	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
TEQ	--	--				
Final meal category based on UCL:						

Existing MDHHS Advisory: Chippewa Lake pumpkinseed and bluegill are covered by the statewide advisory due to mercury: No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: Anyone can eat up to 16 meals per month of Chippewa Lake bluegill or sunfish of any size.

Note: The length range in the sample is representative of fish likely to be caught by anglers.



Largemouth Bass

Horsehead Lake

Mecosta County

Hg Analysis:

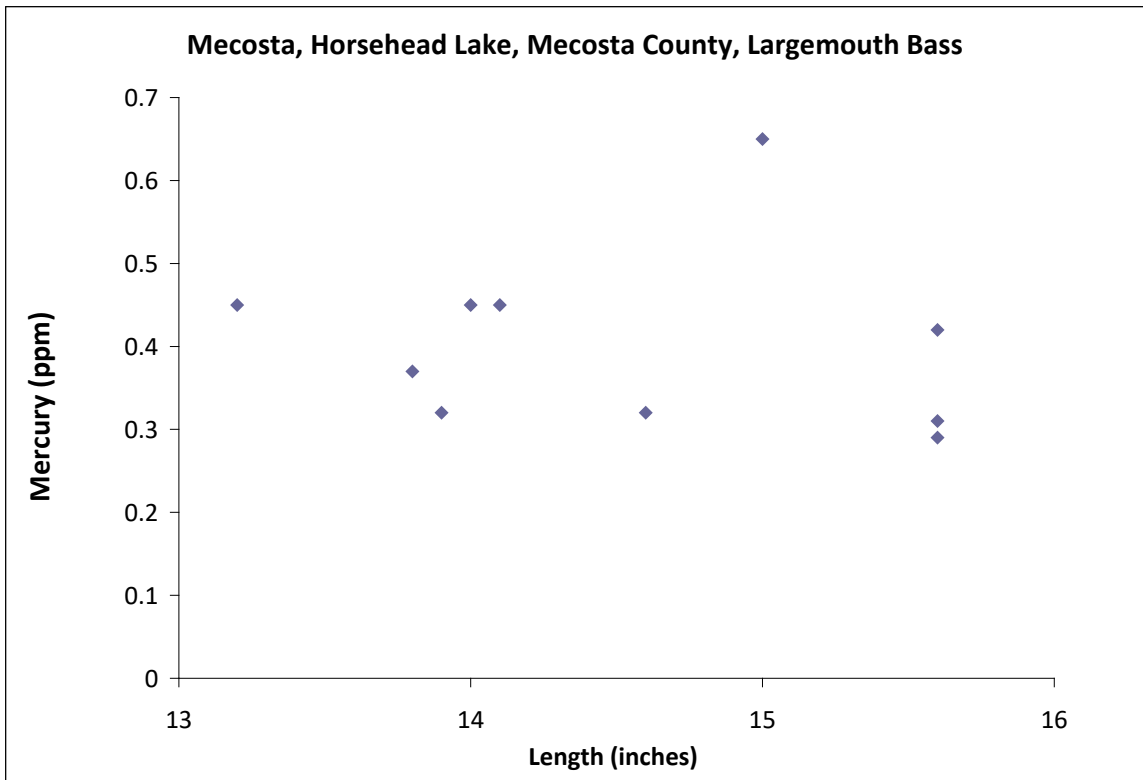
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2010	2010	10	13.2	14	13.8	15.6
Datasets available: 2010						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.40	0.29	0.65	0.48	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.021	0.048				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Horsehead Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of legal size Horsehead Lake largemouth or smallmouth bass under 18 inches or more than 1 meal per month of those fish over 18 inches. The size range of fish in this sample set is limited and the statewide length break was added. Guideline matches the statewide guideline.



Montcalm County

Largemouth Bass

Clifford Lake

Montcalm County

Hg Analysis:

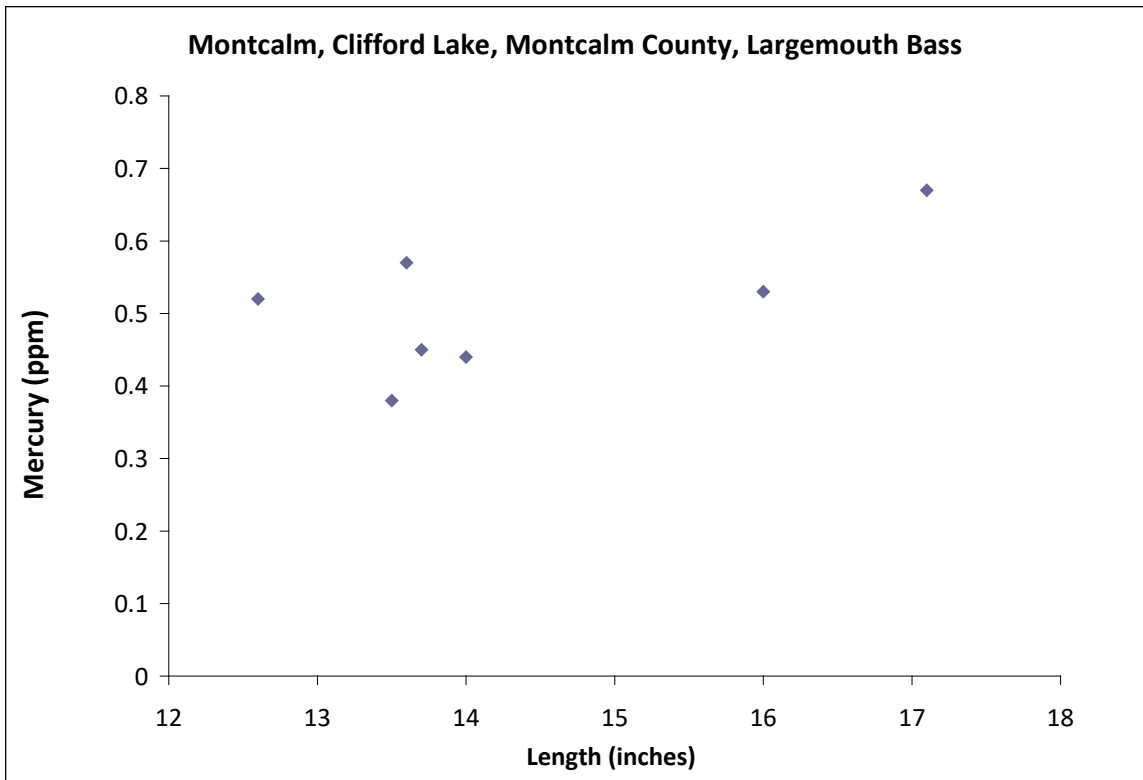
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	7	12.6	14	13.5	17.1
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.51	0.38	0.67	0.62	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.409	0.365				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	14		
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Clifford Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meals per month of legal size Clifford Lake largemouth or smallmouth bass under 18 inches or more than 6 meals per year of those fish over 18 inches due to mercury. Statewide length break applied.



Bluegill

Cowden Lake

Montcalm County

Hg Analysis:

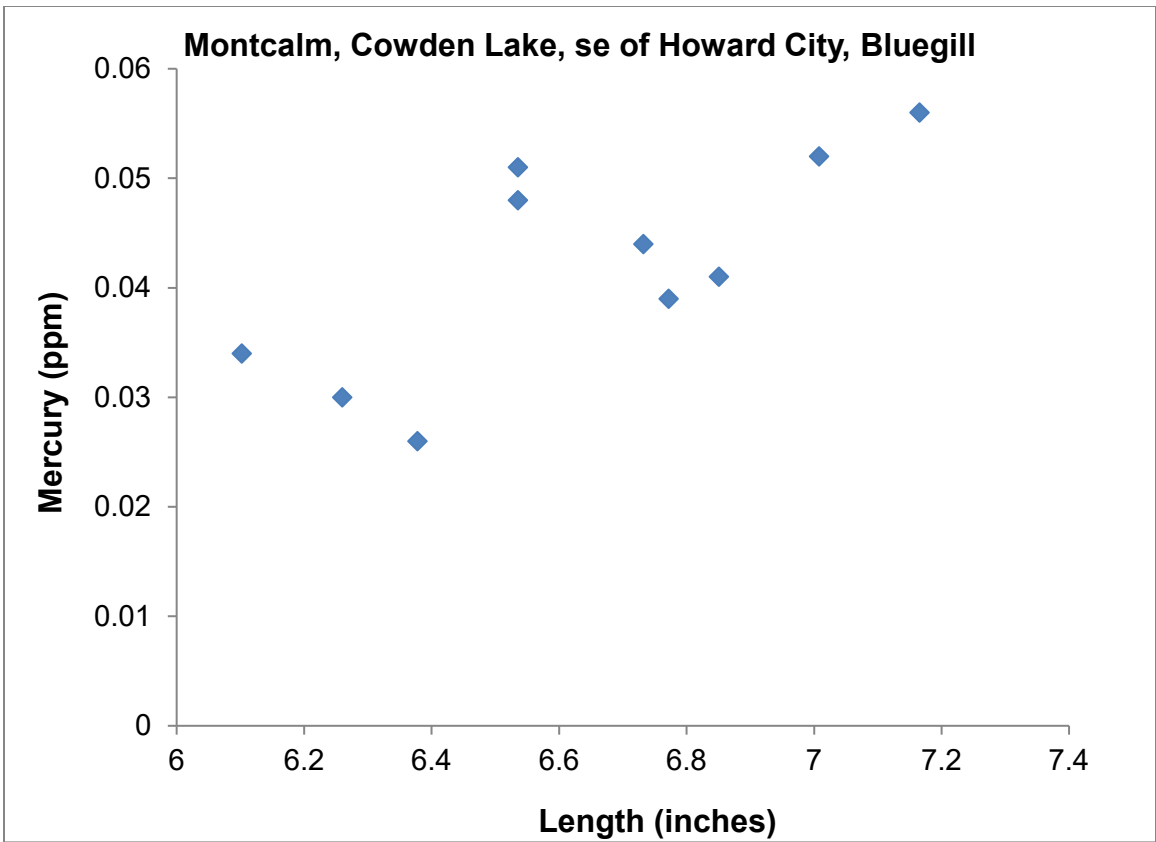
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent					
2018	2018	10	6.1	NA	6.1	7.2
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.042	0.026	0.056	0.049	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.546	0.526				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent					
2018	2018	10	6.1	NA	6.1	7.2
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	ND	<0.25 ppb	<0.25 ppb	--	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	NA	NA				
Final meal category based on UCL:						16

Existing MDHHS Advisory: Bluegill and sunfish from Cowden Lake in Montcalm County are covered under the statewide mercury guidance. No one should eat more than 8 meals per month of these species of any size due to mercury.

Recommendation: No one should eat more than 16 meals per month of bluegill and sunfish of any size from Cowden Lake in Montcalm County due to mercury.



Largemouth Bass

Little Whitefish Lake

Montcalm County

Hg Analysis:

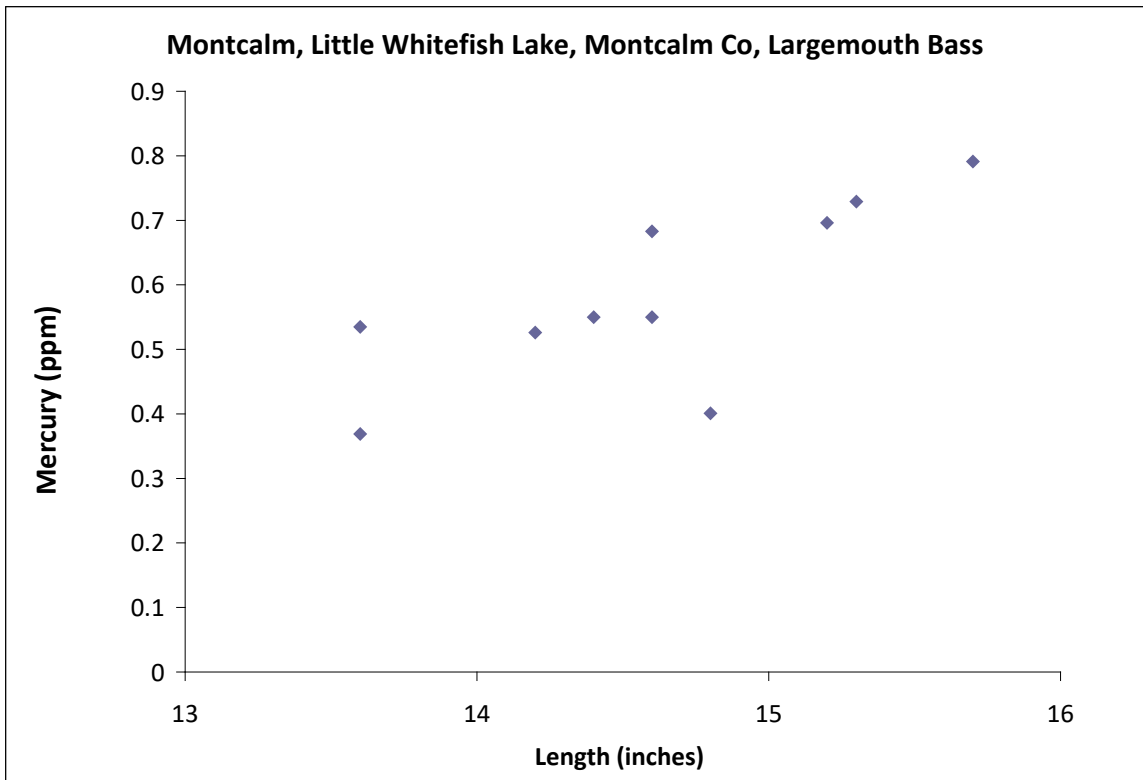
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2008	2008	10	13.6	14	13.6	15.7
Datasets available: 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.58	0.37	0.79	0.68	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.571	0.515				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	14		
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Little Whitefish Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of legal size Little Whitefish Lake largemouth or smallmouth bass under 18 inches or more than 6 meals per year of those fish over 18 inches. Statewide length break applied.



Largemouth Bass

Montcalm Lake

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2003	2004	20	11.6	14	13.8	19.0
Datasets available: 2003, 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.54	0.40	0.80	0.62	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.752*	0.729*	*=Regression for all legal sized samples			

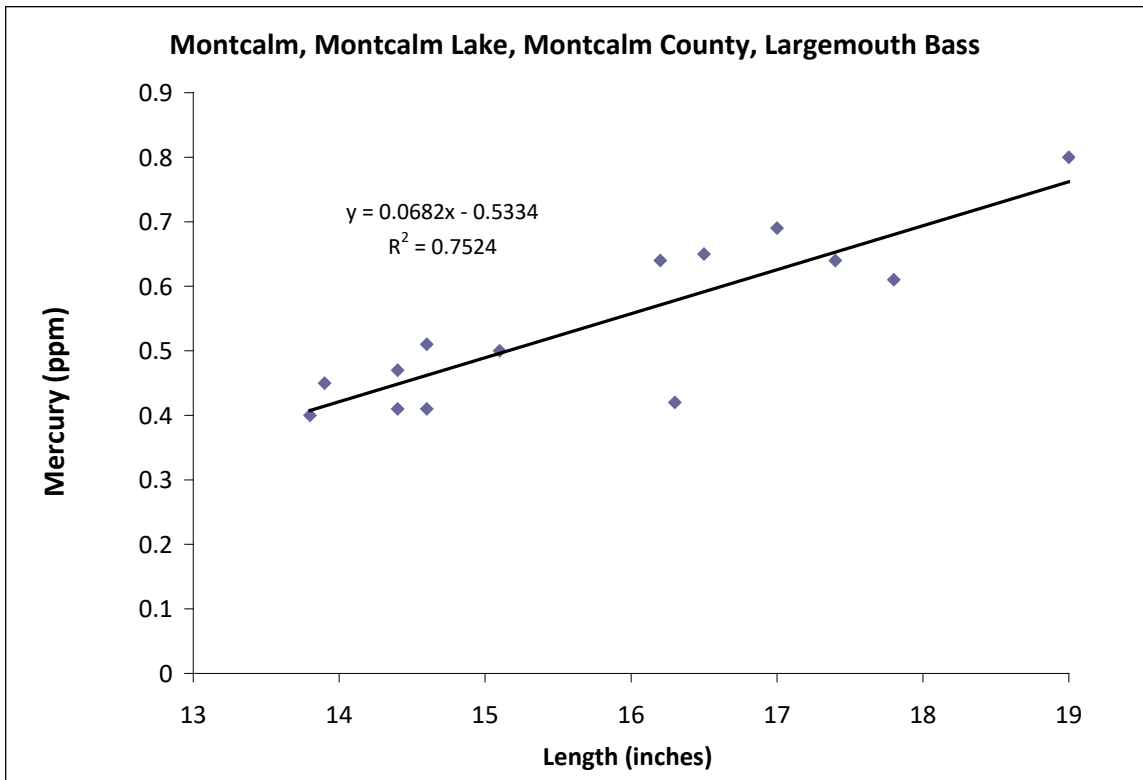
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Montcalm Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Montcalm Lake largemouth or smallmouth bass due to mercury. Regression is robust and suggests the guideline is protective when eating longer lengths.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.42	2
15	0.49	2
16	0.56	1
17	0.63	1
18	0.69	1
19	0.76	1
20	0.83	1
21	0.90	1
22	0.97	1
<i>Shaded area denotes extrapolated estimates</i>		



Largemouth Bass

Nevins Lake

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	10	12.8	14	13.7	19.3
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.53	0.32	0.85	0.73	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.847	0.807				

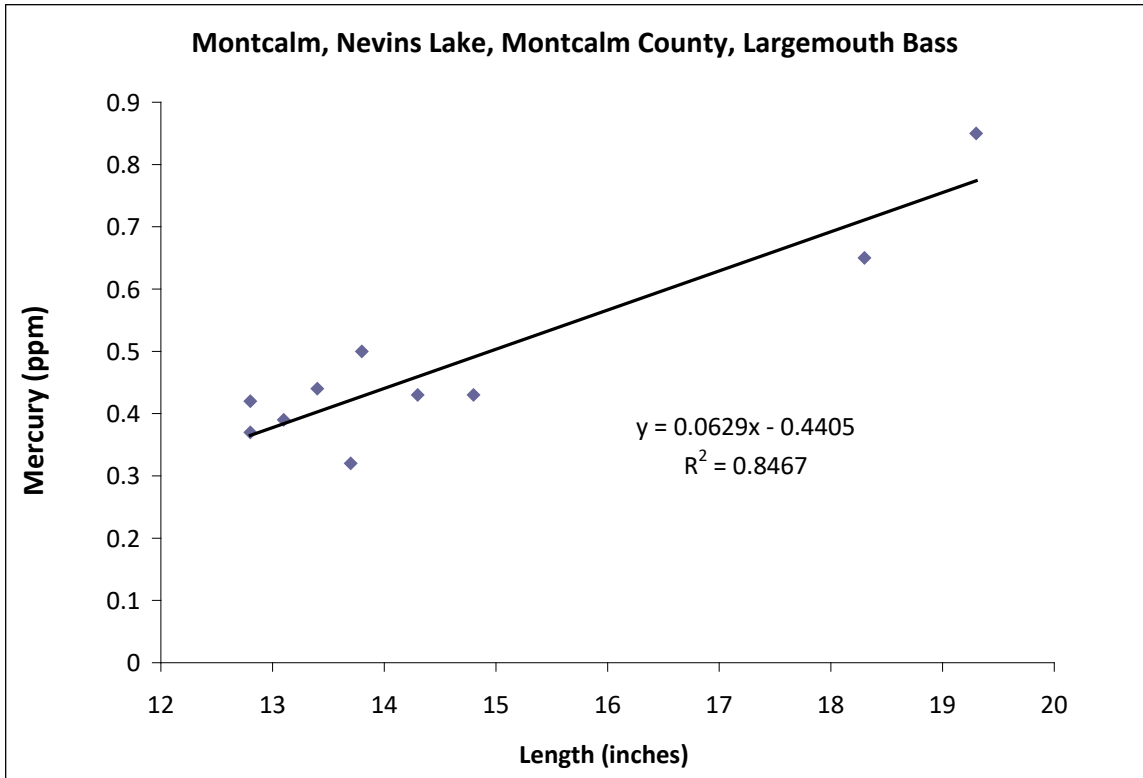
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Nevins Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Nevins Lake largemouth or smallmouth bass due to mercury under 18 inches, or more than 6 meals per year over 18 inches. The slope of the regression is determined by two points, with most of the data are less than 15 inches. Statewide length break was applied.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.440	2
15	0.503	2
16	0.566	1
17	0.629	1
18	0.692	1
19	0.755	1
20	0.818	1
21	0.880	1
22	0.943	1
<i>Shaded area denotes extrapolated estimates</i>		



Largemouth Bass

Rainbow Lake

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	1	13.6	14	13.6	13.6
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.340	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	1	13.6	14	13.6	13.6
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	ND	--	--	--	--
DDT	1	0.034	--	--	--	--
Chlordane	1	0.003	--	--	--	--
Toxaphene	1	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Rainbow Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: Statewide guidelines apply: No one should eat more than 2 meals per month of legal size Rainbow Lake largemouth or smallmouth bass under 18 inches or more than 1 meal per month of largemouth or smallmouth bass over 18 inches. Dataset is limited by sample size.

Northern Pike

Rainbow Lake

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	10	20.7	24	24	32.5
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.826	0.39	1.59	1.39	0.5
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.599	0.267				

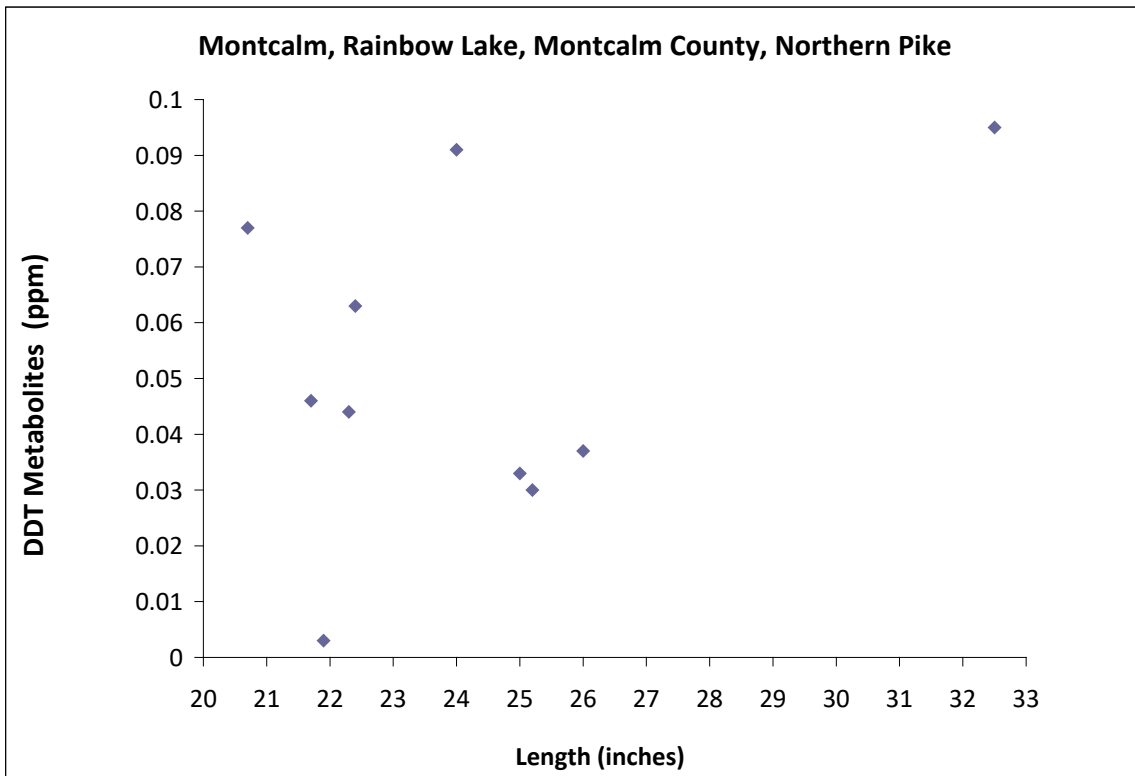
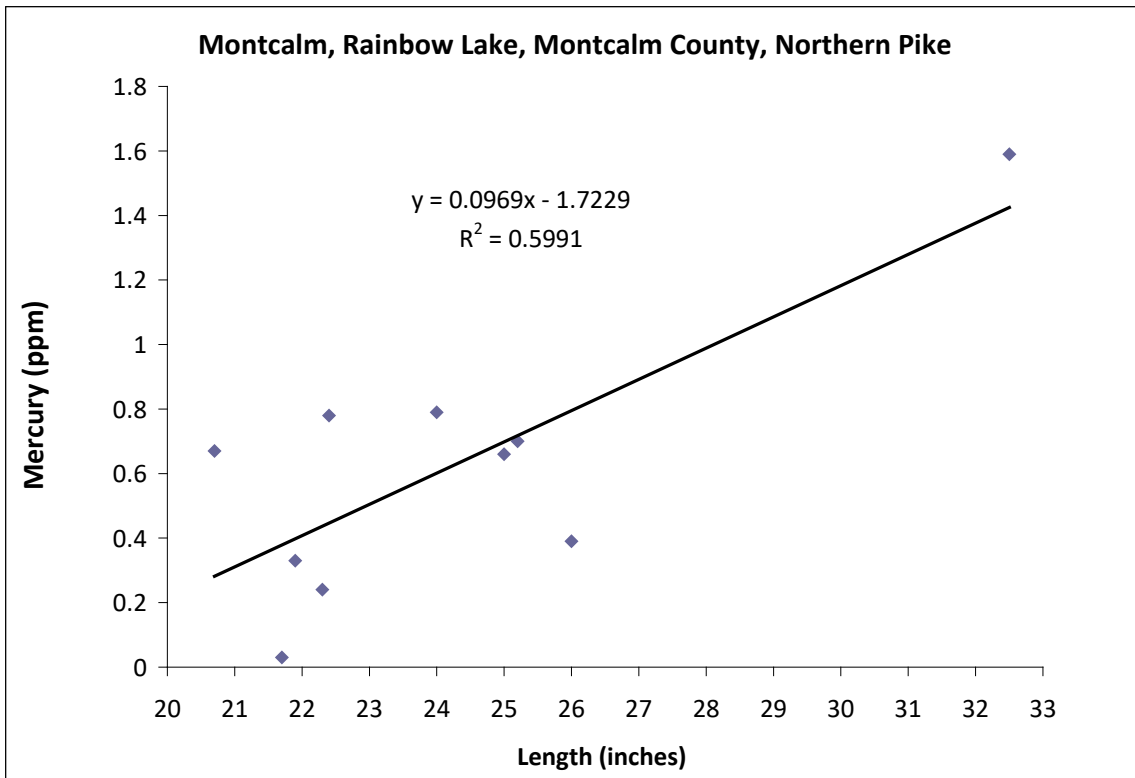
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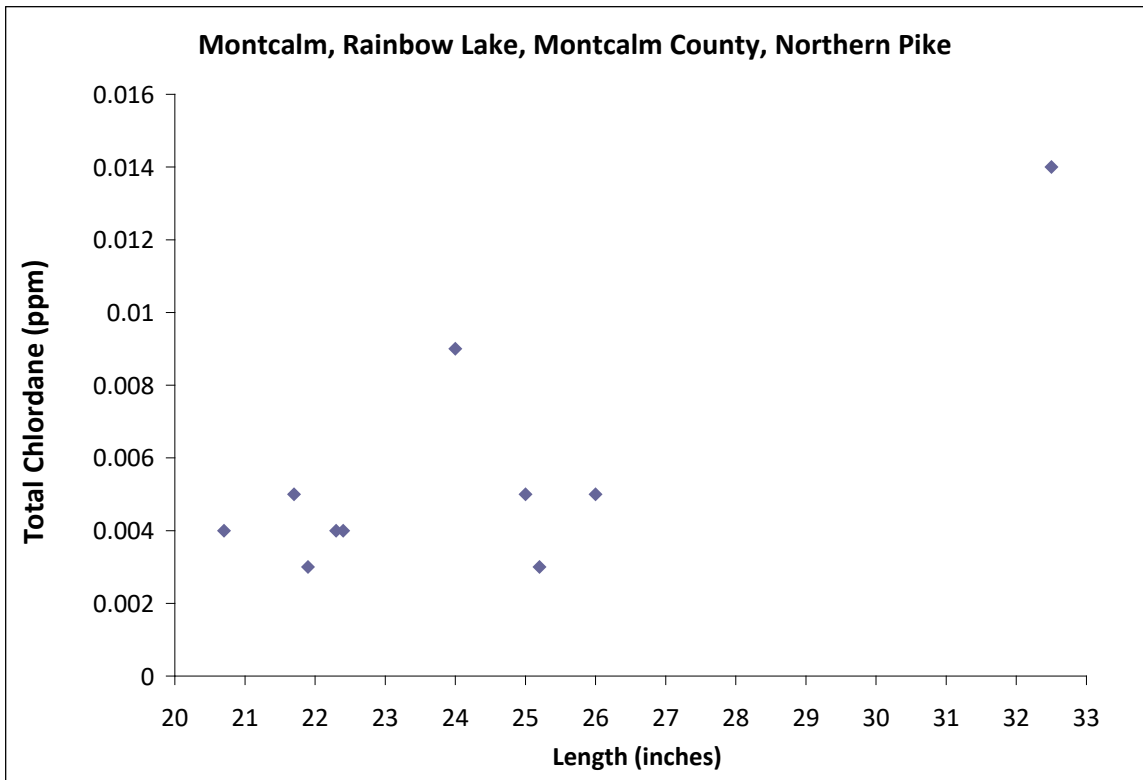
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	1990	10	20.7	24	24	32.5
Datasets available: 1990						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.06	0.03	0.10	0.10	16
Chlordane	5	0.007	0.003	0.01	0.01	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.128	0.082				
Chlordane	0.645	0.528				
Toxaphene	--	--				
Final meal category based on UCL:						0.5

Existing Advisory: Rainbow Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 6 meals per year of Rainbow Lake northern pike smaller than 32 inches due to mercury. No one should eat northern pike over 32 inches due to mercury. Slope of the regression is determined by one data point, so the regression was not used to set the guideline, and instead is based on the 95% UCL for mercury. Lengths beyond the data set were set to one meal category more restrictive.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.603	1
26	0.797	1
28	0.990	1
30	1.184	0.5
32	1.378	0.5
34	1.572	0.5
36	1.766	0.5
38	1.959	0.5
40	2.153	0.5
<i>Shaded area denotes extrapolated estimates</i>		





Largemouth Bass

Rock Lake

Montcalm County

Hg Analysis:

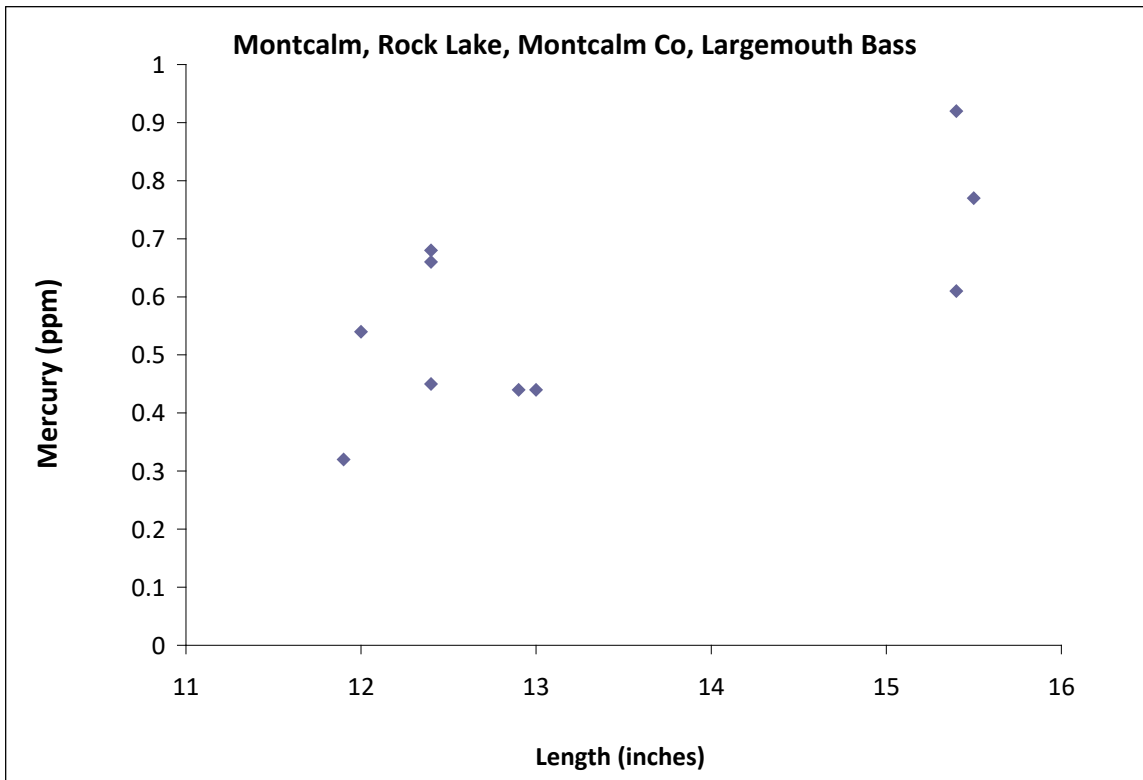
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2007	2007	10	11.9	14	15.4	15.5	
Datasets available:		2007					
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	10	0.58	0.32	0.920	0.71	1	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.471	0.436					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
--	--	0	--	--	--	--	
Datasets available:		--					
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
Final meal category based on UCL:						--	

Existing Advisory: Rock Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of legal size Rock Lake largemouth or smallmouth bass under 18 inches or more than 6 meals per year of those fish over 18 inches due to mercury. Statewide length break was applied as the size range was limited. The UCL includes sublegal length fish.



Walleye

Rock Lake

Montcalm County

Hg Analysis:

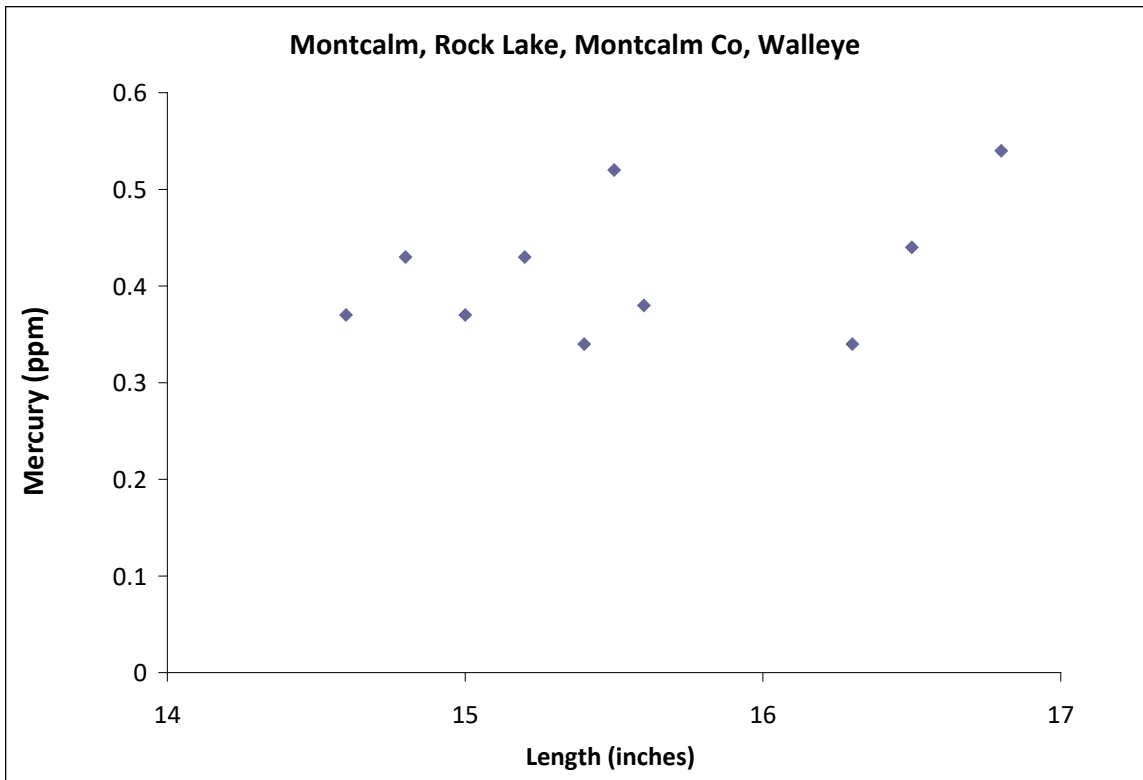
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2007	2007	10	14.6	15	14.6	16.8
Datasets available: 2007						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.42	0.34	0.54	0.47	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.146	0.125				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Rock Lake walleye are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Rock Lake walleye over 20 inches in length or more than 2 meals per month of legal size walleye under 20 inches in length due to mercury. Statewide length break applied.



Northern Pike

Six Lakes

Montcalm County

Hg Analysis:

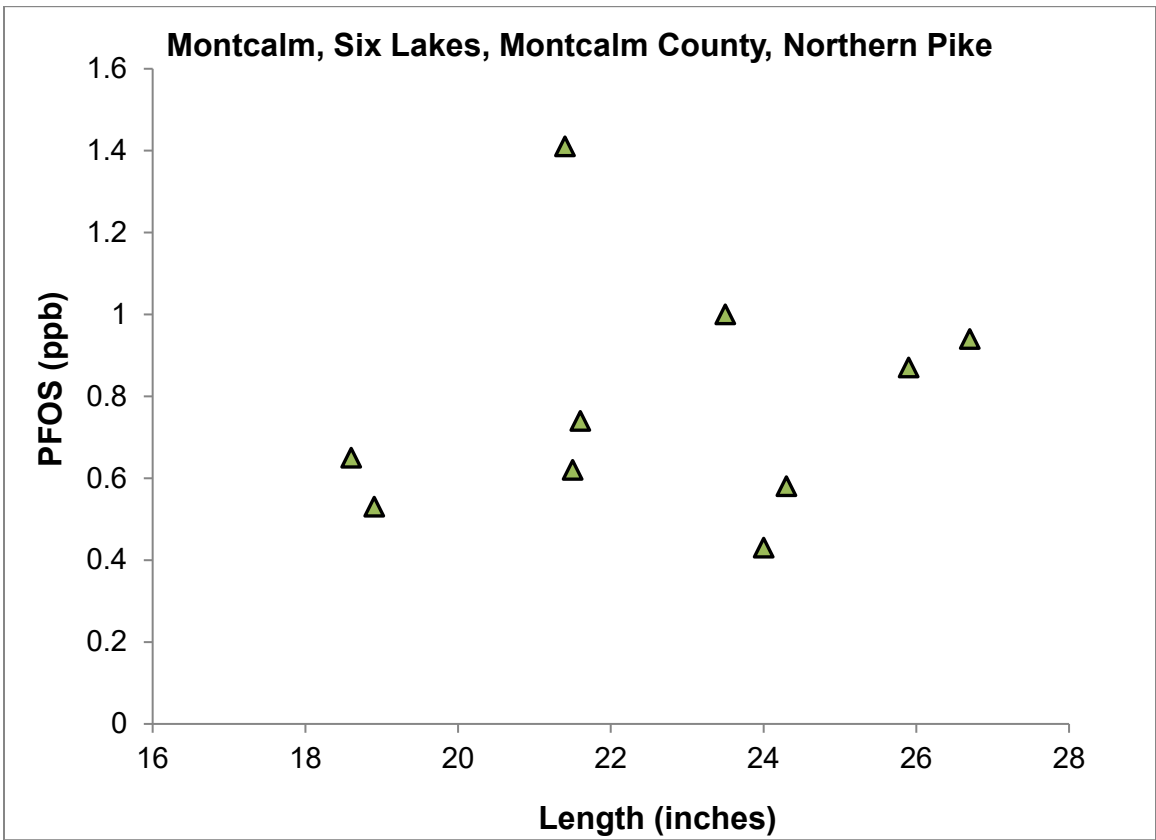
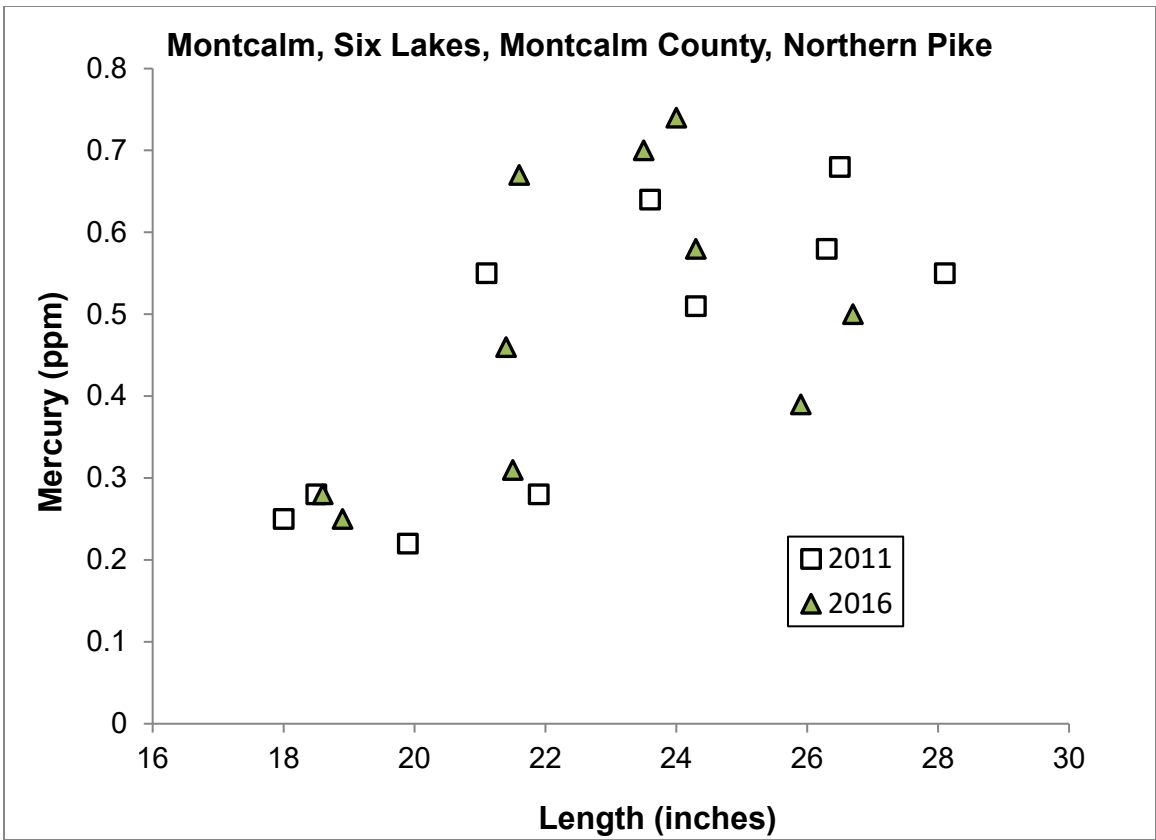
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2011	2016	20	18	24	23.5	28.1	
Datasets available: 2011, 2016							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
Mercury	10	0.59	0.39	0.74	0.66	1	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.421	0.484					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		Meal Category
Earliest	Most Recent				Min	Max	
2016	2016	10	18.6	24	23.5	26.7	
Datasets available: 2016							
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category	
PCB	0	--	--	--	--	--	
DDT	0	--	--	--	--	--	
Chlordane	0	--	--	--	--	--	
Toxaphene	0	--	--	--	--	--	
PFOS	5	0.8 ppb	0.4 ppb	1.0 ppb	1.1 ppb	16	
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--					
PFOS	0.030	0.044	Final meal category based on UCL:				1

Existing MDHHS Advisory: No one should eat more than 1 meal per month of Six Lakes northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches due to mercury.

Recommendation: No change is recommended. The length break in the previous advice is based on a significant regression for mercury using the 2011 results.



Largemouth Bass

Tamarack Lake

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	13.0	14	13.6	16.5
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.421	0.350	0.560	0.496	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.108	0.132				

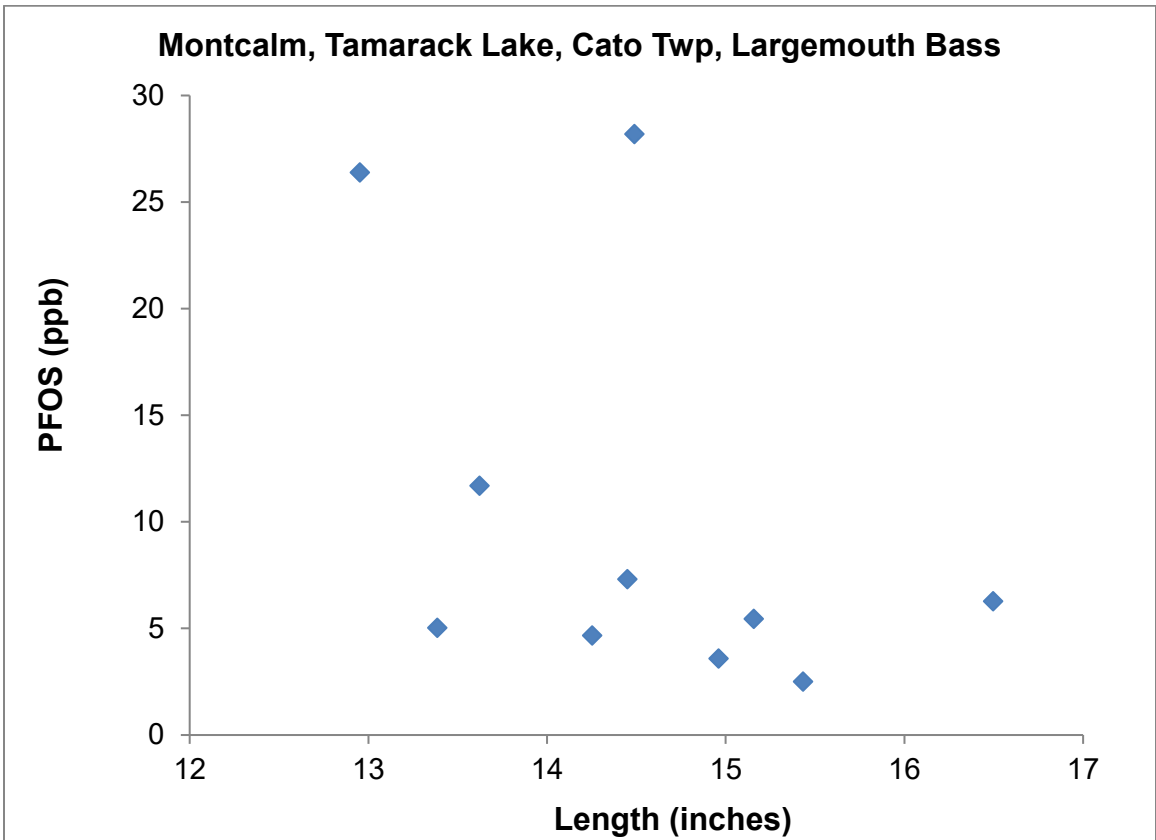
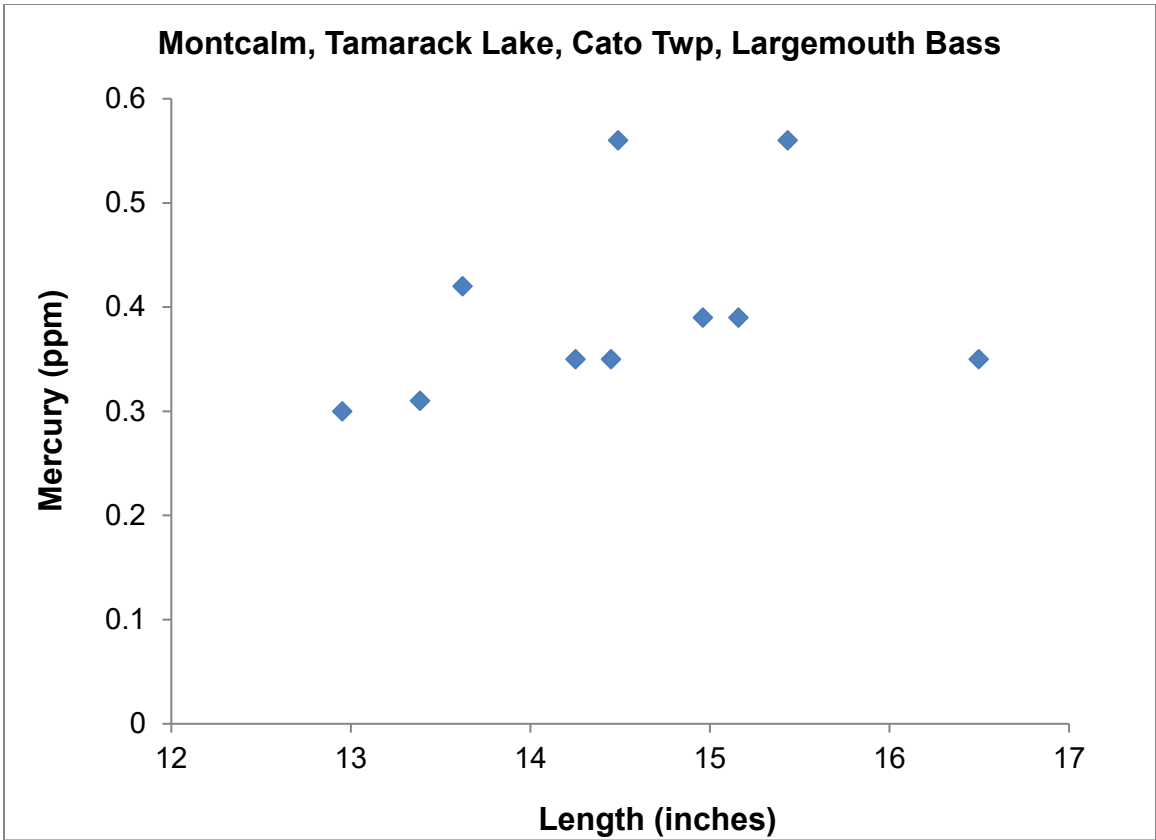
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10*	13.0	14	13.0	16.5
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	10.1 ppb	2.5 ppb	28.2 ppb	16.8 ppb	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.207	0.238				
Final meal category based on UCL:						2

*Sub-legal sized fish used in the PFOS analysis as no correlation between fish size and PFOS has been observed in the statewide dataset.

Existing MDHHS Advisory: Largemouth bass from Tamarack Lake in Montcalm County are currently covered under the statewide mercury advisory. No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 18 inches or no more than 1 meal per month of bass larger than 18 inches.

Recommendation: No one should eat more than 2 meals per month of largemouth or smallmouth bass less than 18 inches or no more than 1 meal per month of bass larger than 18 inches from Tamarack Lake in Montcalm County due to mercury. Statewide length break applied as the size range of the dataset was limited. PFOS causes less-restrictive advice.



Pumpkinseed

Tamarack Lake

Montcalm County

Hg Analysis:

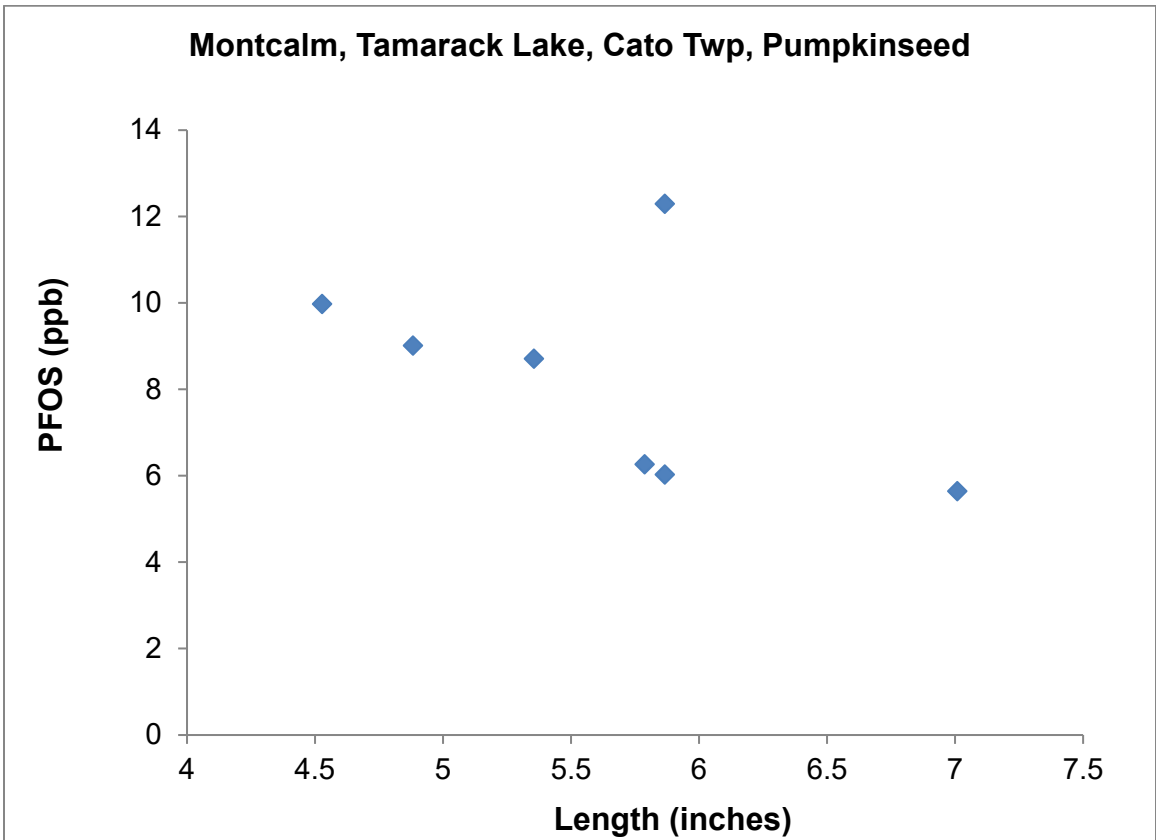
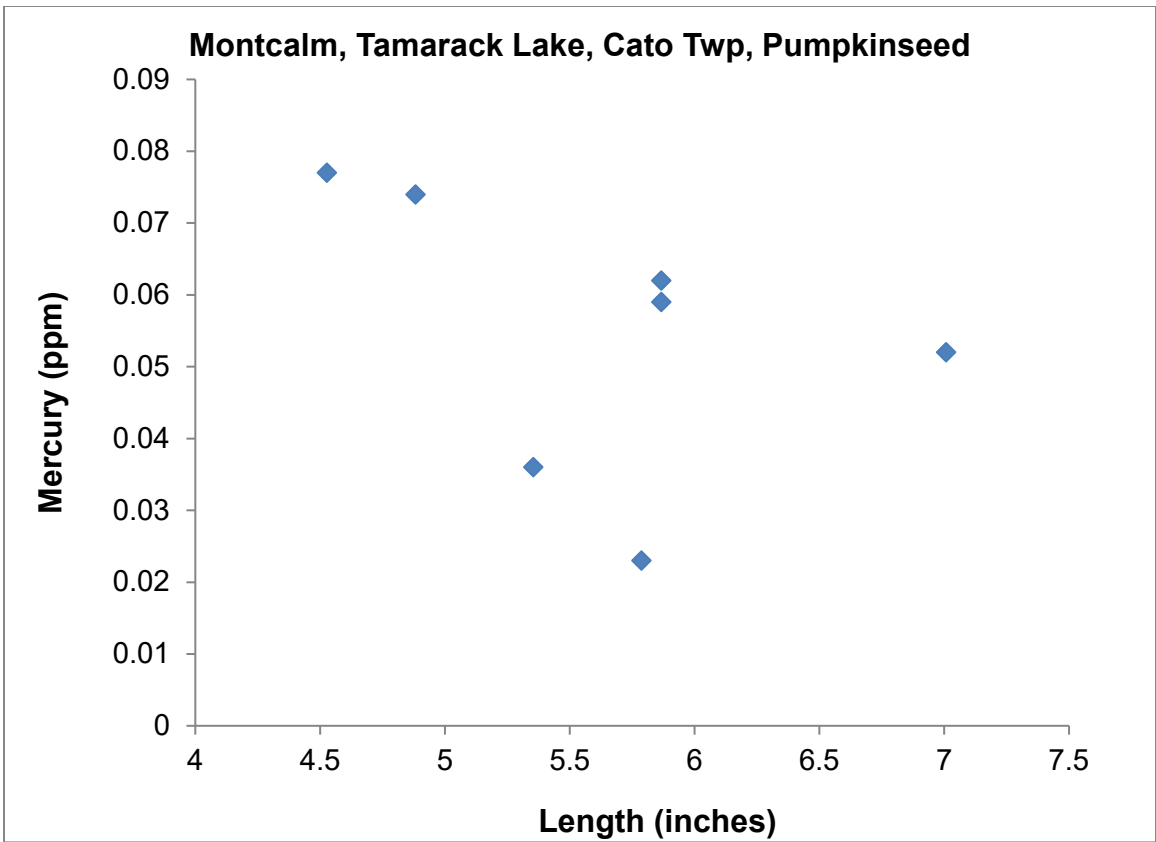
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	4.5	NA	4.5	7.0
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.055	0.023	0.077	0.073	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.177	0.098				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	7	4.5	NA	4.5	7.0
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	7	8.3 ppb	5.7 ppb	12.3 ppb	10.5 ppb	12
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.265	0.352				
Final meal category based on UCL:						12

Existing MDHHS Advisory: Bluegill and pumpkinseed from Tamarack Lake in Montcalm County are currently covered under the statewide mercury advisory. No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 12 meals per month of bluegill or sunfish of any size from Tamarack Lake in Montcalm County due to mercury and PFOS.



Bluegill & Pumpkinseed
Hg Analysis:

Whitefish Lake

Montcalm County

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	4.8	na	4.8	6.7
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.05	0.04	0.07	0.07	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.046	0.030				

Organics Analysis:

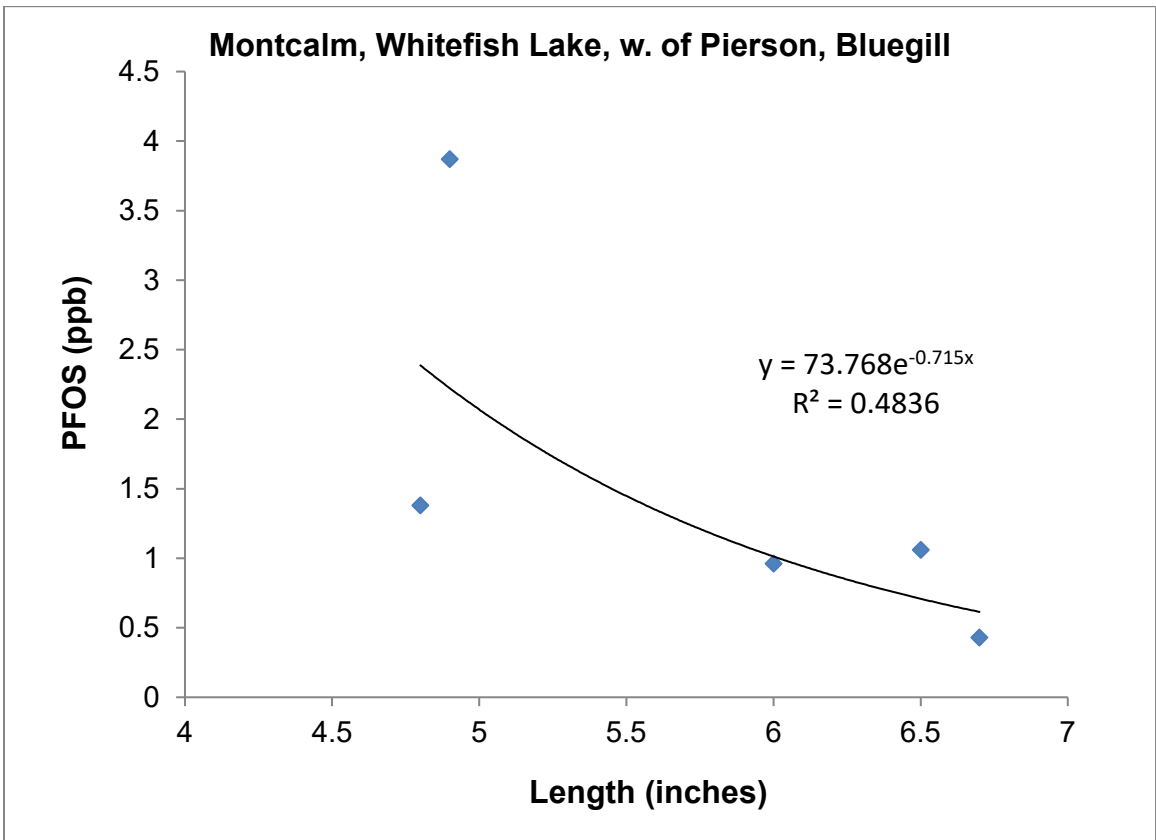
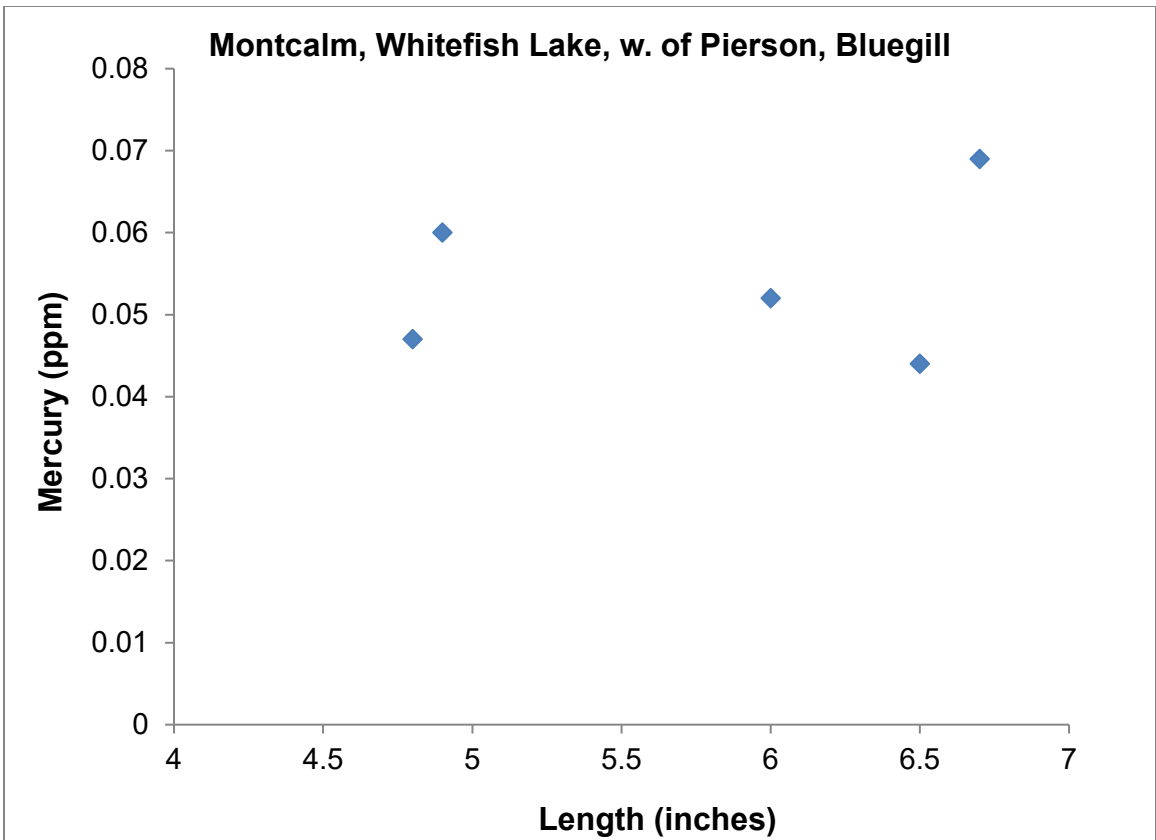
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	5	4.8	na	4.8	6.7
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	5	1.5 ppb	0.4 ppb	4 ppb	3.2 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.503	0.641*	Final meal category based on UCL:			16

* slope is negative and not used to determine meal category

Existing MDHHS Advisory: Whitefish Lake bluegill and pumpkinseed are covered by the statewide advisory; no one should eat more than 8 meals per month of bluegill due to mercury.

Recommendation: No one should eat more than 8 meals per month of Whitefish Lake bluegill or pumpkinseed due to mercury. The statewide advice was retained due to the small sample size and limited size range. Additional samples of bluegill/pumpkinseed may indicate the advice could be relaxed.

Note: The current recommendation will be re-evaluated in the next release of the Eat Safe Fish Guide.



Largemouth Bass

Whitefish Lake

Montcalm County

Hg Analysis:

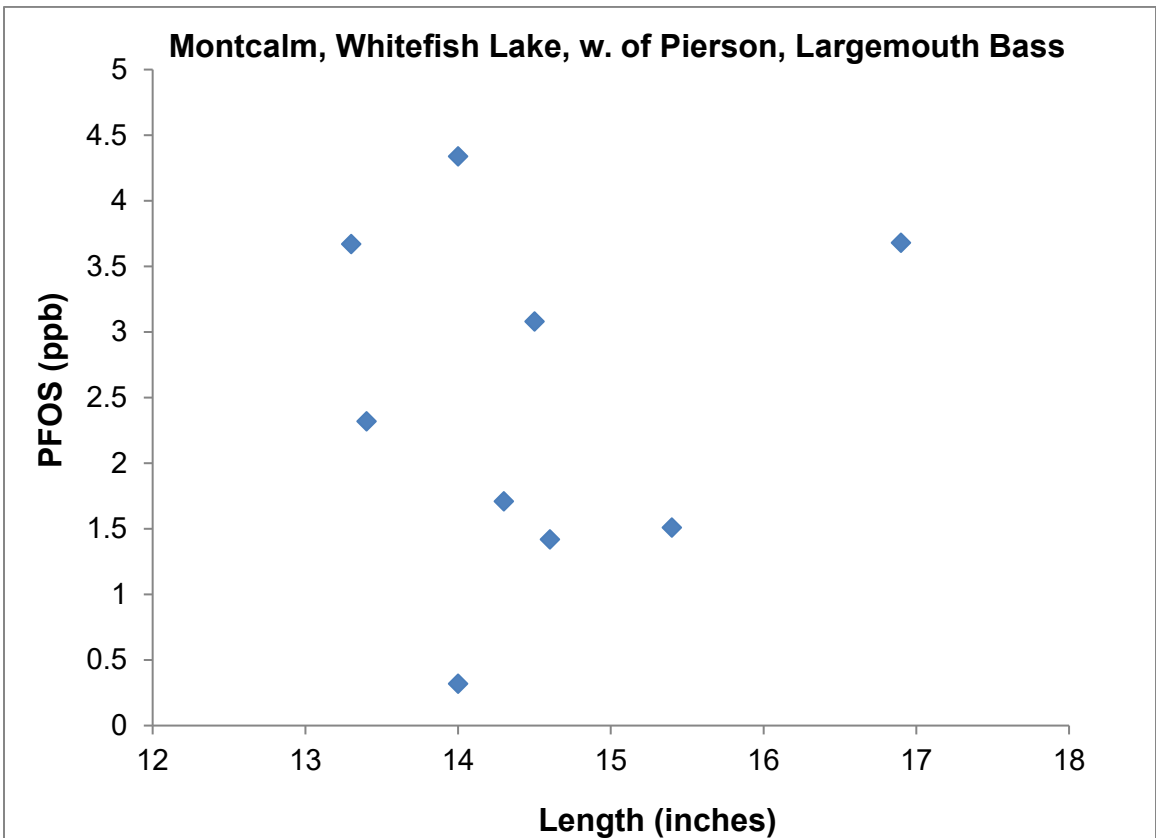
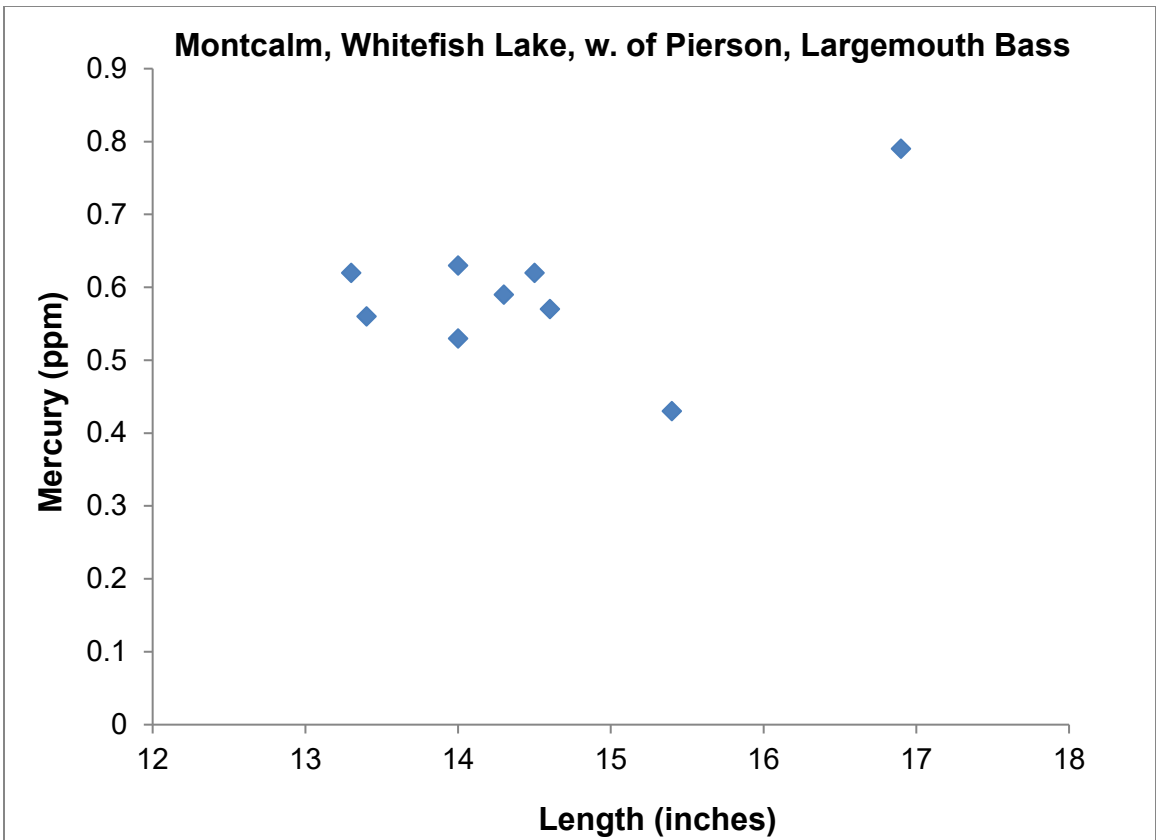
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	9	13.3	14	14	16.9
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.59	0.43	0.79	0.70	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.162	0.090				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	9	13.3	14	14	16.9
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	7	2 ppb	0.3 ppb	4.3 ppb	4 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.007	0.014				
Final meal category based on UCL:						1

Existing MDHHS Advisory: Whitefish Lake largemouth and smallmouth bass are covered by the statewide advisory due to mercury. No one should eat more than 2 meals per month of Whitefish Lake largemouth bass or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury.

Recommendation: No one should eat more than 1 meal per month of Whitefish Lake largemouth bass or smallmouth bass less than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. The statewide length break was applied due to the limited size range of fish in the sample.



Rock Bass

Whitefish Lake

Montcalm County

Hg Analysis:

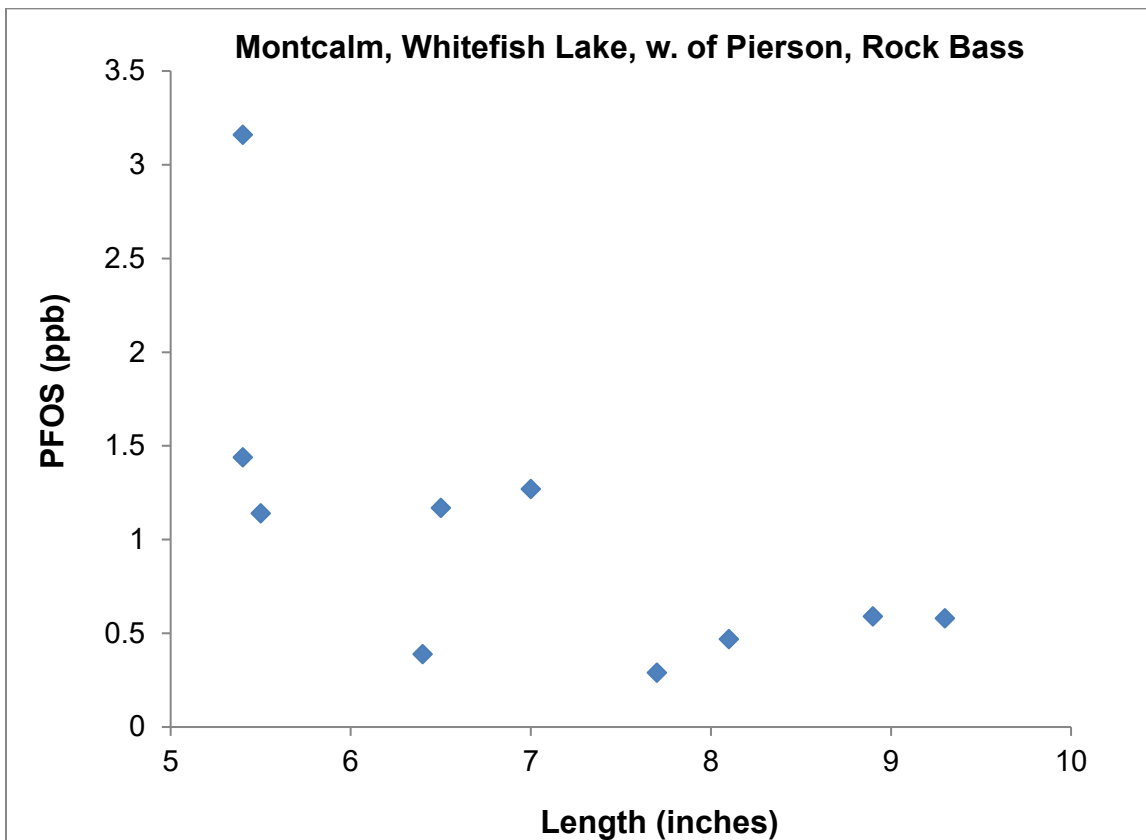
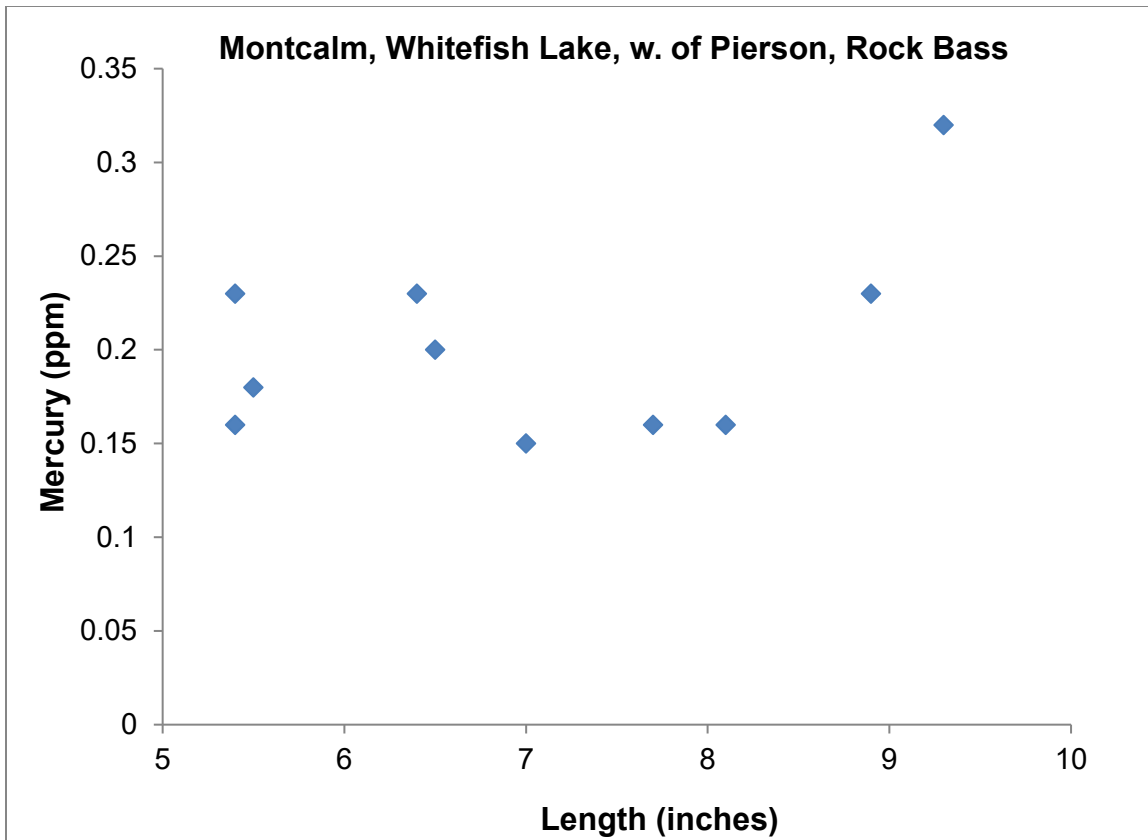
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	5.4	na	5.4	9.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.20	0.15	0.32	0.24	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.181	0.138				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	5.4	na	5.4	9.3
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	1.0 ppb	0.3 ppb	3.2 ppb	1.6 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.400	0.416				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Whitefish Lake rock bass are covered by the statewide advisory; no one should eat more than 4 meals per month of rock bass due to mercury.

Recommendation: No one should eat more than 4 meals per month of Whitefish Lake rock bass due to mercury.



Brown Trout

Wolf Creek

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	2	10	8	10	15.2
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.22	0.12	0.33	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	2	10	8	10	15.2
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	0.04	0.02	0.04	--	--
DDT	2	0.05	0.04	0.06	--	--
Chlordane	2	0.004	0.003	0.004	--	--
Toxaphene	2	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Wolf Creek brown trout are not covered by an advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for determination of a guideline.

Rock Bass

Wolf Creek

Montcalm County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	5	6.5	na	6.5	7.1
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.35	0.16	0.45	0.50	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.278	0.265				

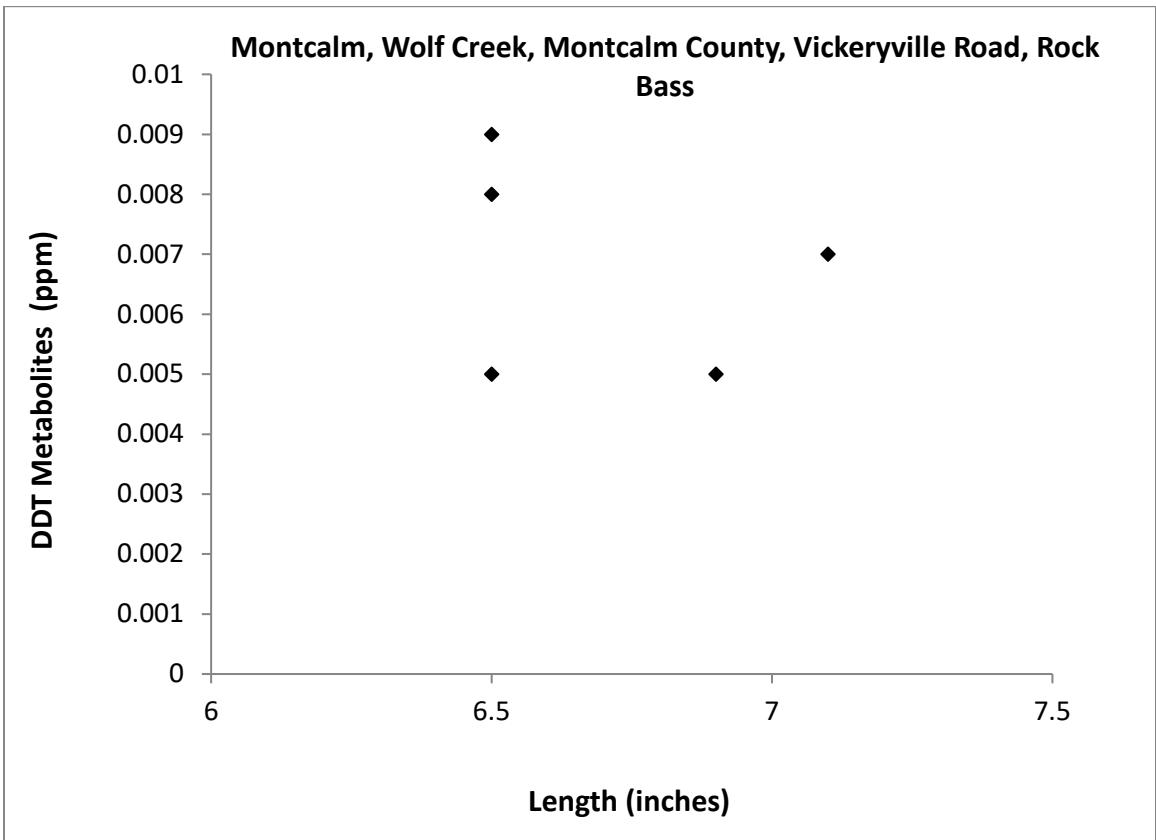
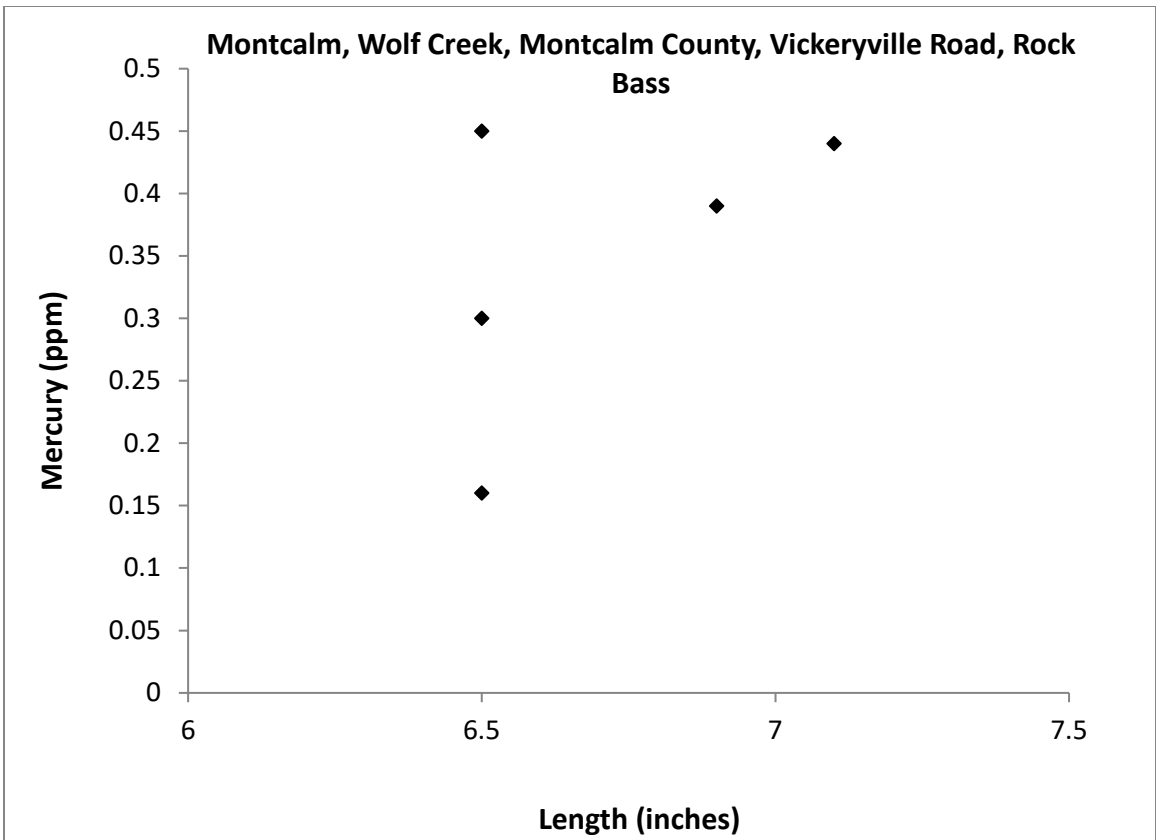
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	5	6.5	na	6.5	7.1
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND*	--	--	--	--
DDT	5	0.007	0.005	0.009	0.01	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.088	0.064				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

* - 0.025 ppb detection limit

Existing Advisory: Wolf Creek rock bass are not covered by an advisory.

Recommendation: No one should eat more than 2 meals per month of Wolf Creek rock bass due to mercury.



White Sucker

Wolf Creek

Montcalm County

Hg Analysis:

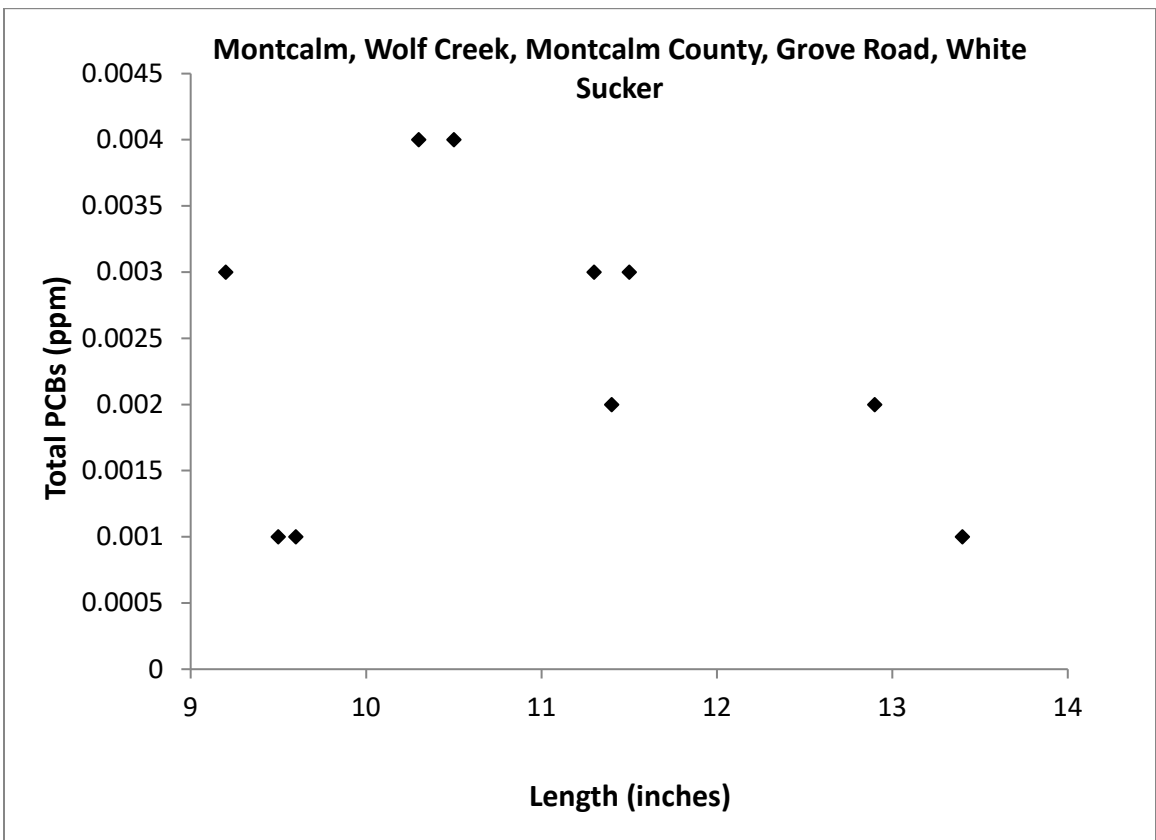
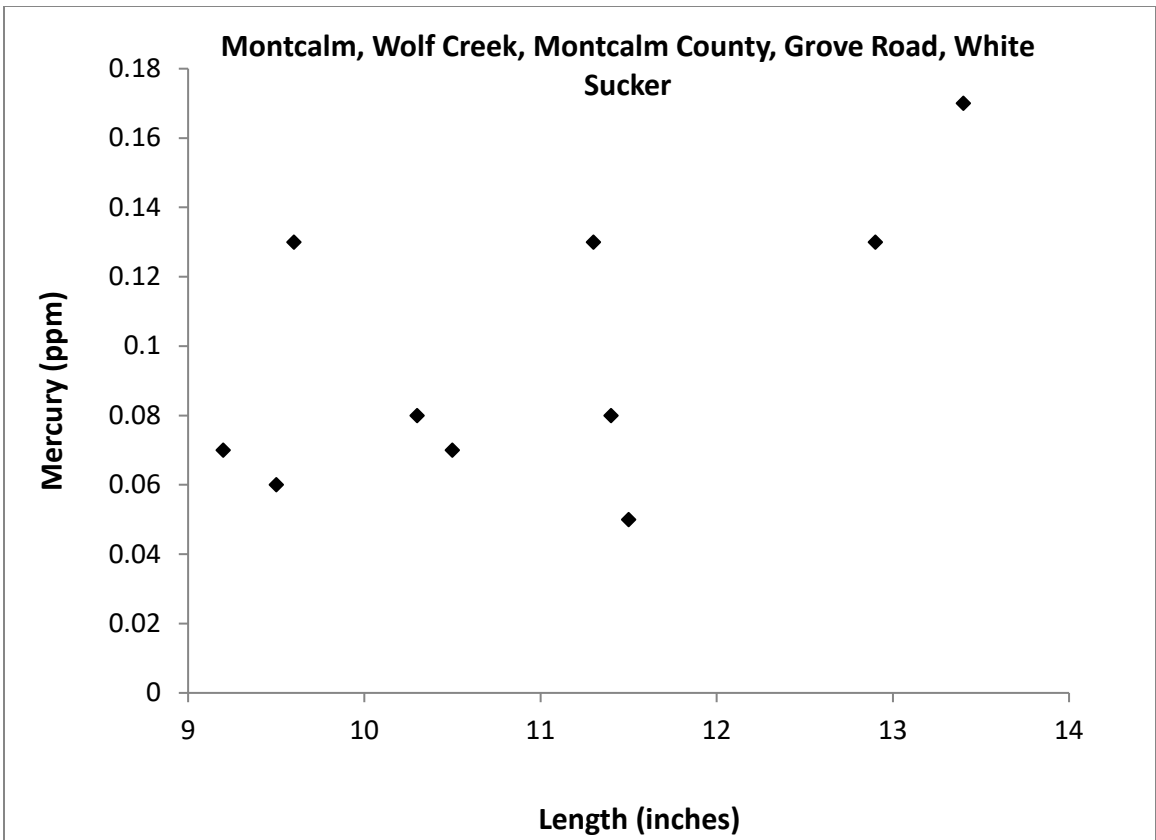
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	10	9.2	na	9.2	13.4
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.10	0.05	0.17	0.13	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.353	0.284				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	10	9.2	na	9.2	13.4
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.002	0.001	0.004	0.003	16
DDT	10	0.007	0.004	0.009	0.01	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.034	0.015				
DDT	0.058	0.040				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						8

Existing Advisory: Wolf Creek white sucker are not covered by an advisory.

Recommendation: No one should eat more than 8 meals per month of Wolf Creek sucker due to mercury.



Muskegon County

Carp

Bear and Muskegon Lakes

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1986	2002	24	21.6	na	21.6	30.7
Datasets available: 1986, 1993, 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	24	0.18	0.08	0.39	0.21	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.003	0.010				

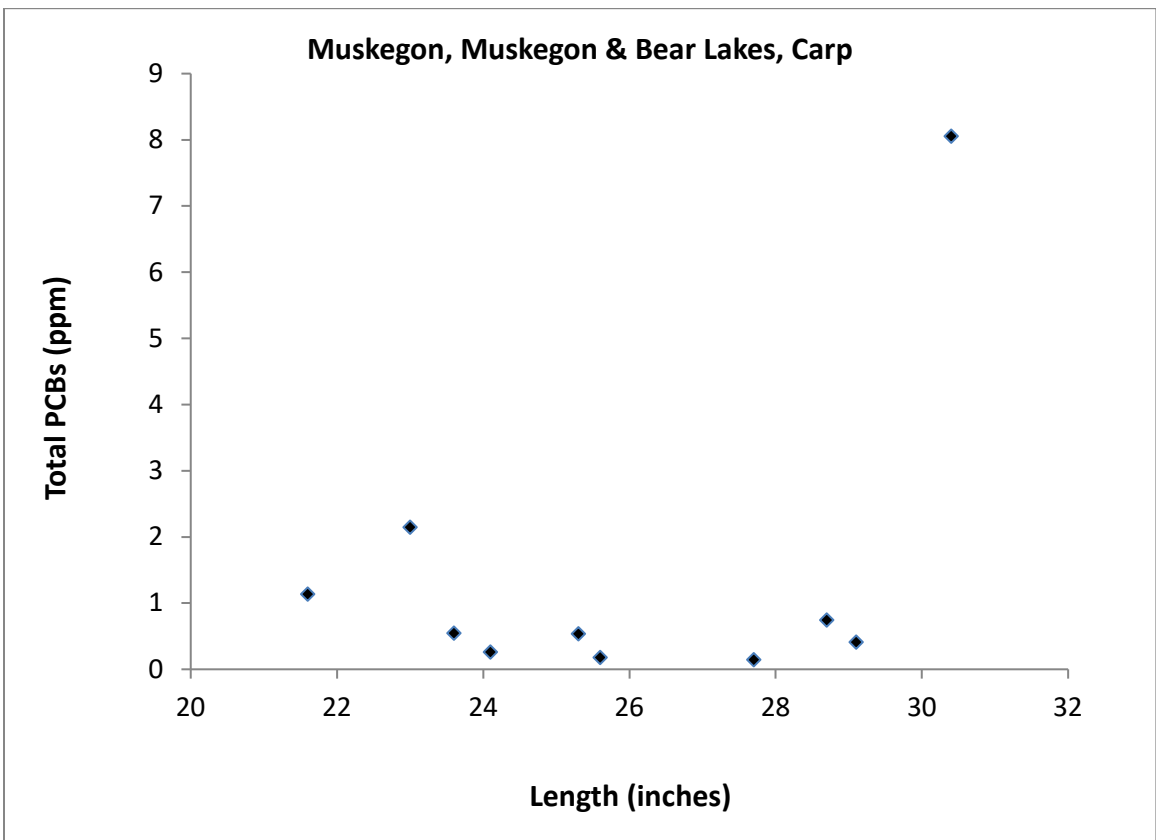
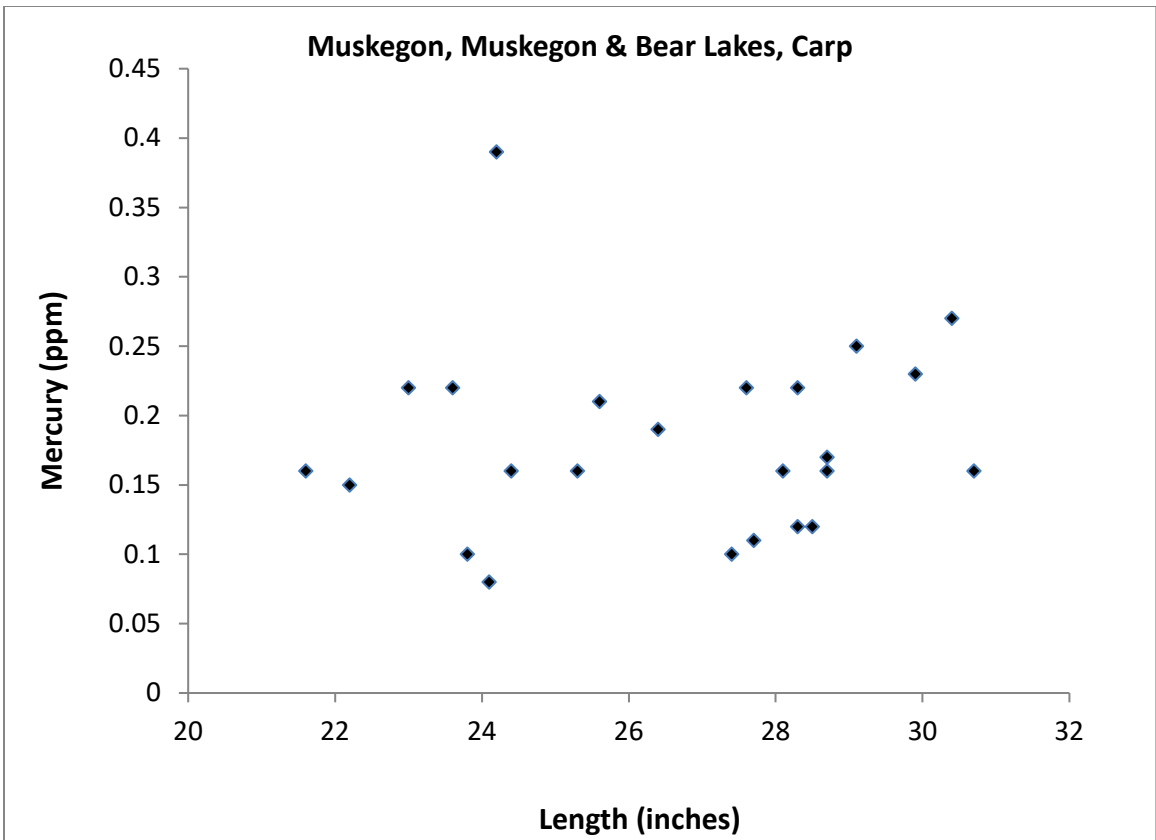
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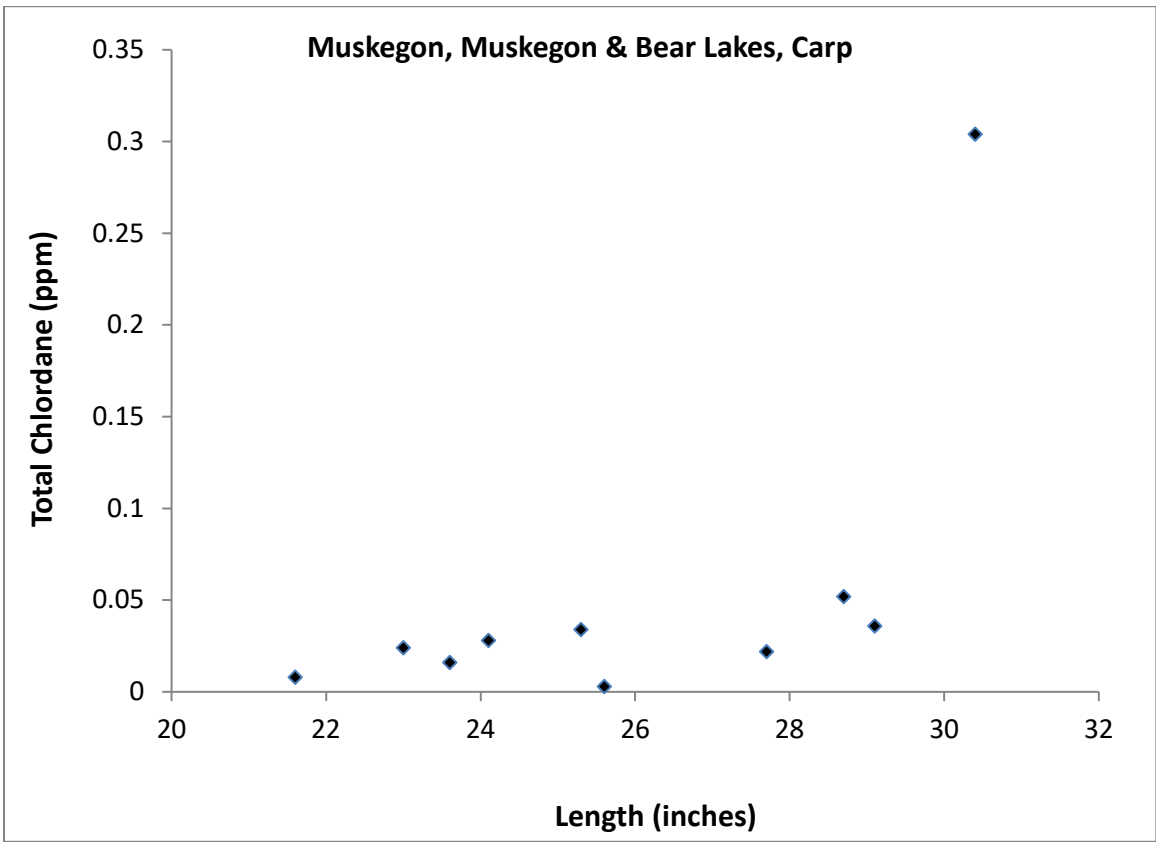
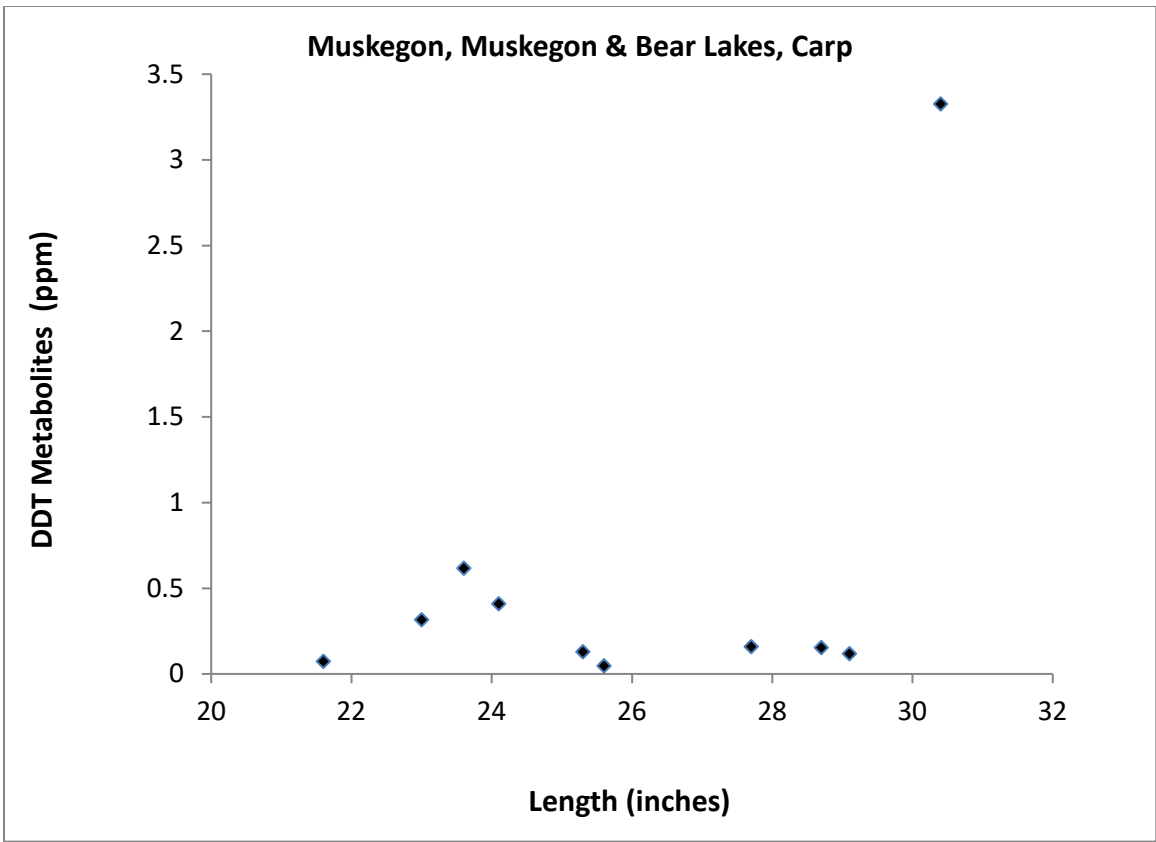
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2002	2002	10	21.6	na	21.6	30.4
Datasets available: 2002						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	1.42	0.14	8.0	3.14	0
DDT	10	0.54	0.04	3.3	1.25	1
Chlordane	10	0.05	0.003	0.30	0.12	--
Toxaphene	10	0.12	0.05	0.47	0.21	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.174	0.017				
DDT	0.227	0.090				
Chlordane	0.378	0.417				
Toxaphene	0.485	0.676				
Final meal category based on UCL:						0

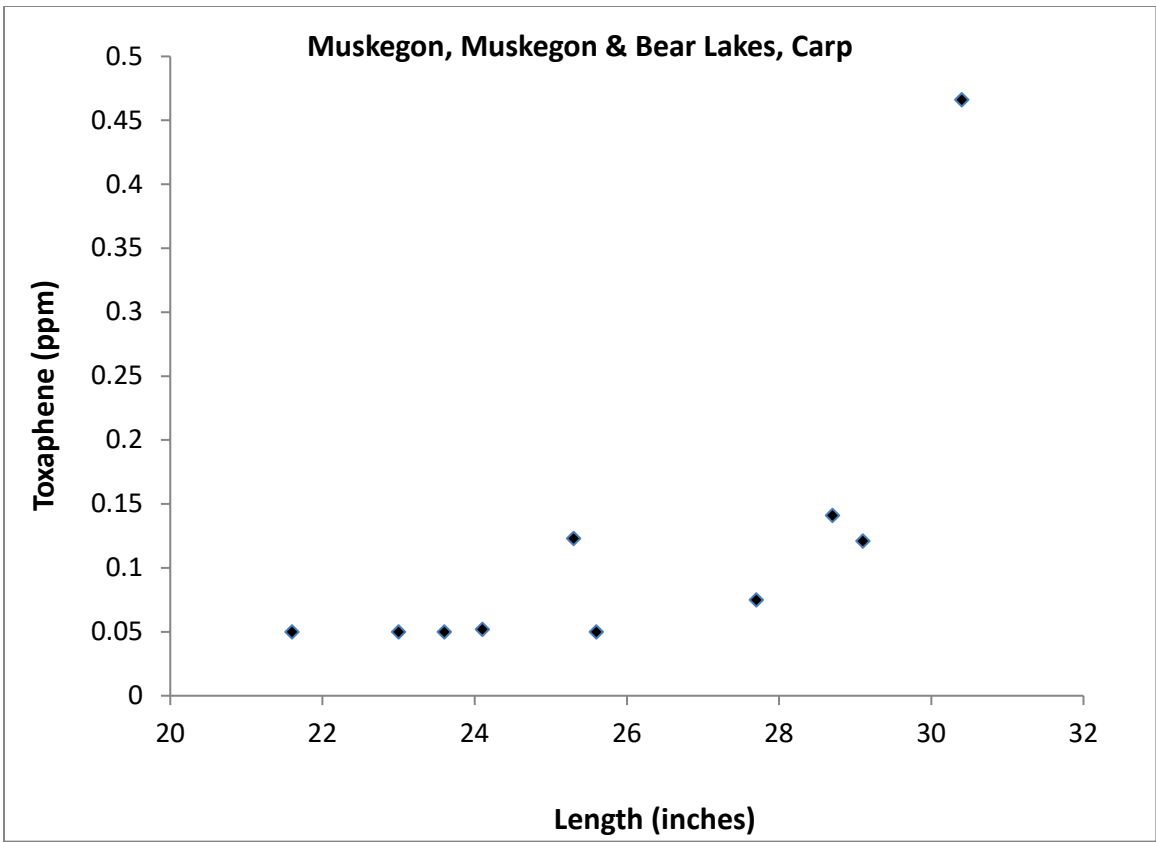
Existing Advisory: Women and children should not eat more than 1 meal per month of Bear or Muskegon Lake carp smaller than 26 inches and should not eat any of those fish larger than 26 inches.

Recommendation: No one should eat carp from Bear and Muskegon Lakes due to PCBs, DDT, mercury, and toxaphene would cause advisories.

Note: *GVSU PCB data was available for multiple species (carp, largemouth bass, northern pike, and walleye), however has not been validated by the MDHHS Analytical Chemistry Laboratory. The inclusion of the GVSU data would not have changed any of the recommended guidelines except for carp. Inclusion of the GVSU data would have changed the recommended guideline from Do Not Eat to Limited.*







**Largemouth and
Smallmouth Bass**

Bear and Muskegon Lakes

Muskegon County

Hg Analysis:

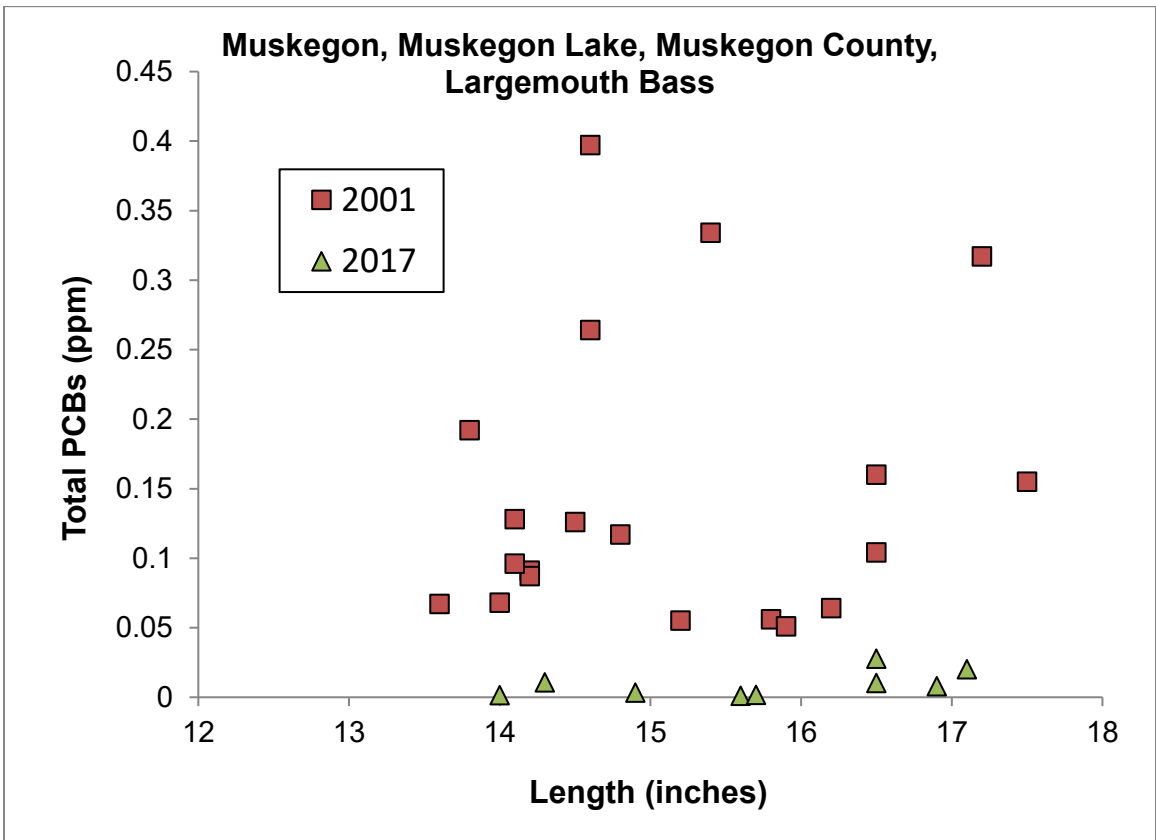
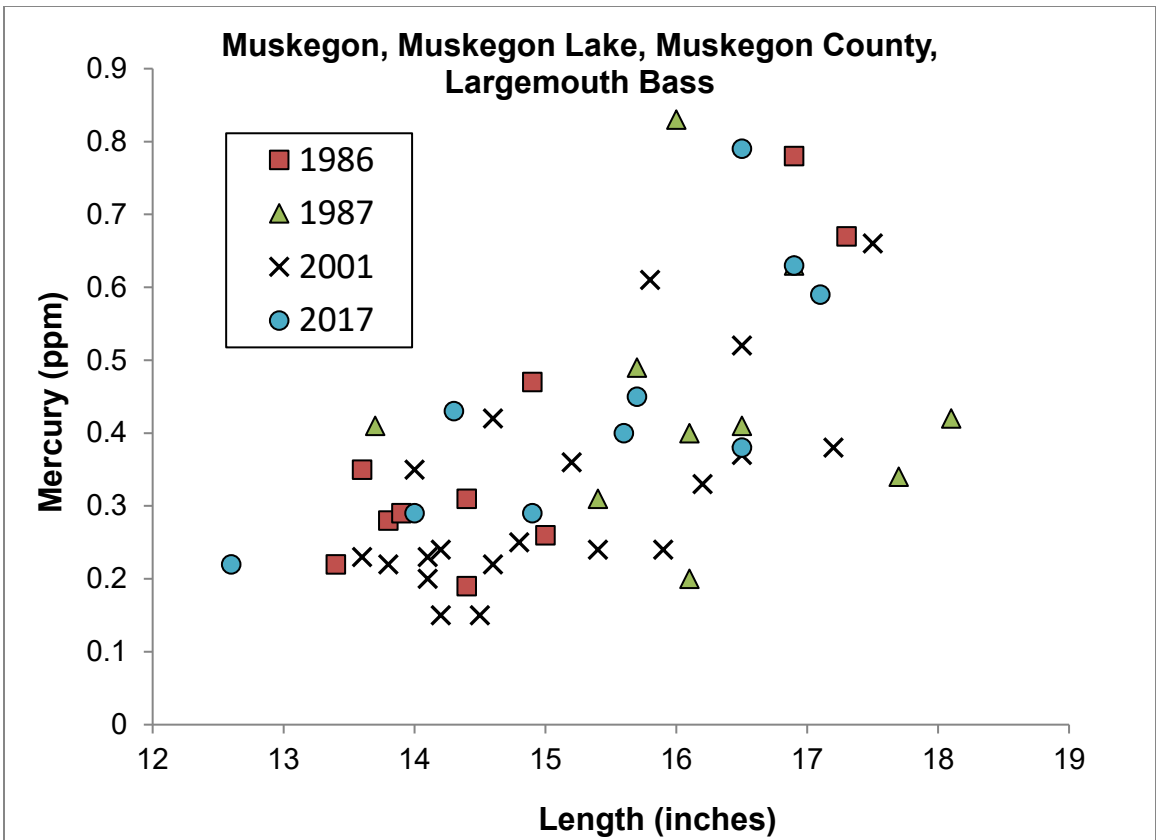
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1986	2017	50	12.6	14	13.6	18.1
Datasets available: 1986, 1987, 2001, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	48	0.39	0.15	0.83	0.44	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.381	0.398				

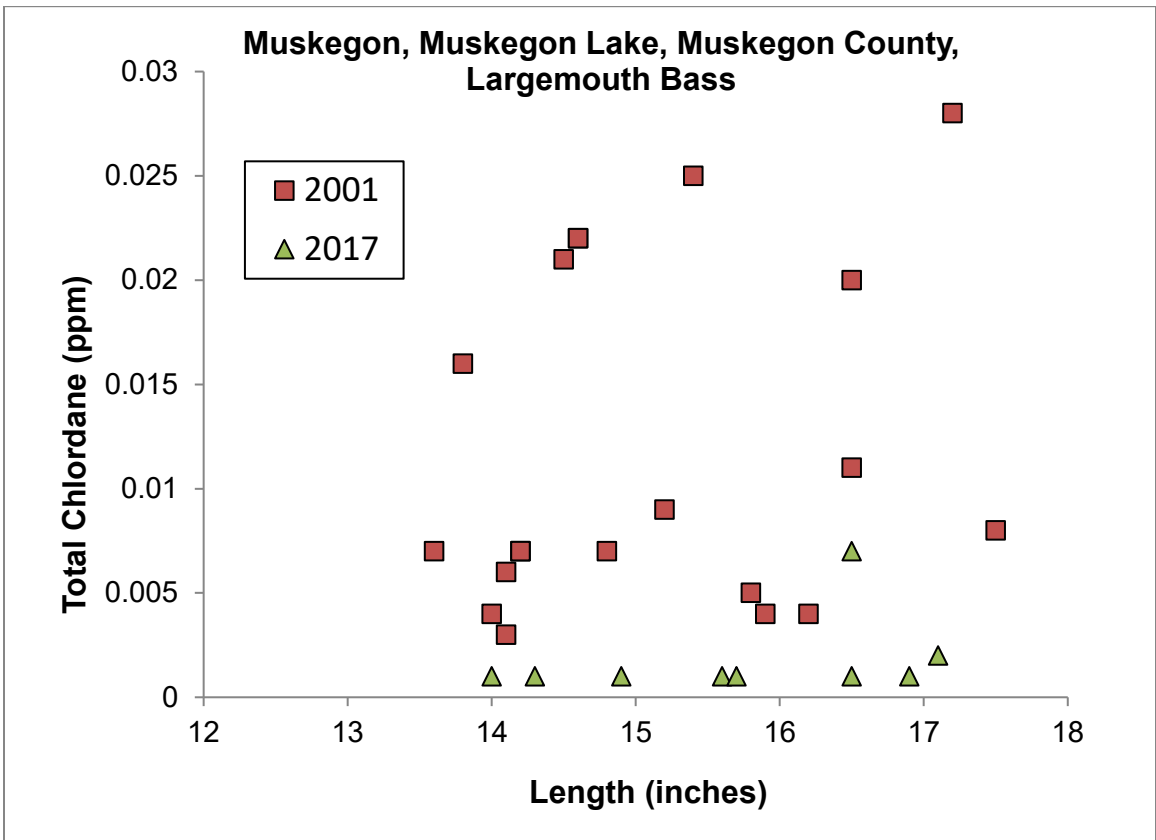
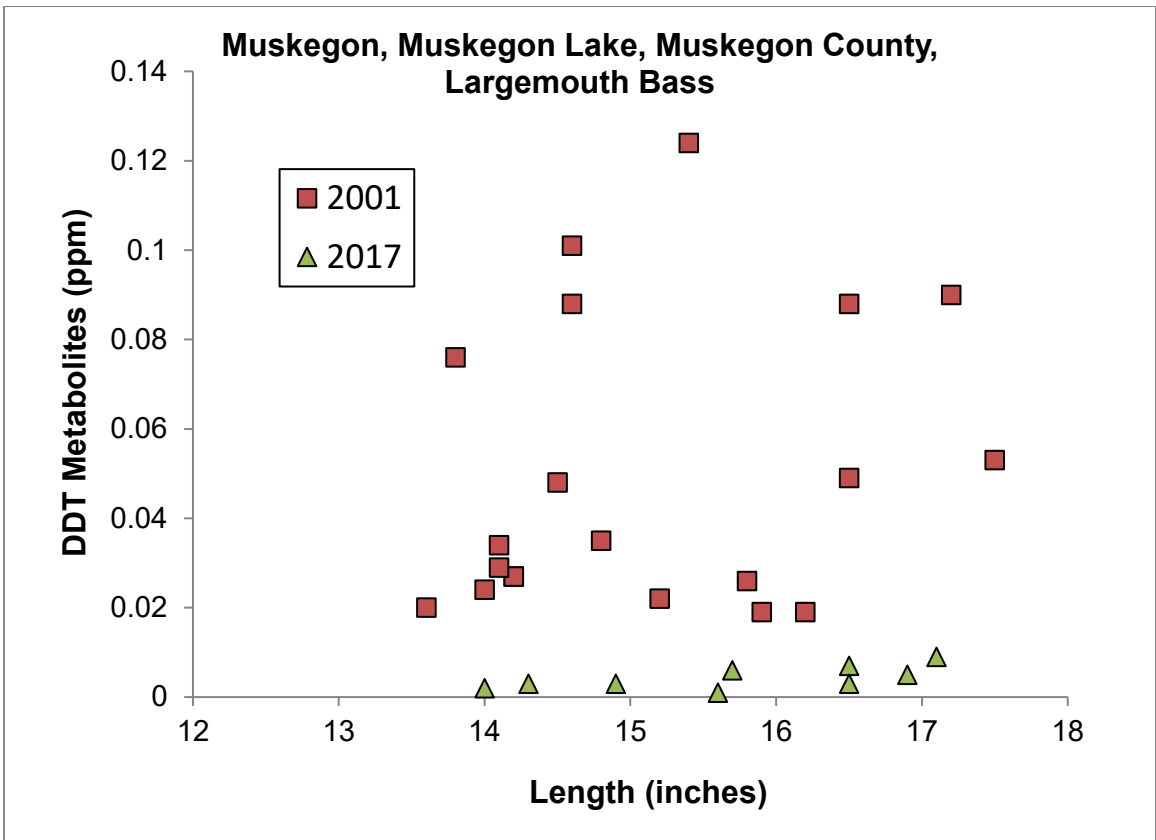
Organics Analysis:

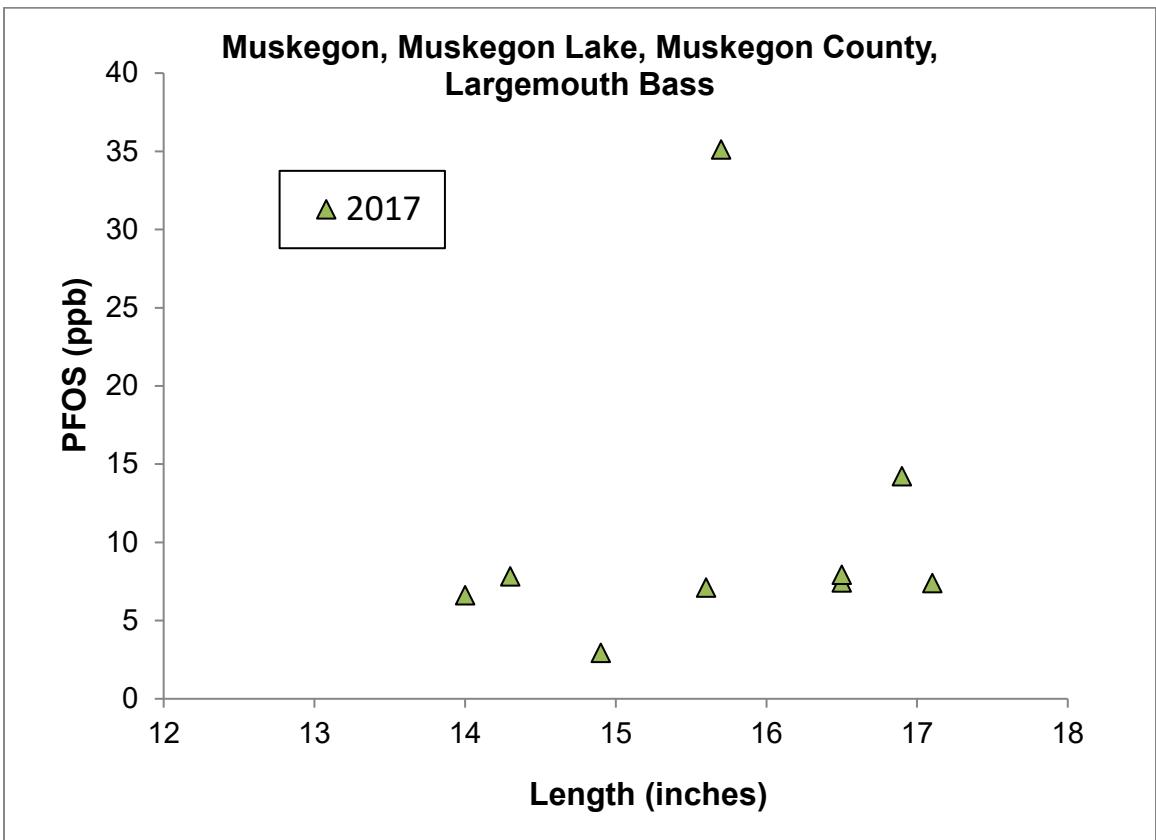
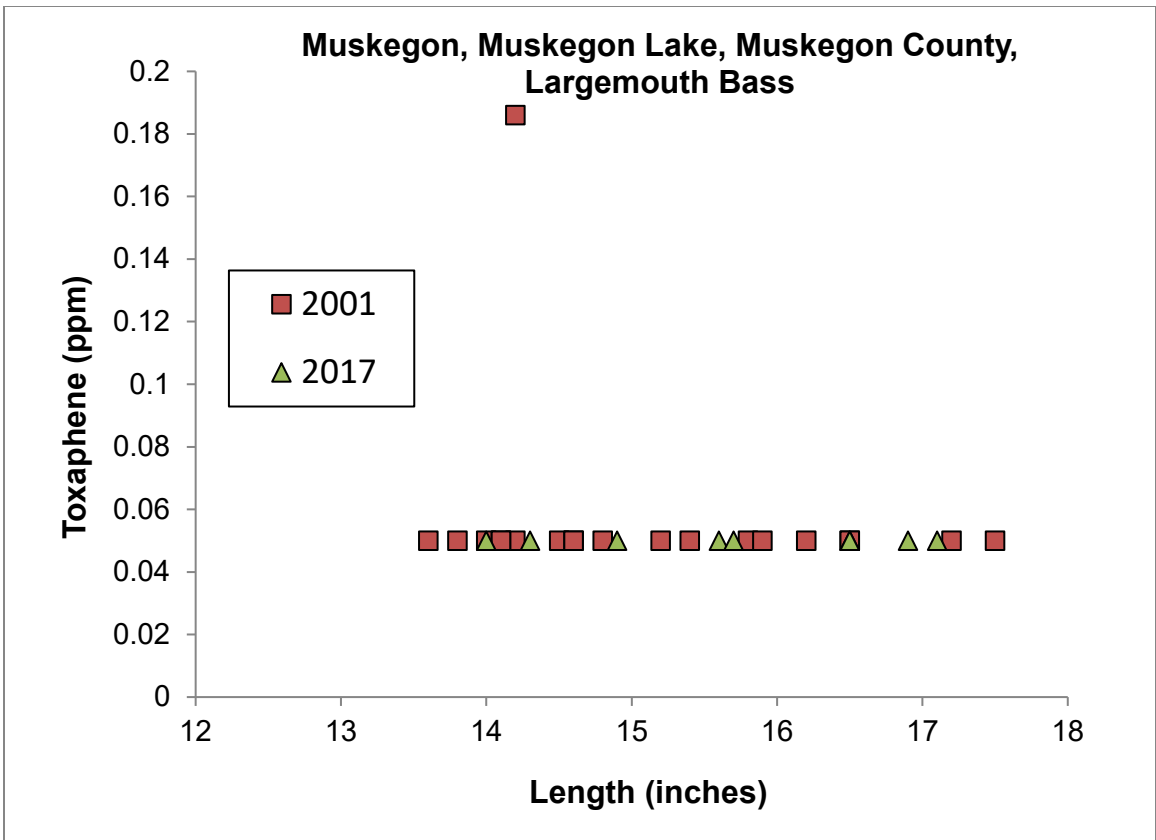
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2017	29	13.6	14	13.6	17.5
Datasets available: 1986, 1987, 2001, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	29	0.10	< 0.001	0.4	0.14	1
DDT	29	0.04	< 0.001	0.12	0.05	16
Chlordane	29	0.01	< 0.001	0.03	0.01	--
Toxaphene	29	0.05	< 0.05	0.19	0.06	4
PFOS	9	11 ppb	3 ppb	35 ppb	18 ppb	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.002	0.004				
DDT	0.000	0.002				
Chlordane	0.001	0.002				
Toxaphene	0.034	0.034				
PFOS	0.020	0.077				
Final meal category based on UCL:						1

Existing MDHHS Advisory: No one should eat more than 6 meals per year of largemouth or smallmouth bass from Muskegon or Bear Lakes due to PCBs. Mercury and DDT would cause advisories.

Recommendation: No change to the advisory is recommended. Additional samples may indicate that the advice due to PCBs can be relaxed. Toxaphene and PFOS should be added to the list of compounds causing an advisory.







Rock Bass

Bear and Muskegon Lakes

Muskegon County

Hg Analysis:

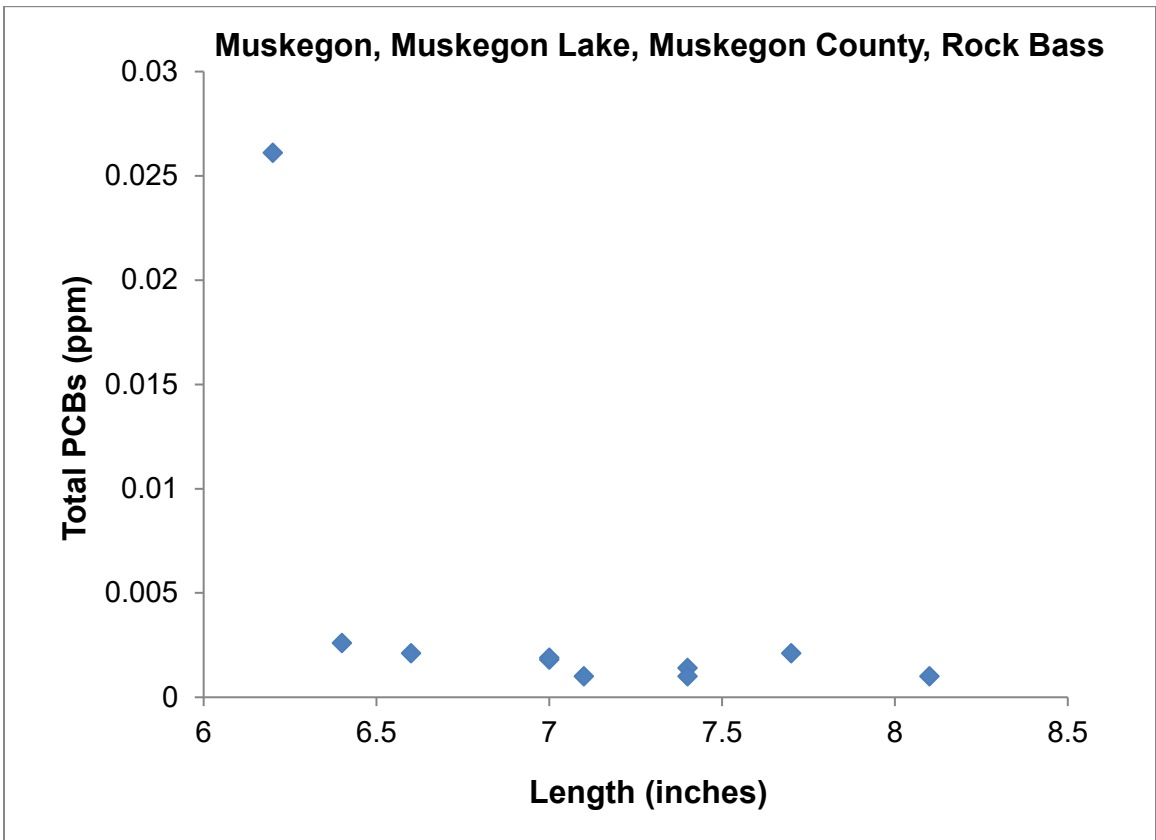
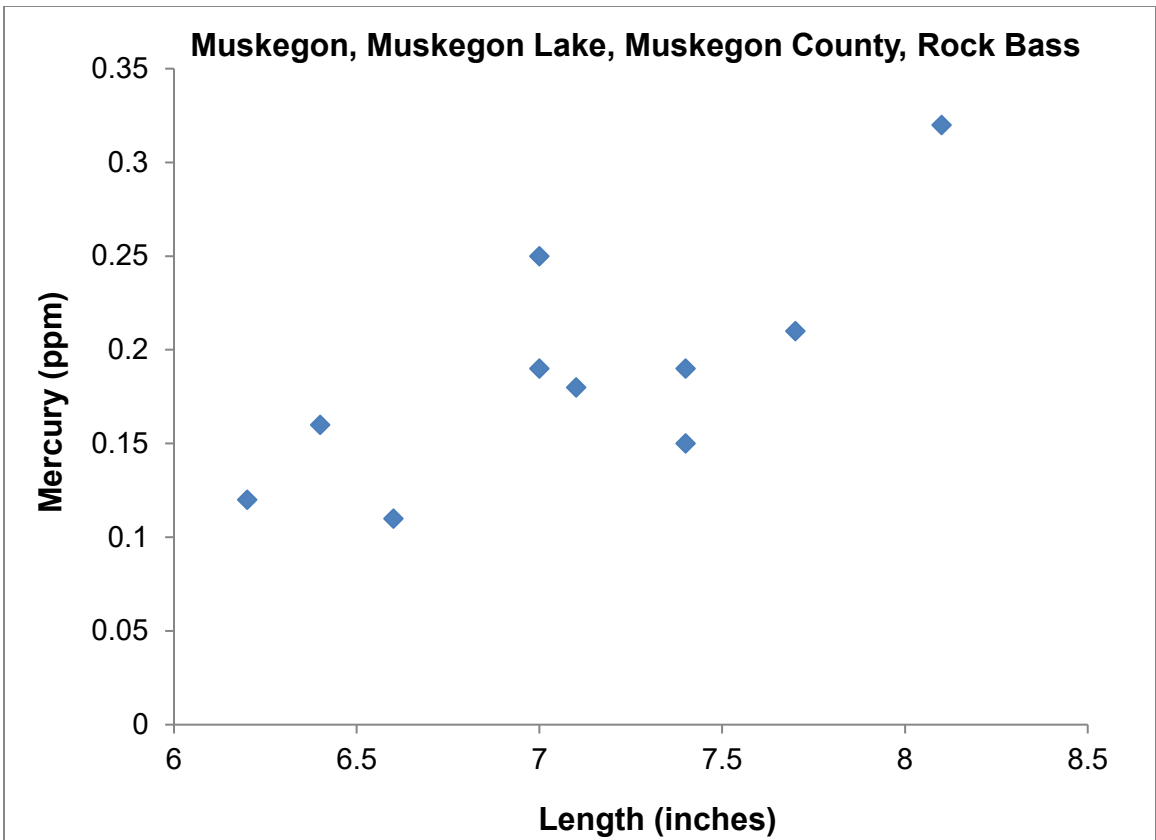
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	6.2	na	6.2	8.1
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.19	0.11	0.32	0.23	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.568	0.575				

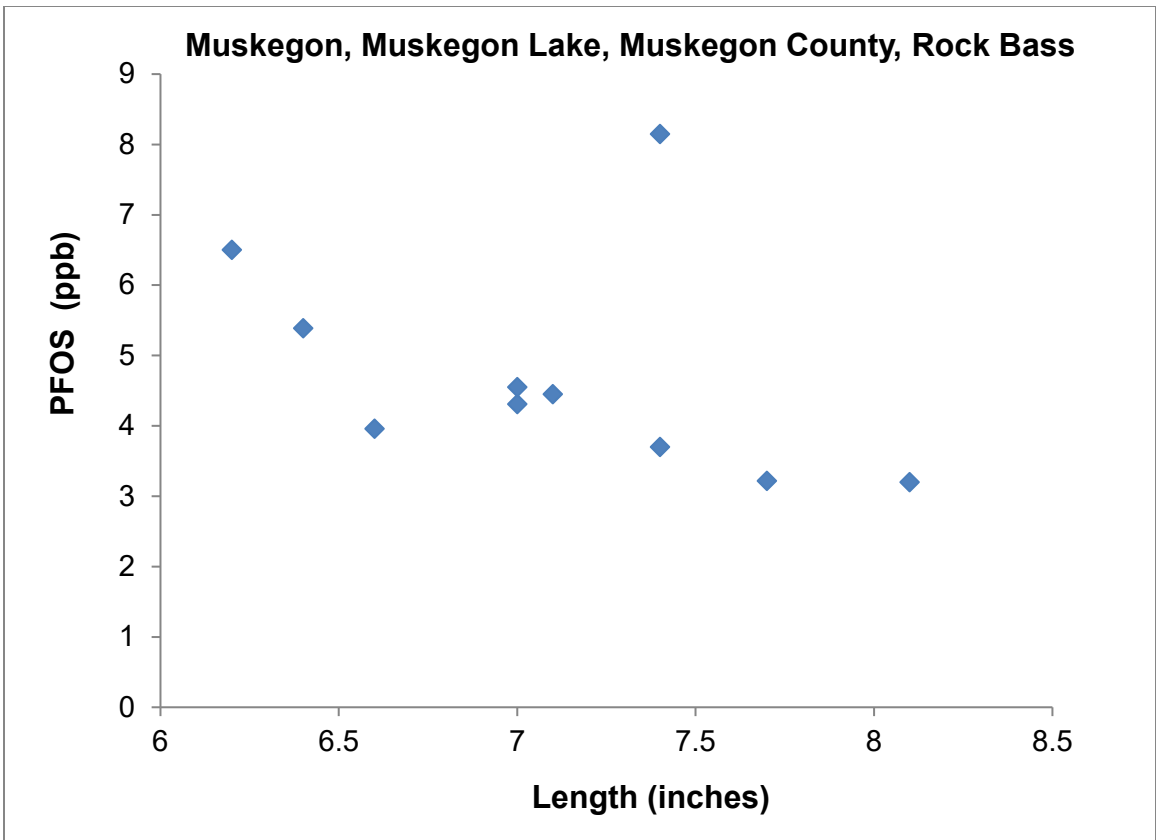
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	6.2	na	6.2	8.1
Datasets available: 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.004	< 0.001	0.03	0.01	16
DDT	10	0.001	< 0.001	0.001	0.001	16
Chlordane	10	0.001	< 0.001	0.001	0.001	--
Toxaphene	10	ND	< 0.05	< 0.05	--	--
PFOS	10	5 ppb	3 ppb	8 ppb	6 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.324	0.472				
DDT	0.000	--				
Chlordane	0.000	--				
Toxaphene	0.000	--				
PFOS	0.163	0.263				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Muskegon Lake rock bass are covered by the statewide advisory due to mercury: No one should eat more than 4 meals per month of rock bass of any size.

Recommendation: No one should eat more than 4 meals per month of Bear and Muskegon Lake rock bass due to mercury.





Northern Pike Bear and Muskegon Lakes Muskegon County
Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1986	2006	31	22	24	23.6	35.8
Datasets available: 1986, 1993, 2006						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	21	0.26	0.12	0.64	0.32	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.005	0.023				

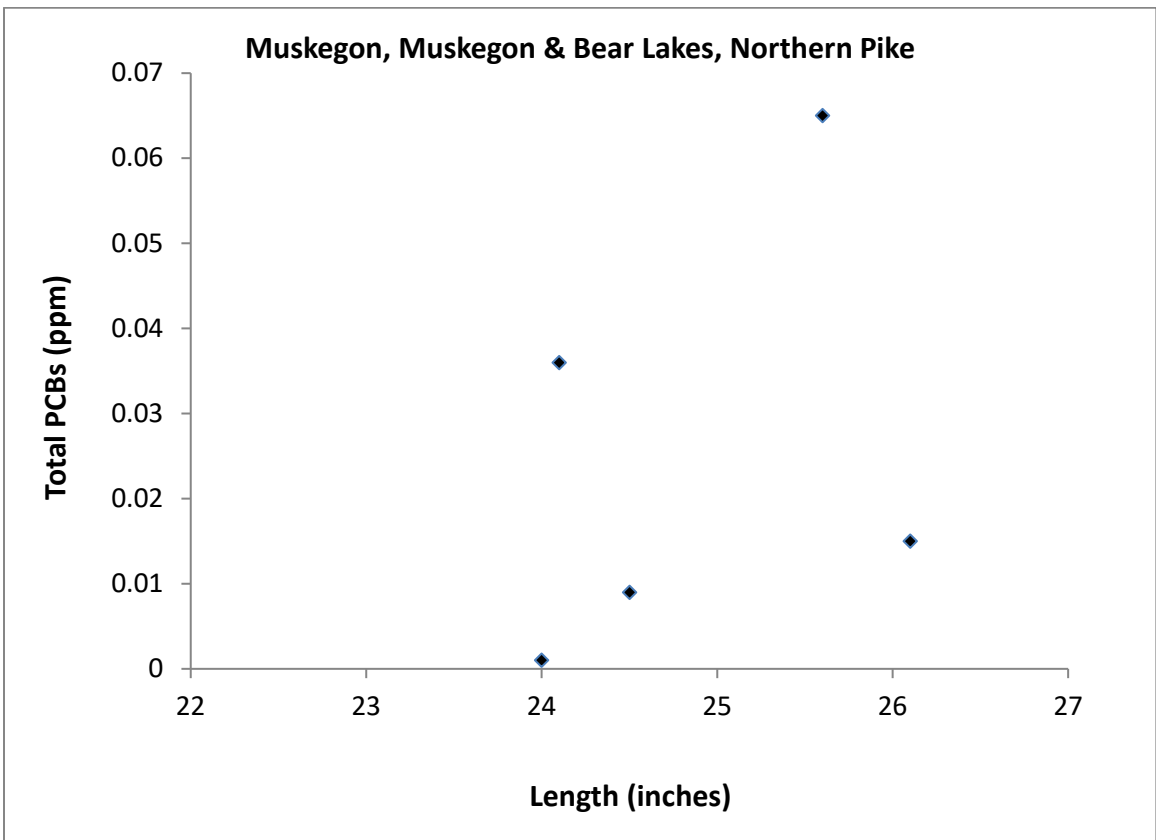
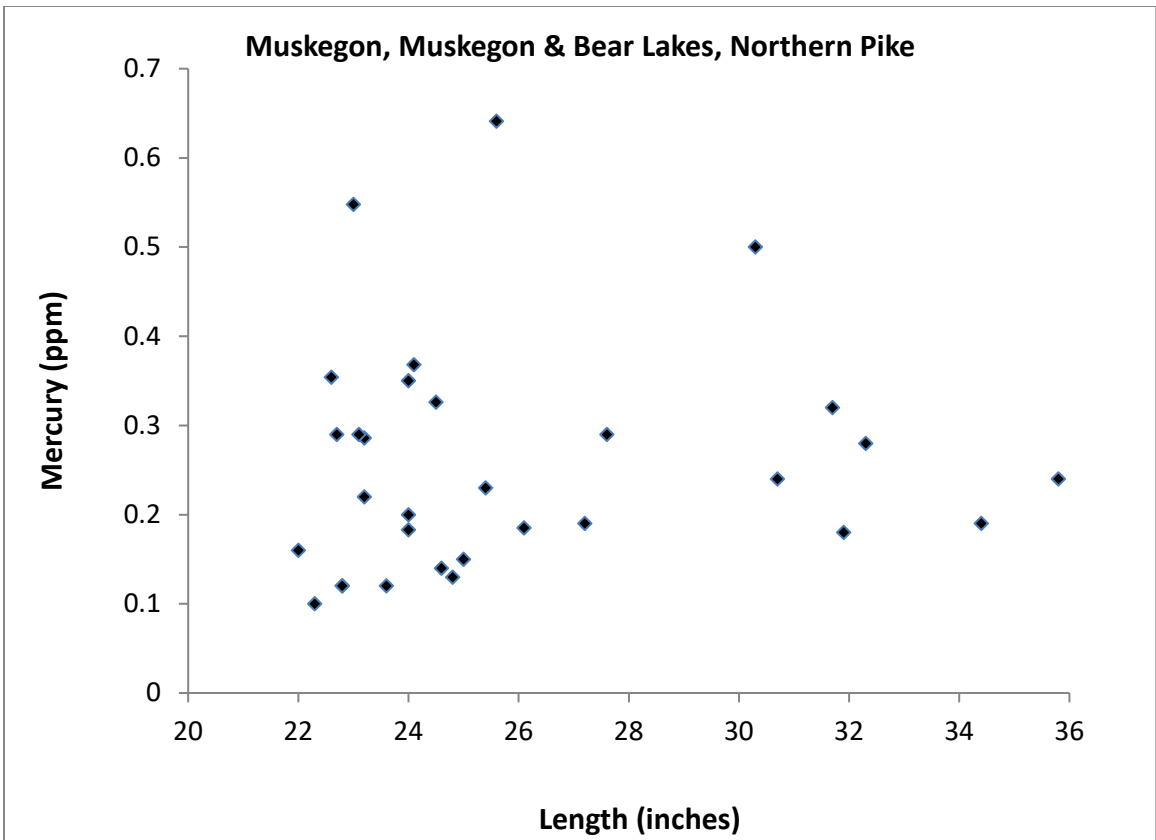
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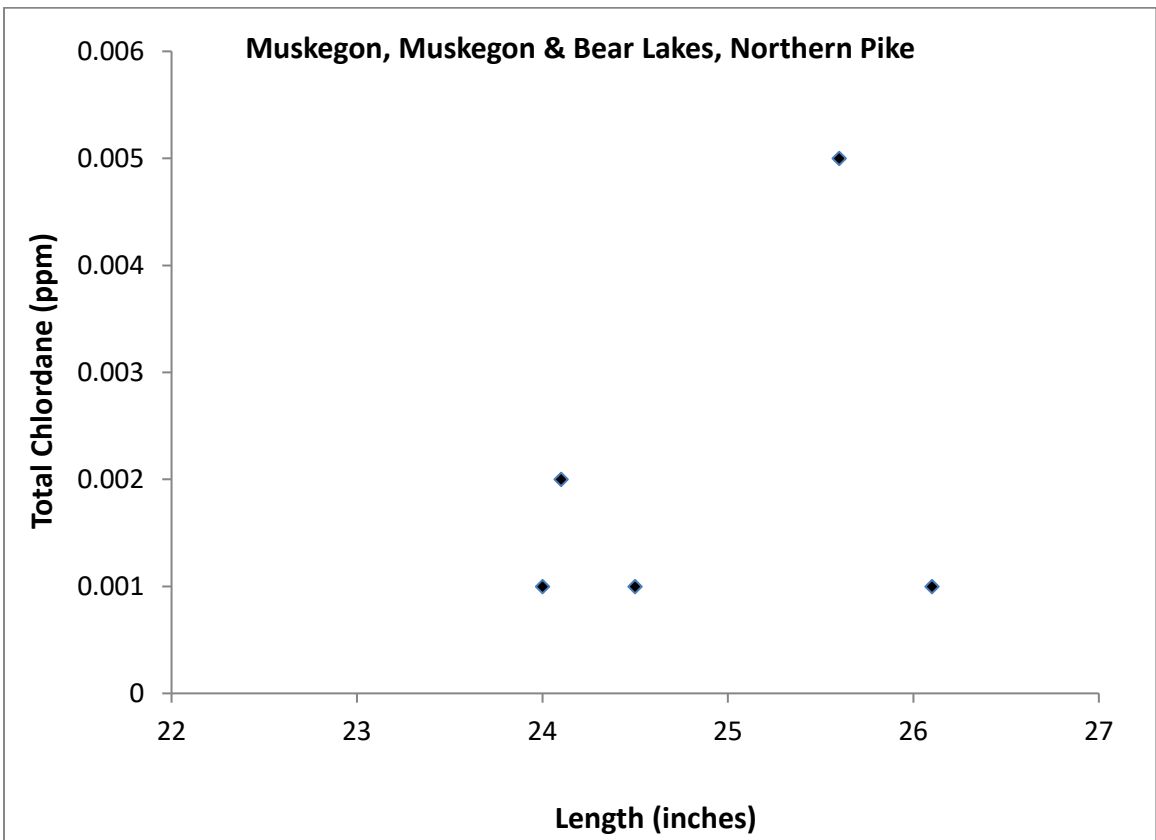
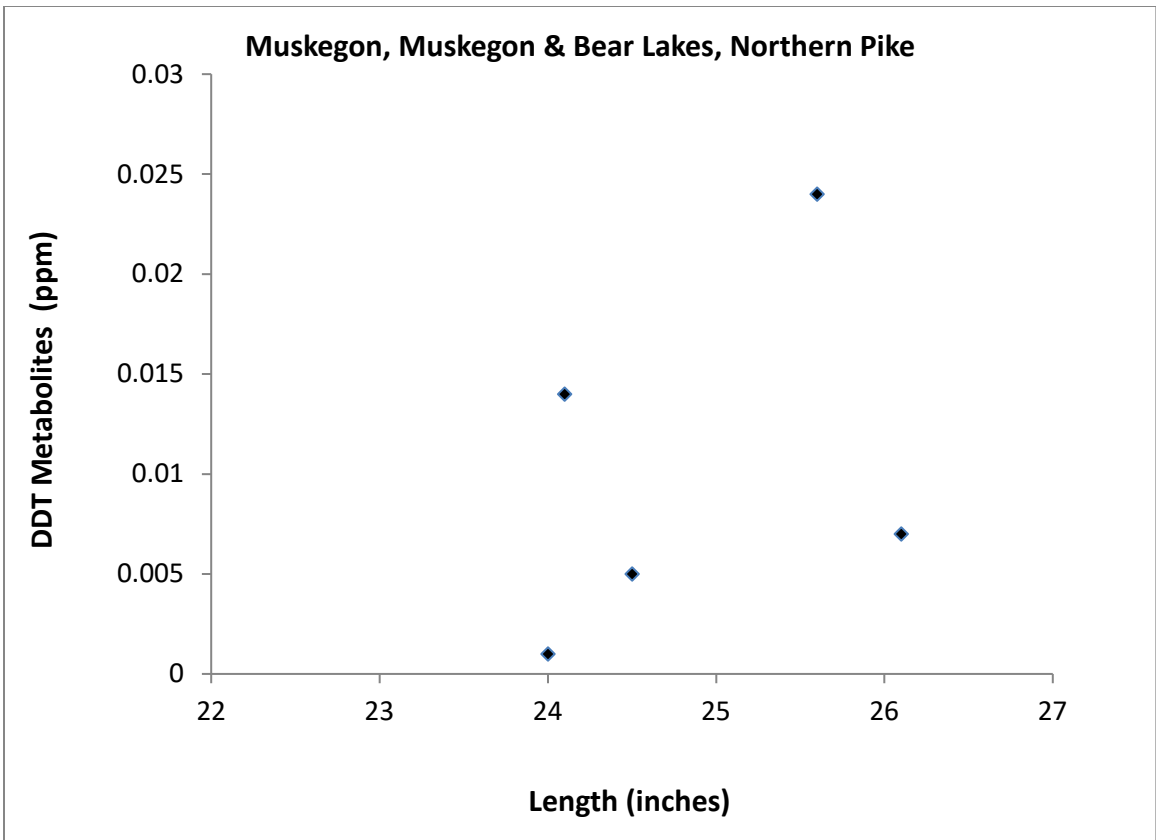
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2006	2006	10	22.6	24	24.0	26.1
Datasets available: 1986, 1993, 2006						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.025	0.001	0.065	0.060	2
DDT	5	0.010	0.001	0.024	0.020	16
Chlordane	5	0.002	0.001	0.005	0.004	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.005	0.000				
DDT	0.008	0.001				
Chlordane	0.000	0.000				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Women and children should not eat more than 1 meal per week of Bear and Muskegon Lake northern pike smaller than 26 inches or more than 1 meal per month of those fish larger than 26 inches due to PCBs.

Recommendation: No one should eat more than 2 meals per month of Bear and Muskegon Lake northern pike due to mercury and PCBs.

Note: GVSU PCB data was available for multiple species (carp, largemouth bass, northern pike, and walleye), however has not been validated by the MDHHS Analytical Chemistry Laboratory. The inclusion of the GVSU data would not have changed any of the recommended guidelines except for carp. Inclusion of the GVSU data would have changed the recommended guideline from Do Not Eat to Limited.





Walleye
Hg Analysis:

Bear and Muskegon Lakes

Muskegon County

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1986	2008	51	15	15	15	26.4	
Datasets available: 1986, 1987, 1993, 2002, 2008							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	51	0.37		0.05	0.97	0.44	2
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.653	0.707					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2002	2008	17	15	15	15	24.2	
Datasets available: 1986, 1987, 1993, 2002, 2008							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	17	0.183		0.001	0.71	0.300	0.5
DDT	17	0.084		0.001	0.34	0.140	12
Chlordane	17	0.016		0.001	0.05	0.030	--
Toxaphene	17	0.073		0.05	0.18	0.090	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.453	0.643					
DDT	0.400	0.620					
Chlordane	0.485	0.614					
Toxaphene	0.260	0.288					
Final meal category based on UCL:							0.5

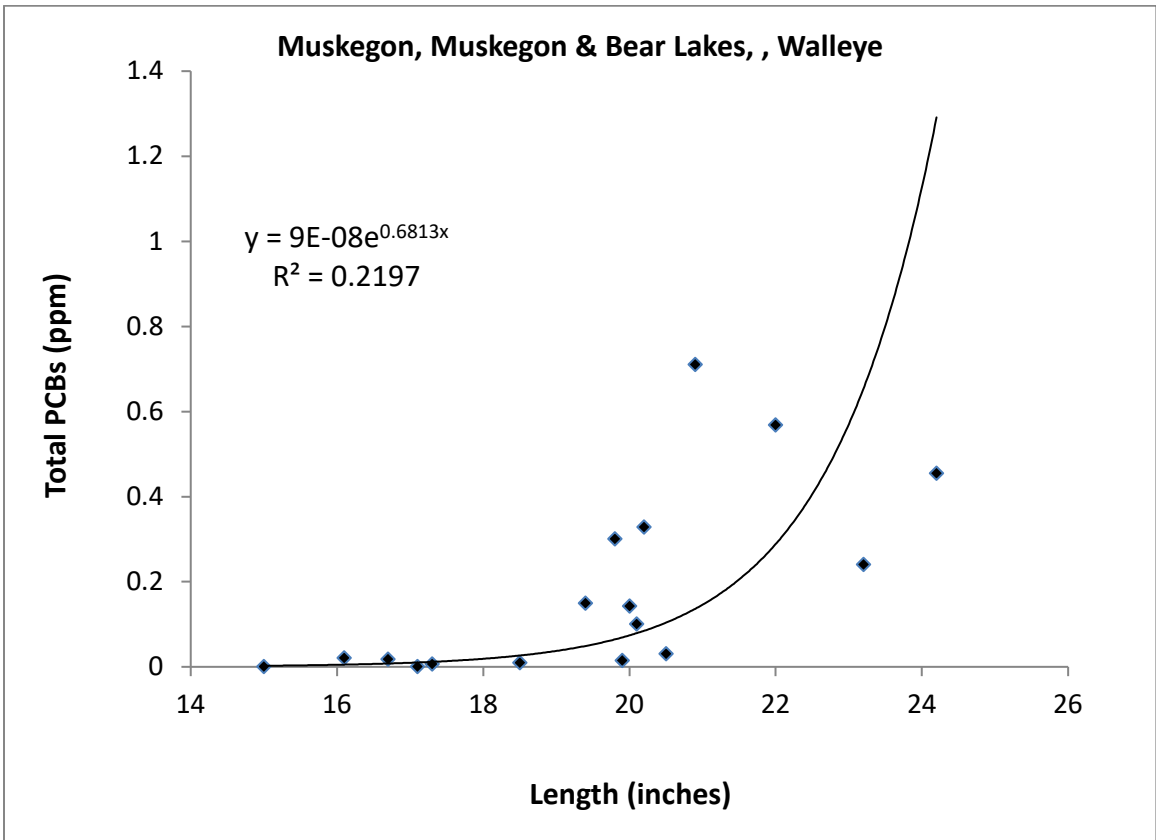
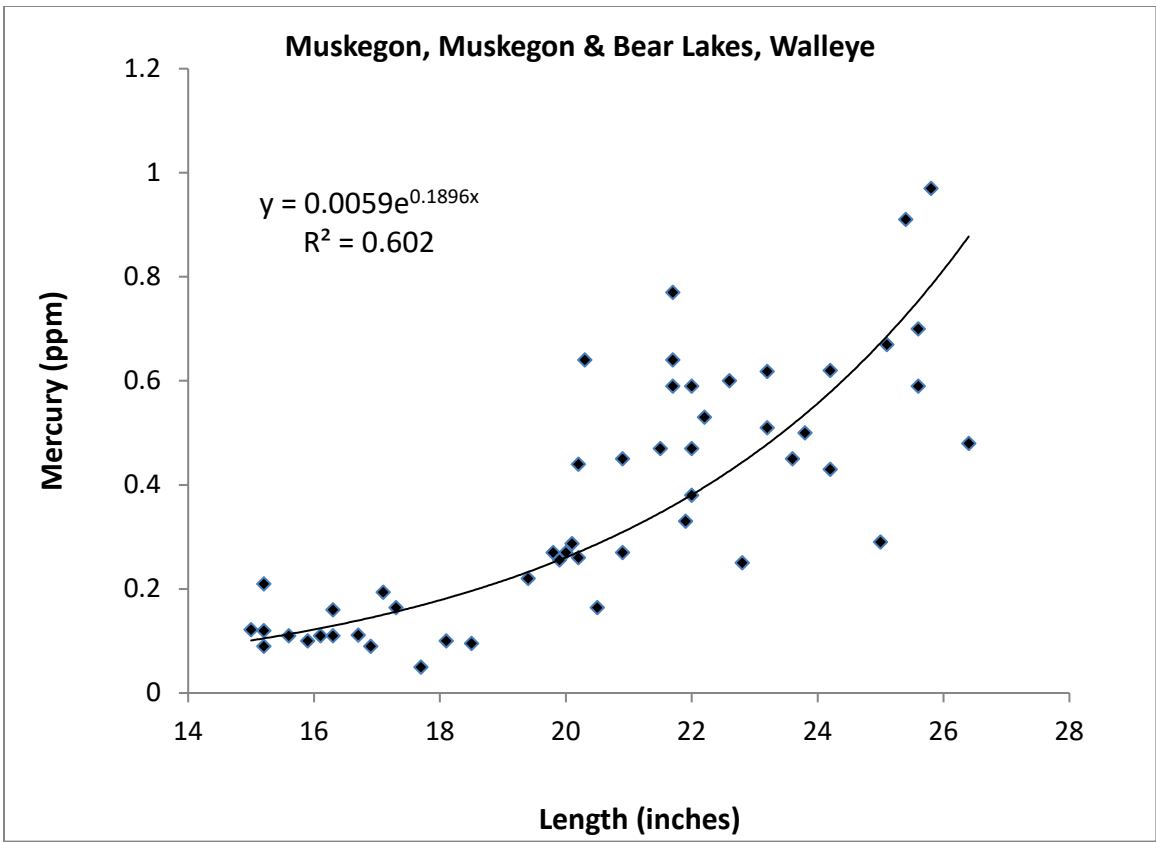
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category	PCB Regression Equation Estimate (ppm)	Meal Category
14	0.08	12	0.001	16
16	0.12	8	0.005	16
18	0.18	4	0.019	12
20	0.26	4	0.07	2
22	0.38	2	0.29	0.5
24	0.56	1	1.14	Limited
26	0.82	1	4.4	0
28	1.19	0.5	17.3	0
30	1.74	0.5	67.7	0

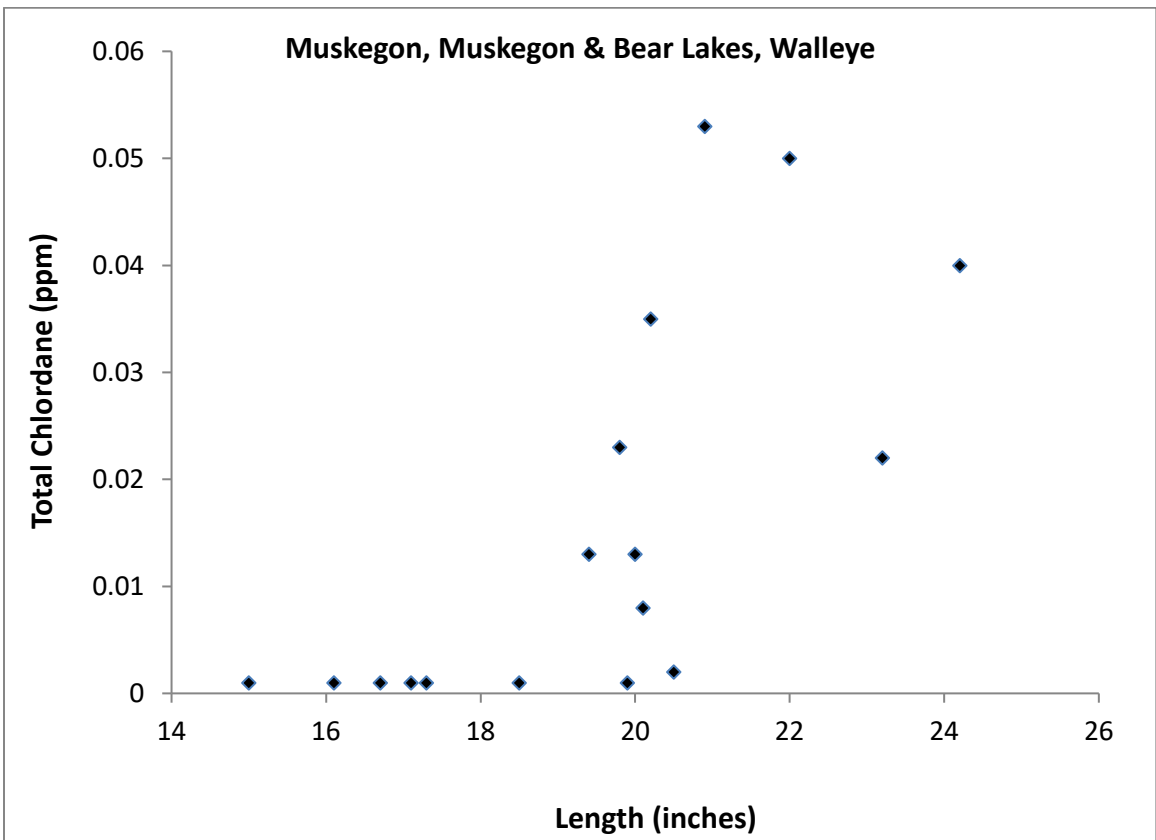
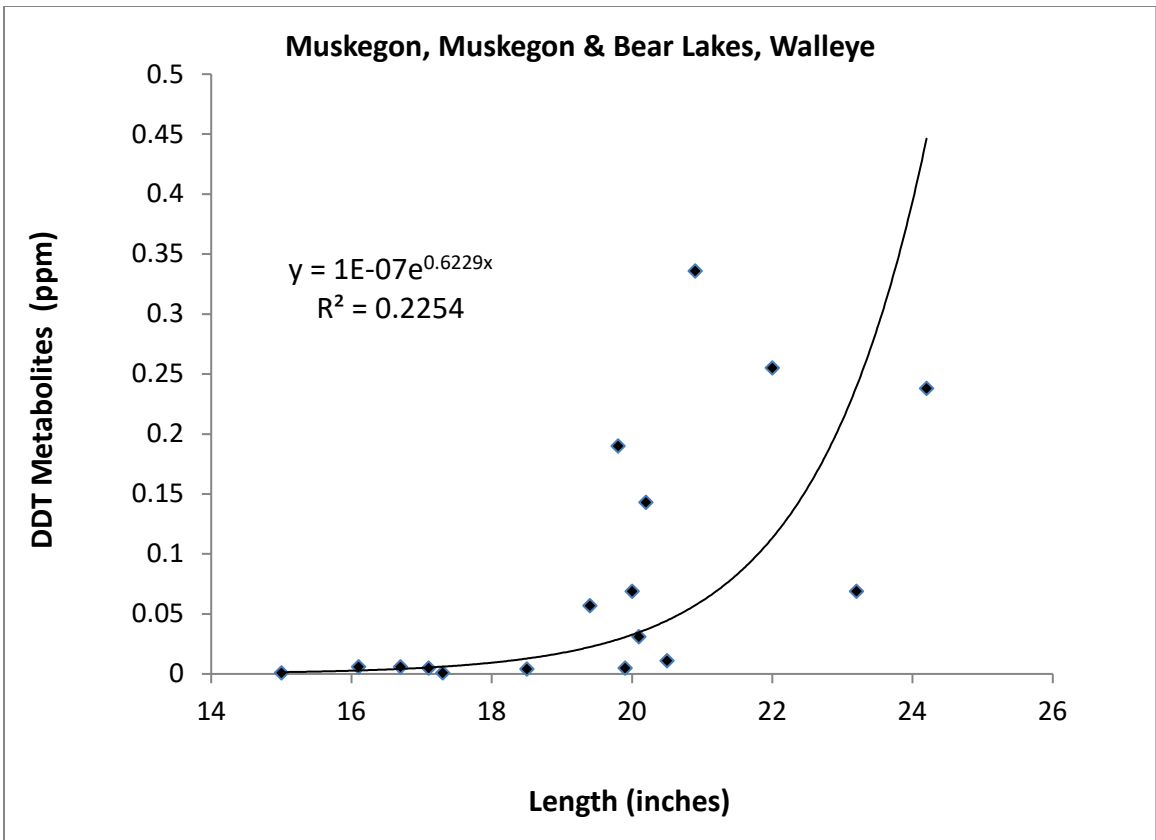
Shaded area denotes extrapolated estimates

Existing Advisory: Women and children should not eat more than 1 meal per month of Muskegon Lake walleye or Bear Lake walleye less than 22 inches or more than 6 meals per year of Bear Lake walleye larger than 22 inches due to mercury and PCBs.

Recommendation: Sensitive populations should not eat Bear and Muskegon Lake walleye over 22 inches due to PCBs. Healthy adults should eat no more than 1 or 2 meals per year of Bear and Muskegon Lake walleye over 22 inches due to PCBs. No one should eat more than 6 meals per year of Bear or Muskegon Lake walleye between 18 and 22 inches due to PCBs or more than 4 meals per month of walleye less than 18 inches due to mercury. Toxaphene and DDT would cause advisories.

Note: GVSU PCB data was available for multiple species (carp, largemouth bass, northern pike, and walleye), however has not been validated by the MDHHS Analytical Chemistry Laboratory. The inclusion of the GVSU data would not have changed any of the recommended guidelines except for carp. Inclusion of the GVSU data would have changed the recommended guideline from Do Not Eat to Limited.





Largemouth Bass

Big Blue Lake

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	10.2	14	13.6	19.7
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.56	0.42	0.72	0.66	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.870	0.871				

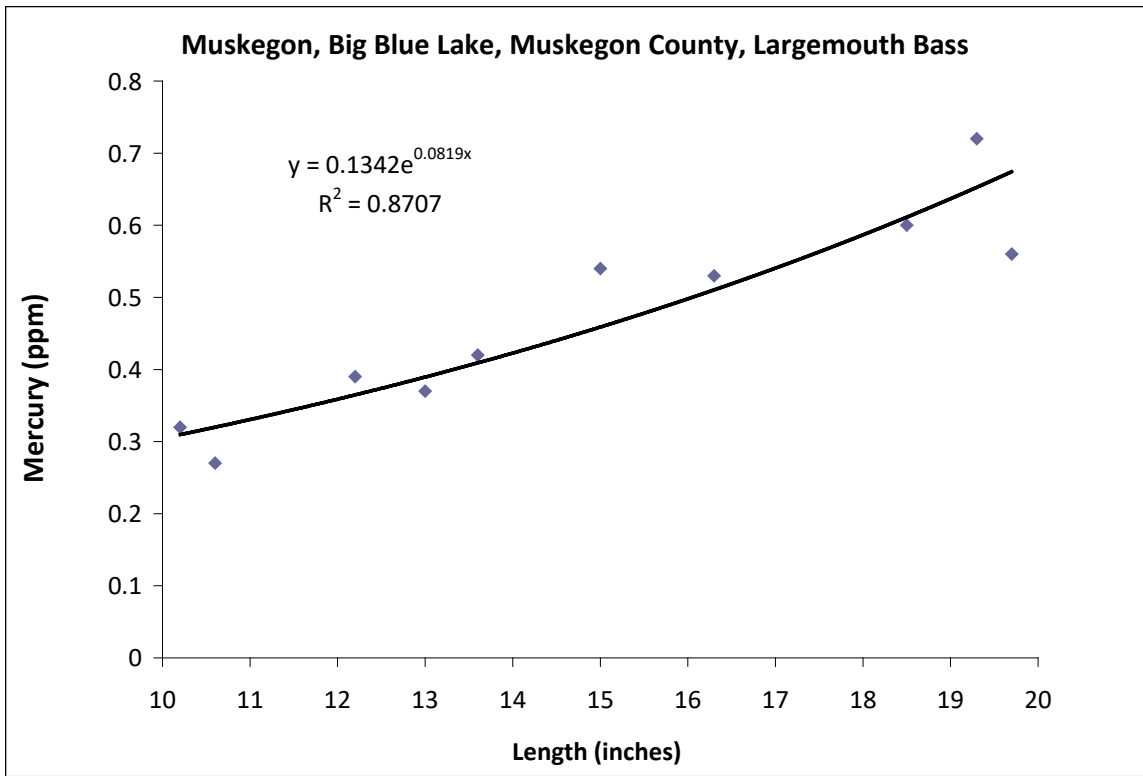
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Big Blue Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Big Blue Lake largemouth or smallmouth bass smaller than 16 inches or more than 1 meal per month of those fish larger than 16 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.42	2
15	0.46	2
16	0.50	2
17	0.54	1
18	0.59	1
19	0.64	1
20	0.69	1
21	0.75	1
22	0.81	1
<i>Shaded area denotes extrapolated estimates</i>		



Northern Pike

Big Blue Lake

Muskegon County

Hg Analysis:

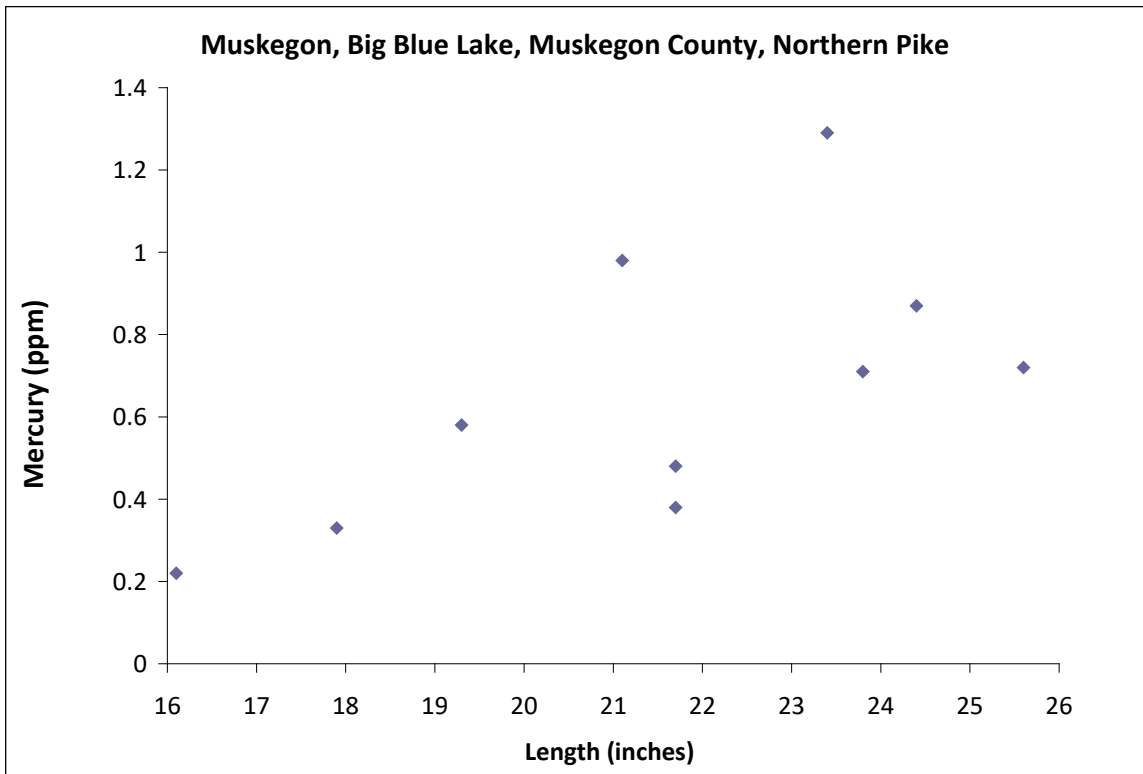
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	16.1	24	23.8	25.6
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.767	0.710	0.870	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.410	0.562				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Big Blue Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: The statewide advice due to mercury applies to Big Blue Lake northern pike: No one should eat more than 1 meal per month of northern pike larger than 30 inches or more than 2 meals per month of northern pike smaller than 30 inches in length.



Brown Trout**Black Creek
(at US-31)****Muskegon County****Hg Analysis:**

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1987	1987	3	7.7	10	7.7	9.4
Datasets available: 1987						
Chemical	Sample Size	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1987	1987	3	7.7	10	7.7	9.4
Datasets available: 1987						
Chemical	Sample Size	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	0.12	0.06	0.18	--	--
DDT	3	0.09	0.08	0.10	--	--
Chlordane	3	0.003	0.003	0.004	--	--
Toxaphene	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: There are no current consumption advisories for Black Creek brown trout.

Recommendation: There are insufficient data available to develop specific advice for Black Creek brown trout.

Carp

**Black Creek
(at US-31)**

Muskegon County

Hg Analysis:

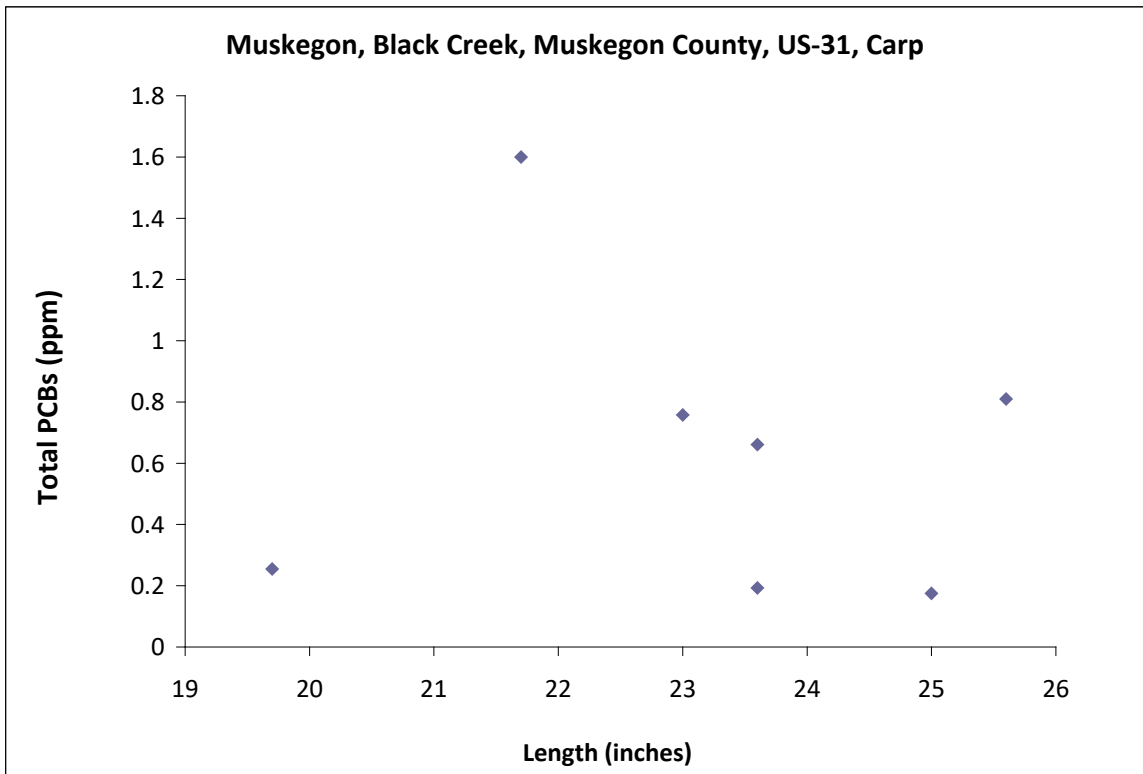
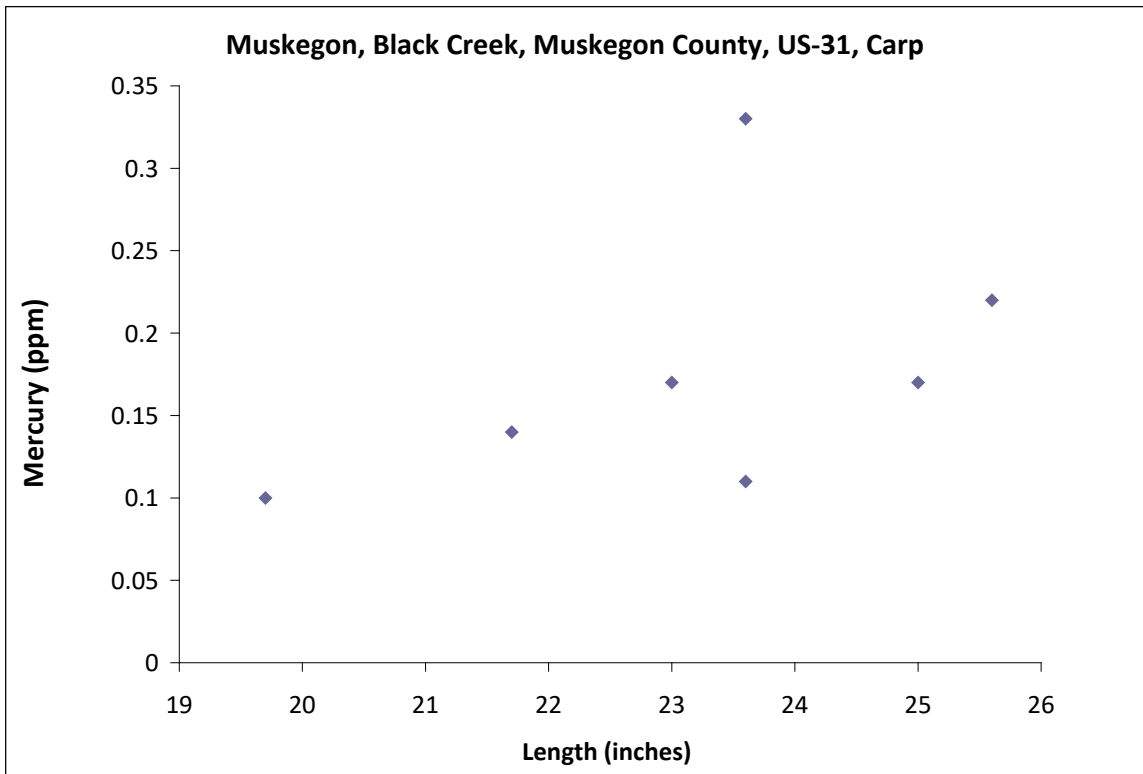
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	7	19.7	na	19.7	25.6
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.18	0.10	0.33	0.25	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.230	0.339				

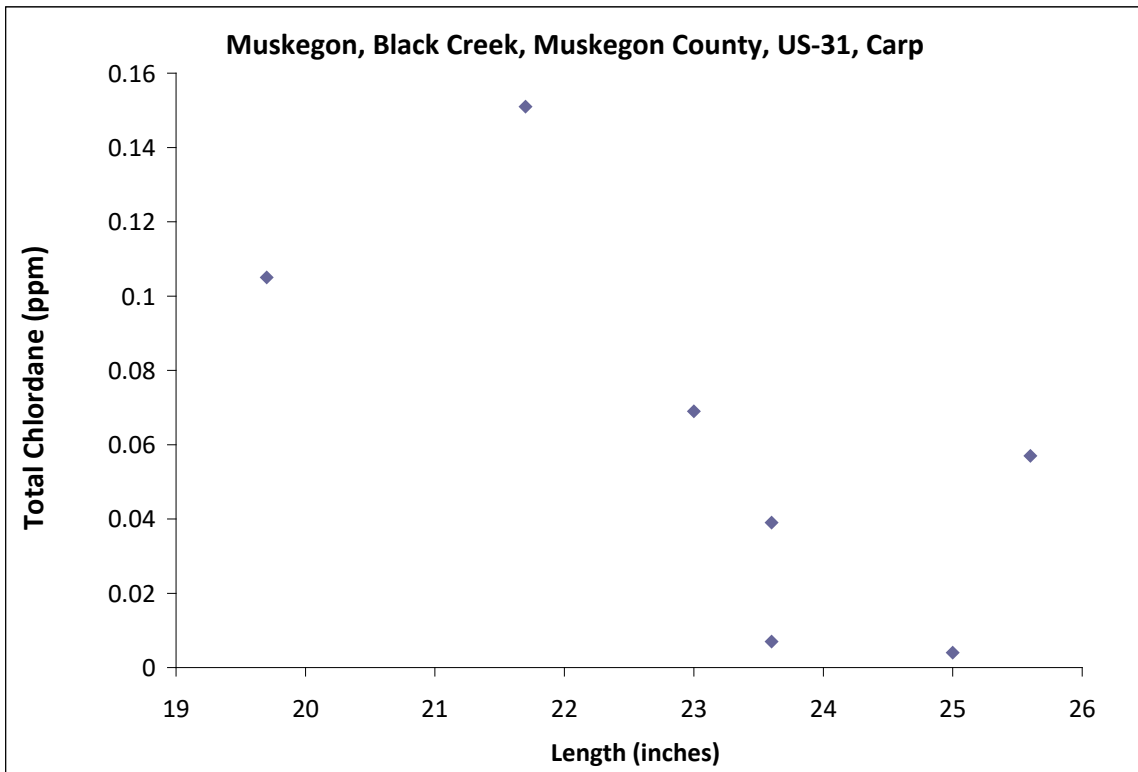
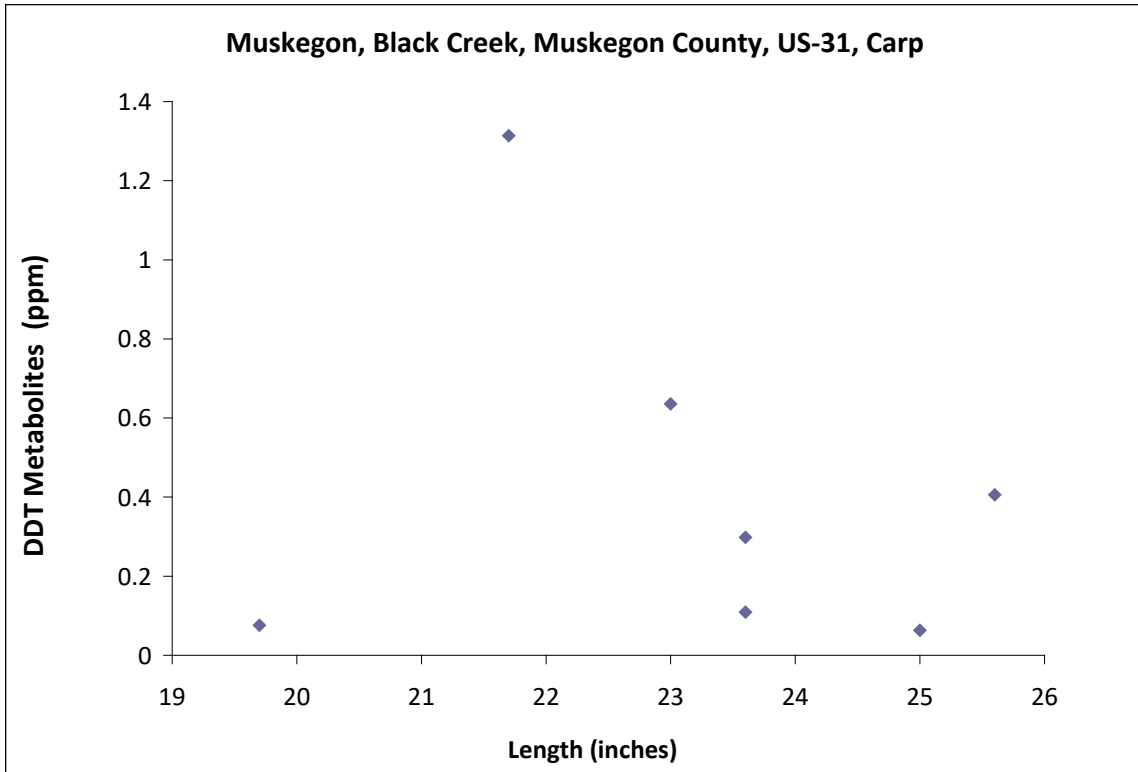
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	7	19.7	NA	19.7	25.6
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.64	0.18	1.60	1.10	Limited
DDT	7	0.42	0.06	1.31	0.83	0.5
Chlordane	7	0.06	0.004	0.15	0.11	--
Toxaphene	7	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.014	0.002				
DDT	0.037	0.000				
Chlordane	0.469	0.334				
Toxaphene	--	--				
Final meal category based on UCL:						Limited

Existing Advisory: Women and children should not eat more than one meal per month of Black Creek carp due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of Black Creek carp to no more than 1 or 2 meals per year due to PCBs. DDT and mercury would cause advisories.





White Sucker

**Black Creek
(at US-31)**

Muskegon County

Hg Analysis:

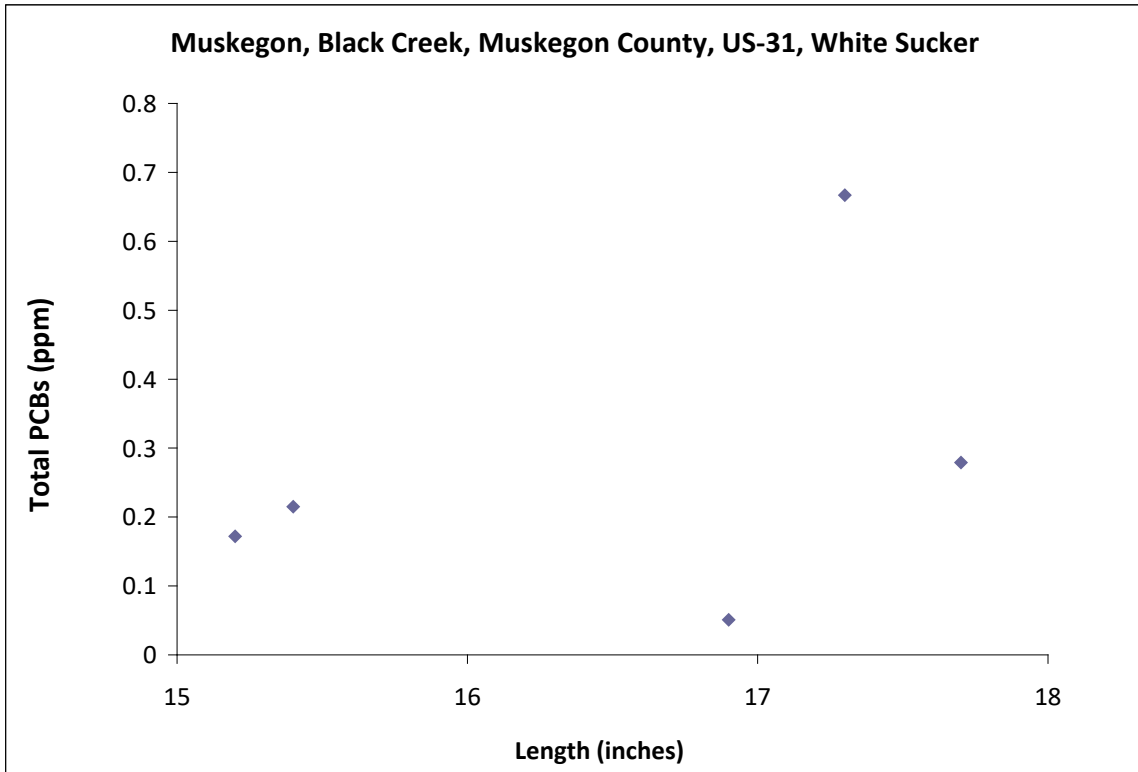
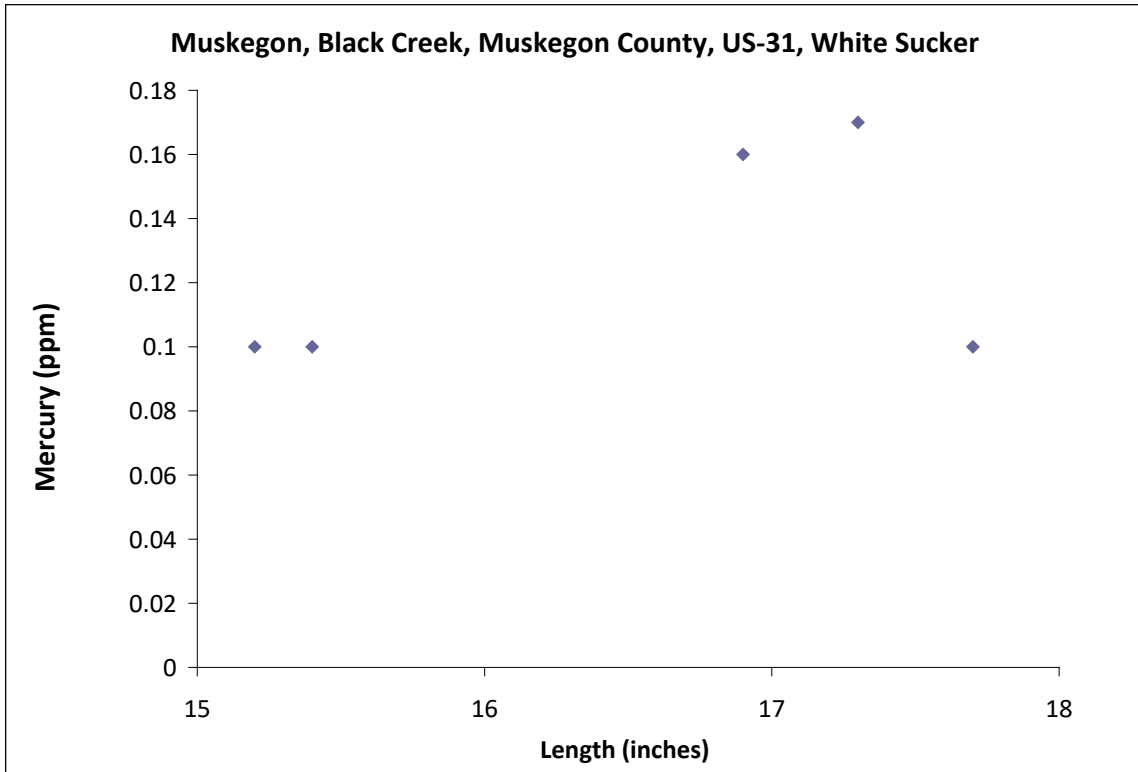
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	5	15.2	na	15.2	17.7
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.13	0.10	0.17	0.17	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.243	0.242				

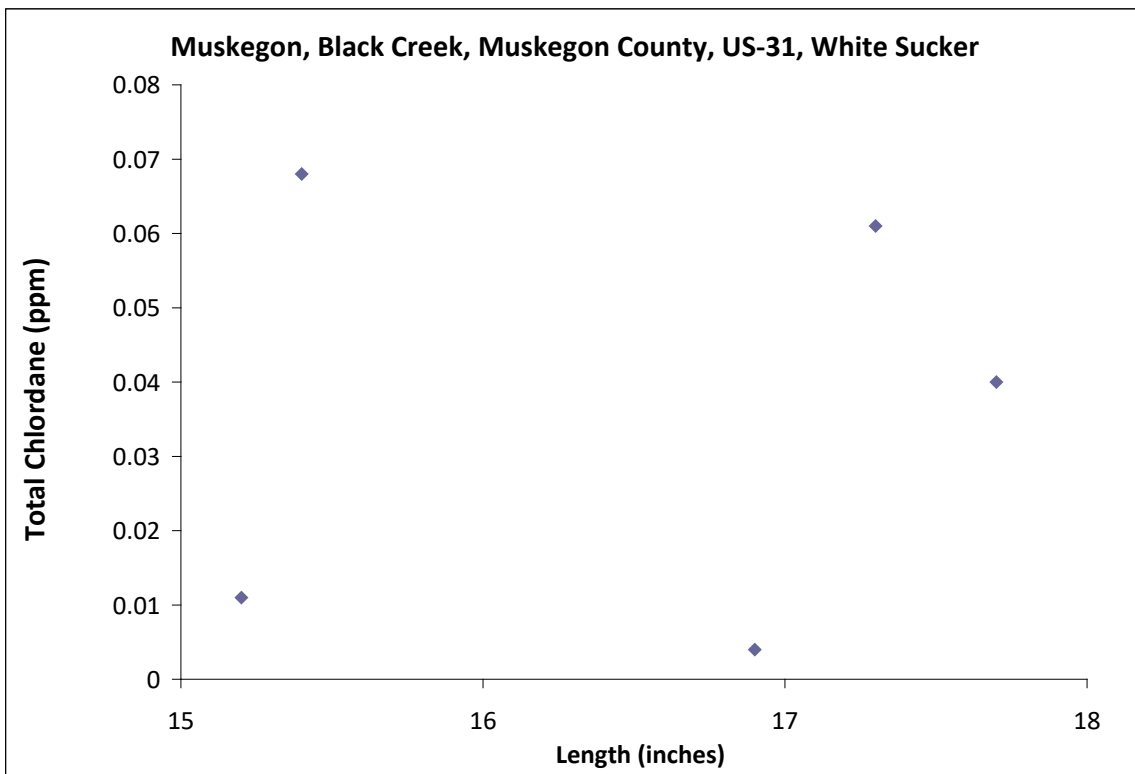
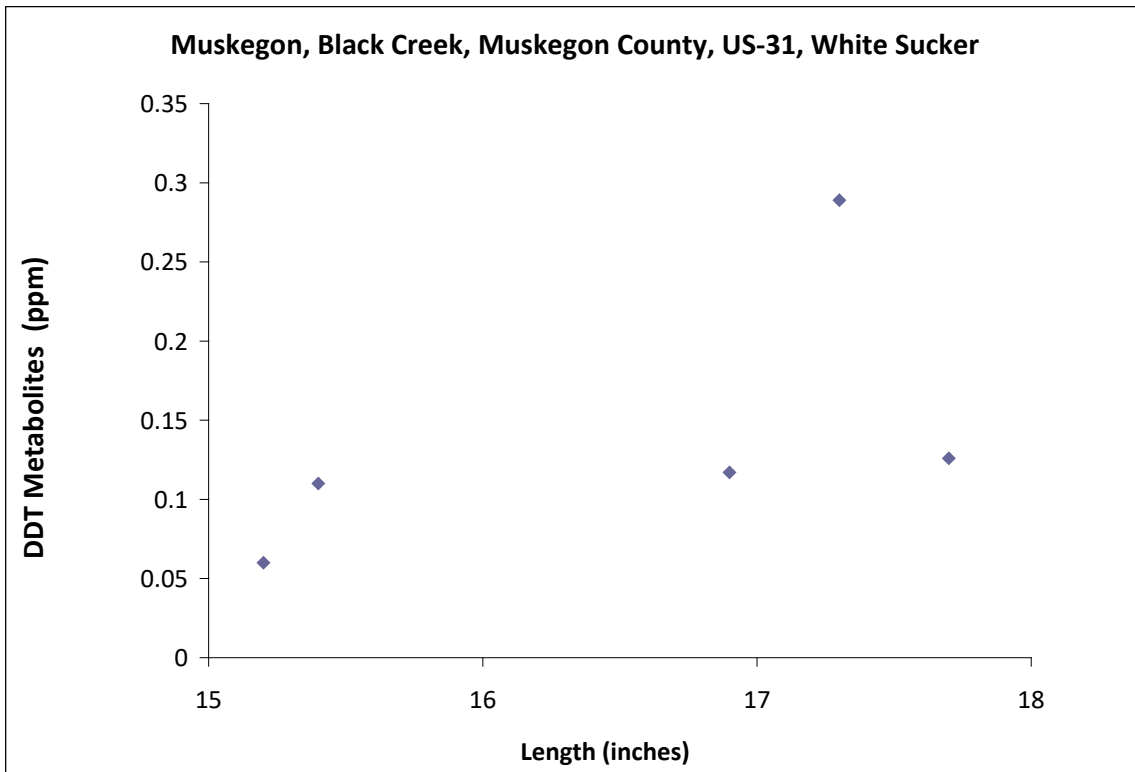
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1987	1987	5	15.2	NA	15.2	17.7
Datasets available: 1987						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.28	0.05	0.67	0.57	Limited*
DDT	5	0.14	0.06	0.29	0.25	1
Chlordane	5	0.04	0.004	0.07	0.07	--
Toxaphene	5	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.164	0.049				
DDT	0.341	0.472				
Chlordane	0.005	0.008				
Toxaphene	--	--				
Final meal category based on UCL:						0.5*

Existing Advisory: Women and children should not eat more than one meal per month of Black Creek white sucker due to PCBs.

Recommendation: No one should eat more than six meals per year of white sucker from Black Creek due to PCBs. *This dataset is limited by the age of the data. Based on EGLE’s Fish Contaminant Monitoring Program, PCB and DDT concentrations ≥15 years old are expected to have declined allowing one meal category less restrictive advice for PCBs.





Carp

Mona Lake

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1987	2002	30	18.1	na	18.1	32.1	
Datasets available: 1987, 2000, 2002							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	30	0.14		0.07	0.40	0.17	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.255	0.272					

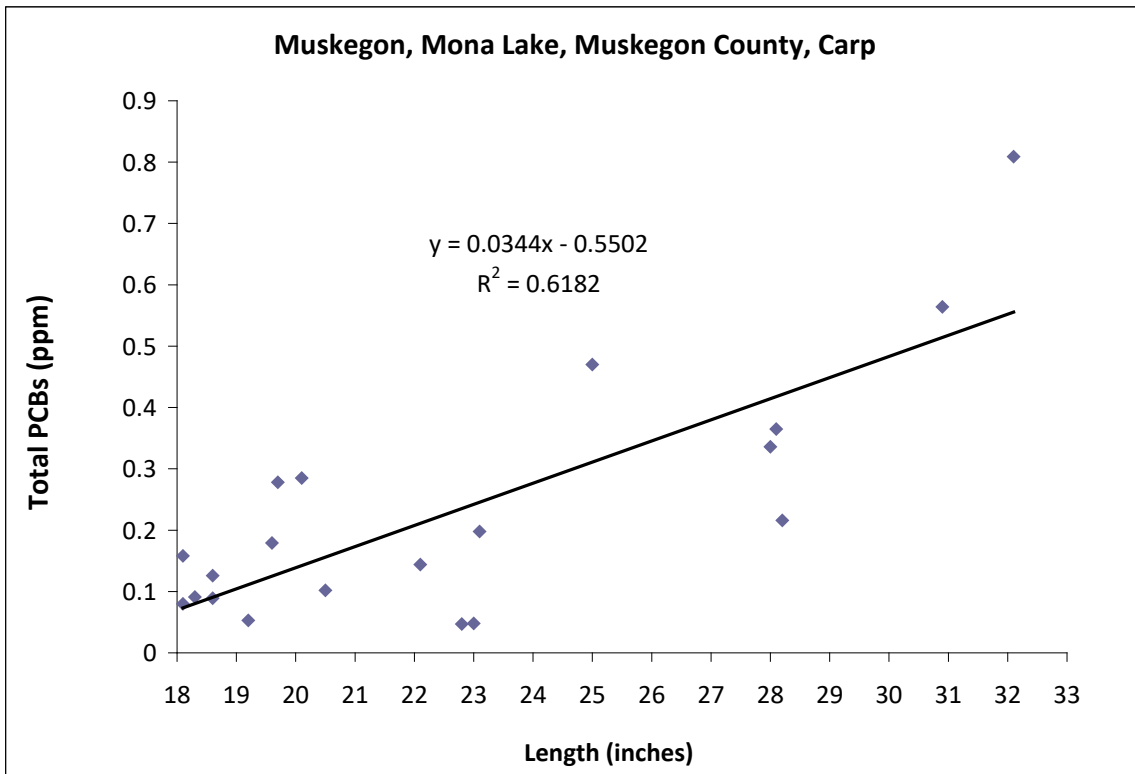
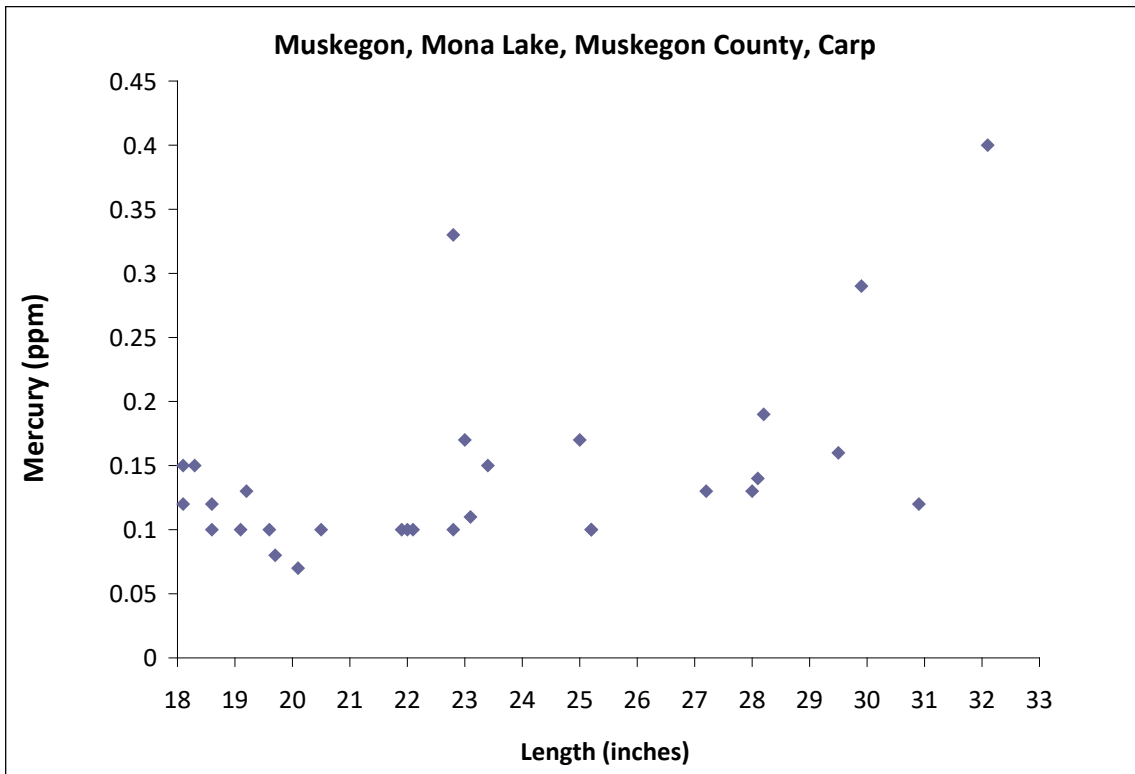
Organics Analysis:

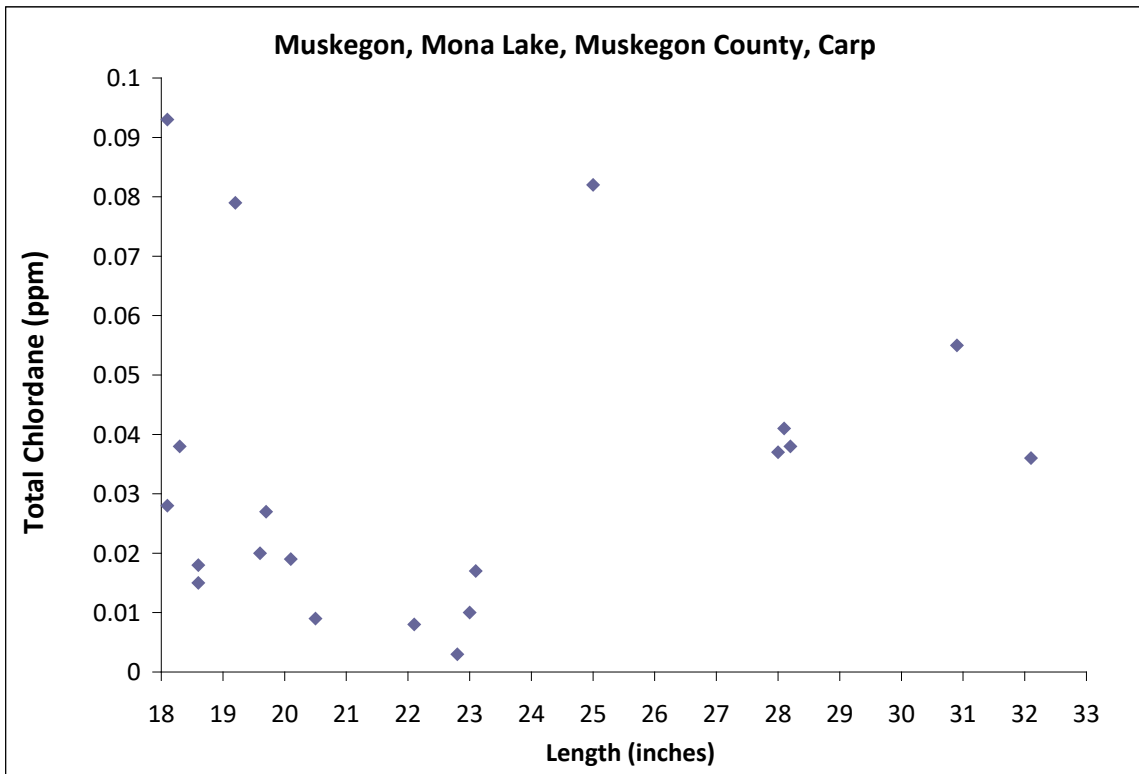
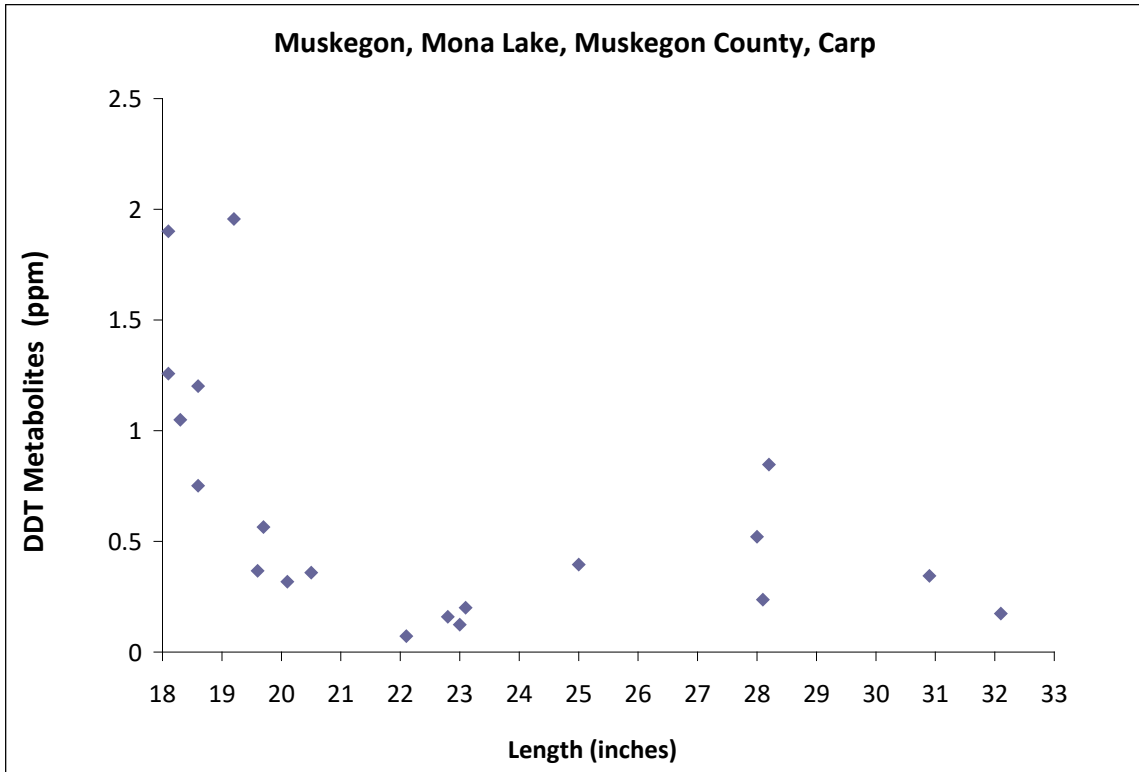
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2002	20	18.1	na	18.1	32.1	
Datasets available: 2000, 2002							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	20	0.23		0.05	0.81	0.32	0.5
DDT	20	0.64		0.07	1.96	0.90	2
Chlordane	20	0.03		0.003	0.09	0.05	--
Toxaphene	20	ND		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.618	0.465					
DDT	0.253	0.201					
Chlordane	0.014	0.036					
Toxaphene	--	--					
Final meal category based on UCL:							0.5

Existing Advisory: Women and children should eat no more than one meal per week of Mona Lake carp smaller than 22 inches and no more than one meal per month of Mona Lake carp larger than 22 inches due to PCBs.

Recommendation: No one should eat more than 2 meals per month of Mona Lake carp smaller than 18 inches due to DDT, or more than 6 meals per year of those fish between 18 and 28 inches due to PCBs. Sensitive populations should not eat Mona Lake carp larger than 28 inches and healthy adults should limit consumption of those fish to no more than 1 or 2 meals per year due to PCBs. Mercury would cause an advisory.

Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
18	0.069	2
20	0.138	1
22	0.207	1
24	0.275	0.5
26	0.344	0.5
28	0.413	0.5
30	0.482	Limited
<i>Shaded area denotes extrapolated estimates</i>		





**Largemouth and
Smallmouth Bass**

Mona Lake

Muskegon County

Hg Analysis:

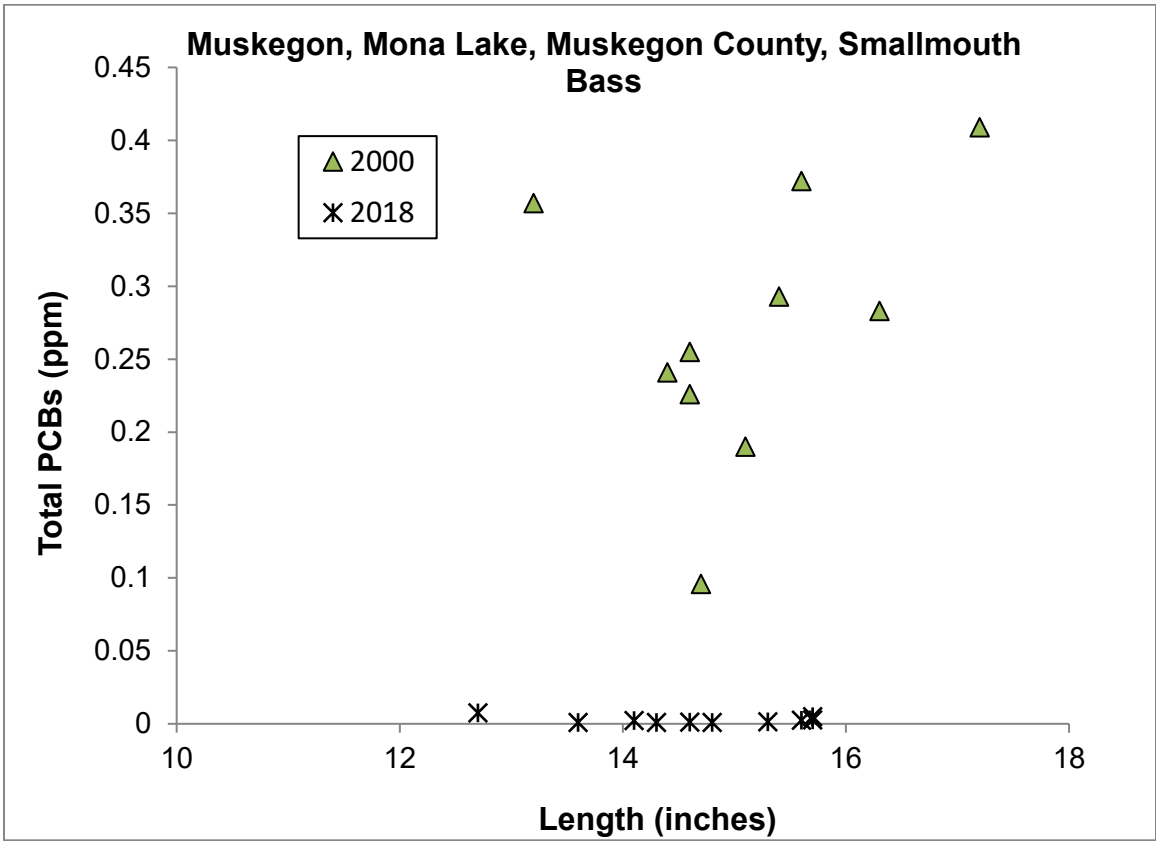
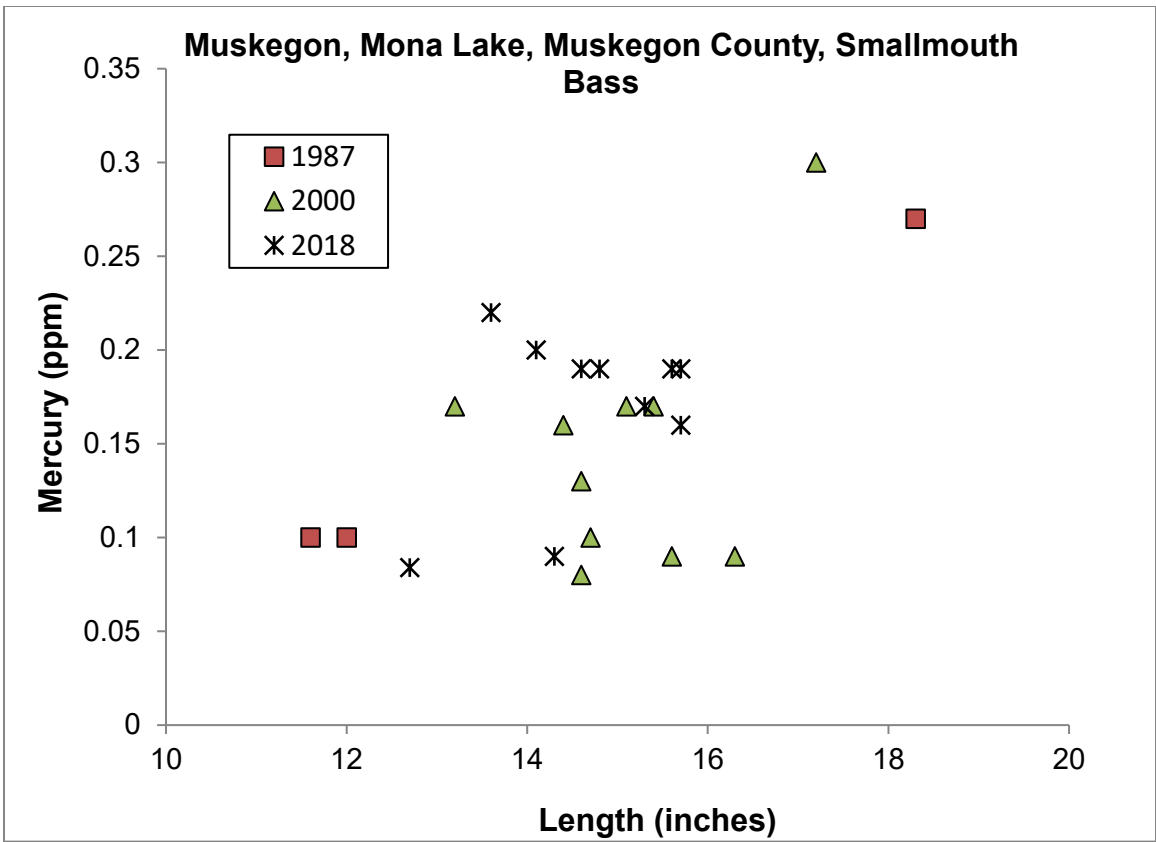
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1987	2018	23	11.6	14	13.6	18.3	
Datasets available: 1987, 2000, 2018							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	19	0.17		0.08	0.30	0.20	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.288	0.232					

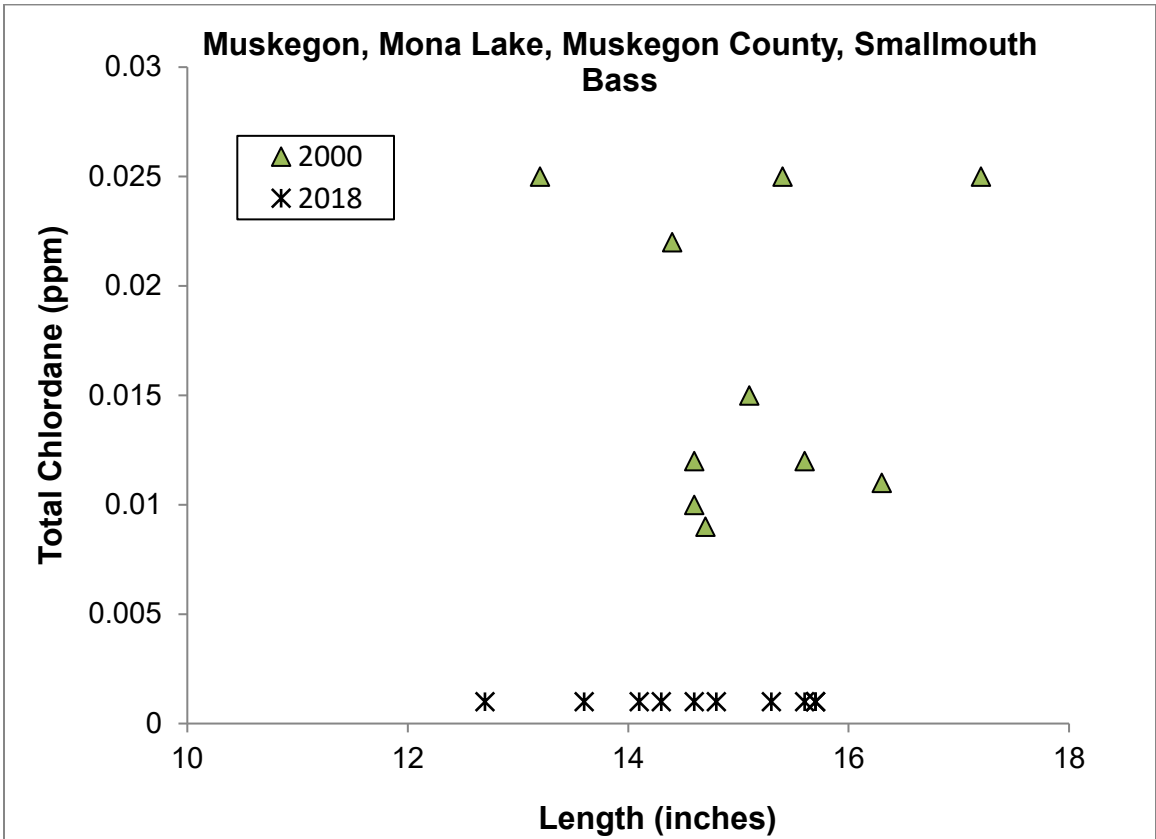
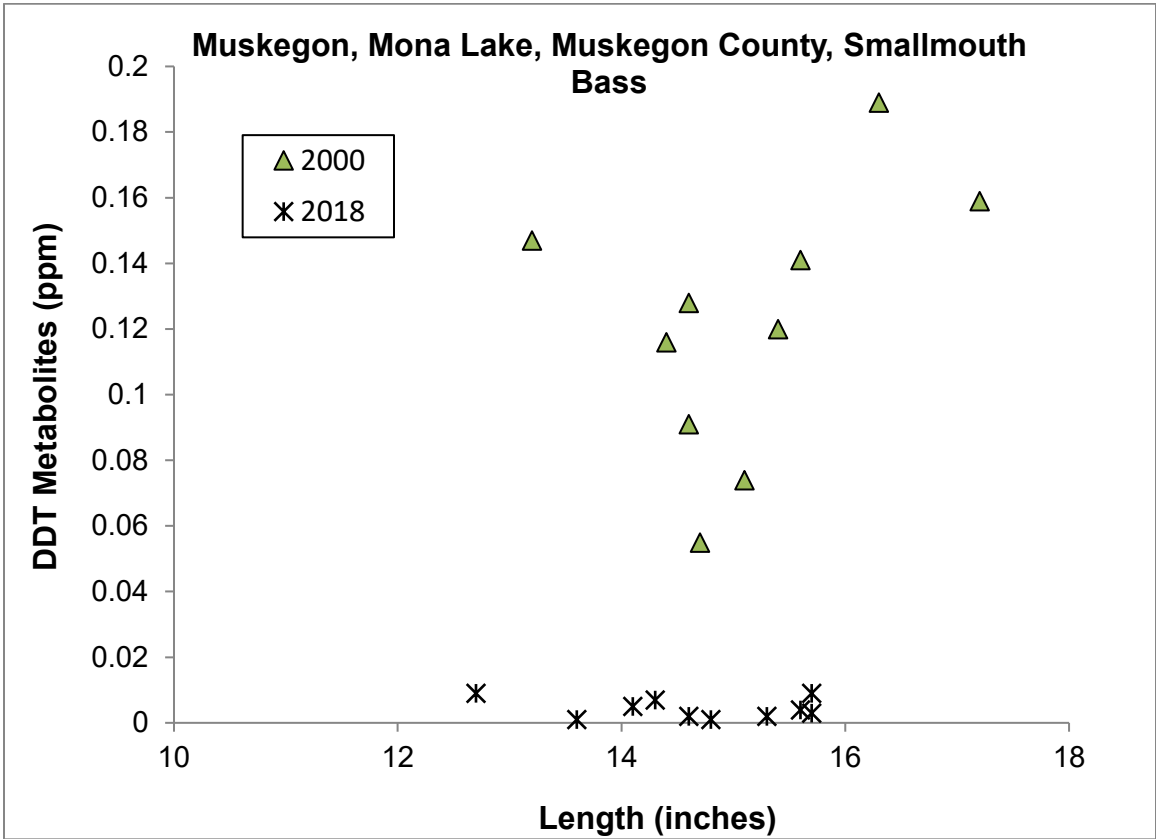
Organics Analysis:

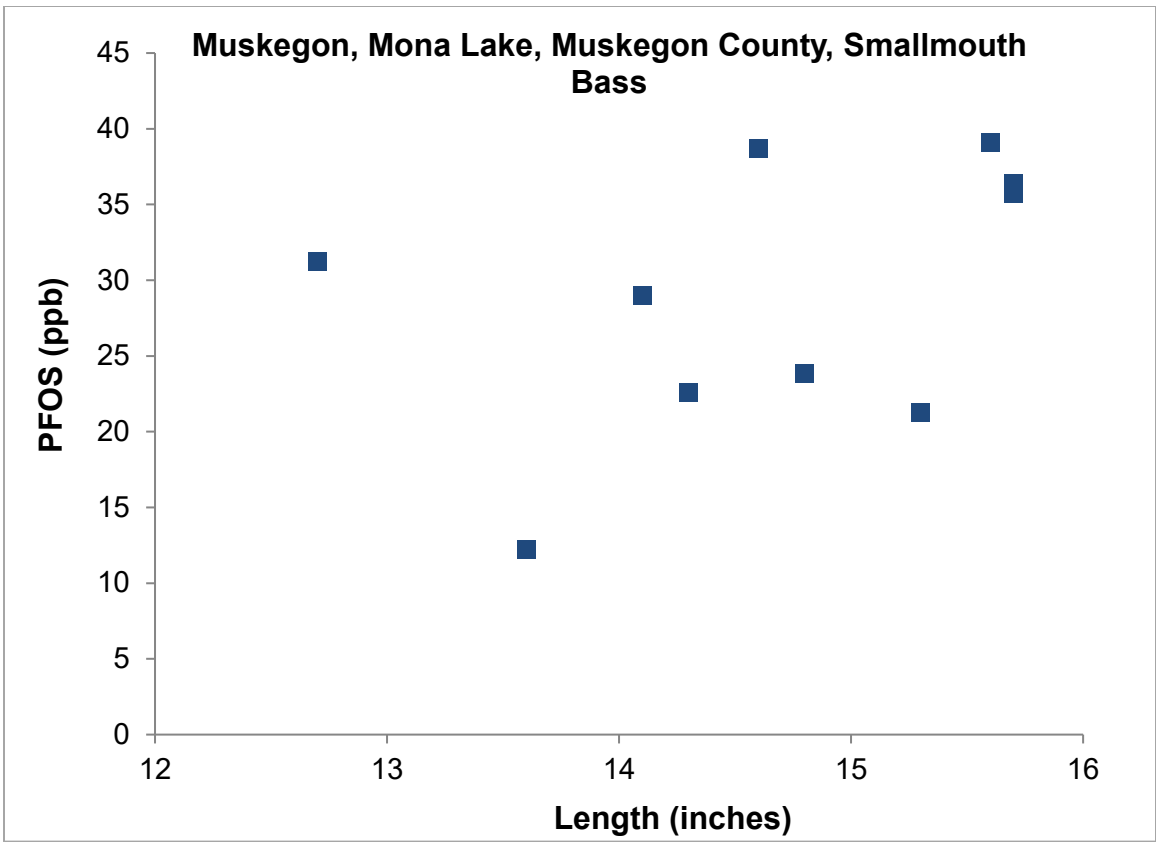
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
PCBs: 2000	2018	18	13.2	14	13.6	17.2	
PFOS: 2018	2018	10	12.7	14	13.6	15.7	
Datasets available: 1987, 2000, 2018							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	18	0.13		0.001	0.41	0.21	1
DDT	18	0.06		0.001	0.19	0.09	16
Chlordane	18	0.008		< 0.001	0.02	0.01	--
Toxaphene	18	ND		< 0.05	< 0.05	--	--
PFOS	9	29 ppb		12 ppb	39 ppb	36 ppb	4
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.097	0.056					
DDT	0.107	0.056					
Chlordane	0.039	0.051					
Toxaphene	--	--					
PFOS	0.180	0.171					
Final meal category based on UCL:							1

Existing MDHHS Advisory: No one should eat more than 6 meals per year of Mona Lake largemouth bass or smallmouth bass of any size due to PCBs.

Recommendation: No one should eat more than 1 meal per month of Mona Lake largemouth bass or smallmouth bass of any size due to PCBs. Mercury and PFOS would cause an advisory. More data is needed to remove PCBs as the driving contaminant.







Walleye

Mona Lake

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	10	14.3	15	14.6	25.1
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.10	0.03	0.18	0.15	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.606	0.731				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2000	2000	10	14.3	15	14.6	25.1
Datasets available: 2000						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.17	0.04	0.29	0.25	0.5
DDT	9	0.14	0.02	0.37	0.23	8
Chlordane	9	0.02	0.003	0.03	0.03	--
Toxaphene	9	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.725	0.772				
DDT	0.361	0.652				
Chlordane	0.705	0.767				
Toxaphene	--	--				
Final meal category based on UCL:						0.5

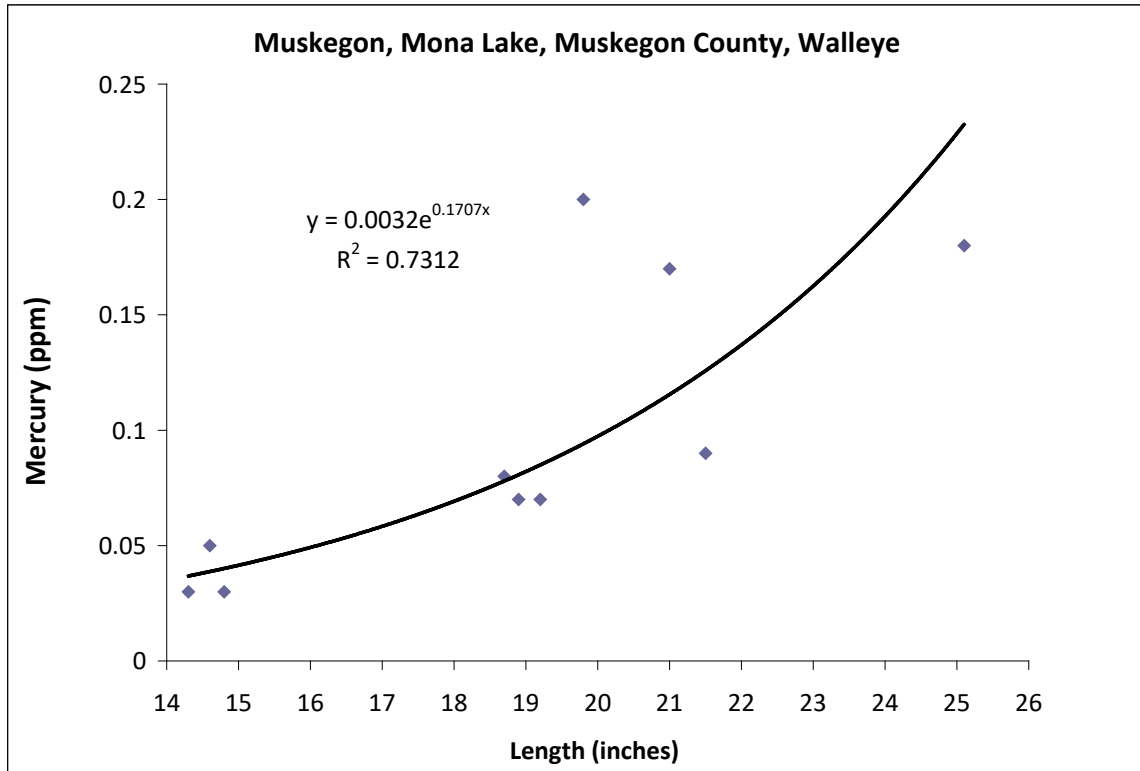
Length (Inches)	Hg		PCB		DDT	
	Regression Equation Estimate (ppm)	Meal Category	Regression Equation Estimate (ppm)	Meal Category	Regression Equation Estimate (ppm)	Meal Category
14	0.03	16	0.03	8	0.03	16
16	0.05	16	0.09	2	0.04	16
18	0.07	16	0.14	1	0.07	16
20	0.10	8	0.19	1	0.12	12
22	0.14	4	0.24	0.5	0.20	8
24	0.19	4	0.29	0.5	0.32	4
26	0.27	2	0.35	0.5	0.53	2
28	0.38	2	0.40	0.5	0.87	2
30	0.54	1	0.45	Limited	1.44	1

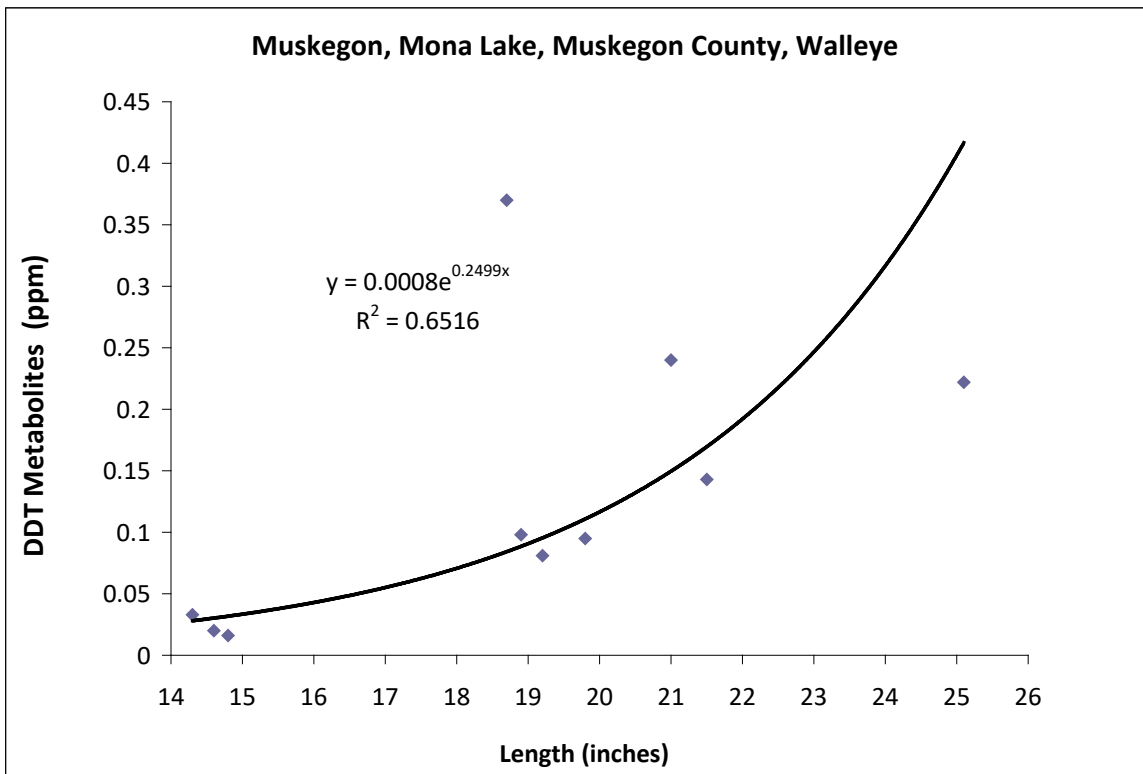
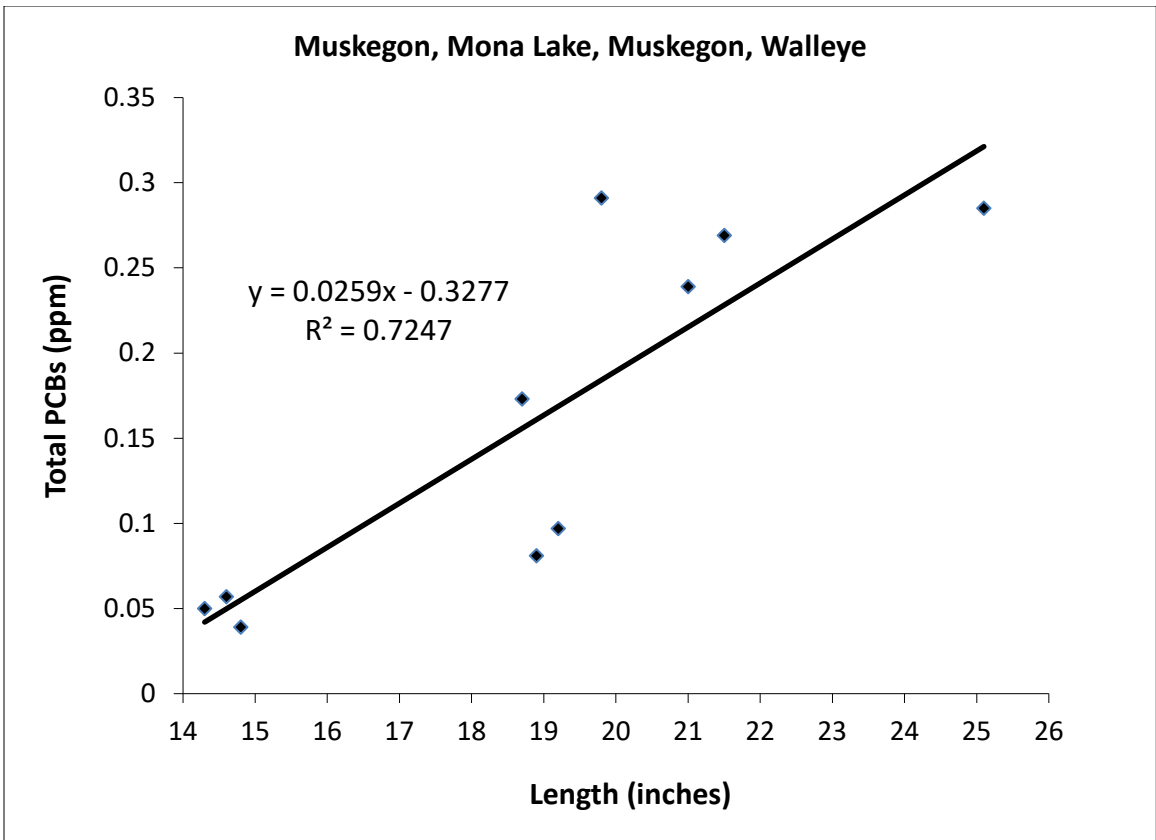
Shaded area denotes extrapolated estimates

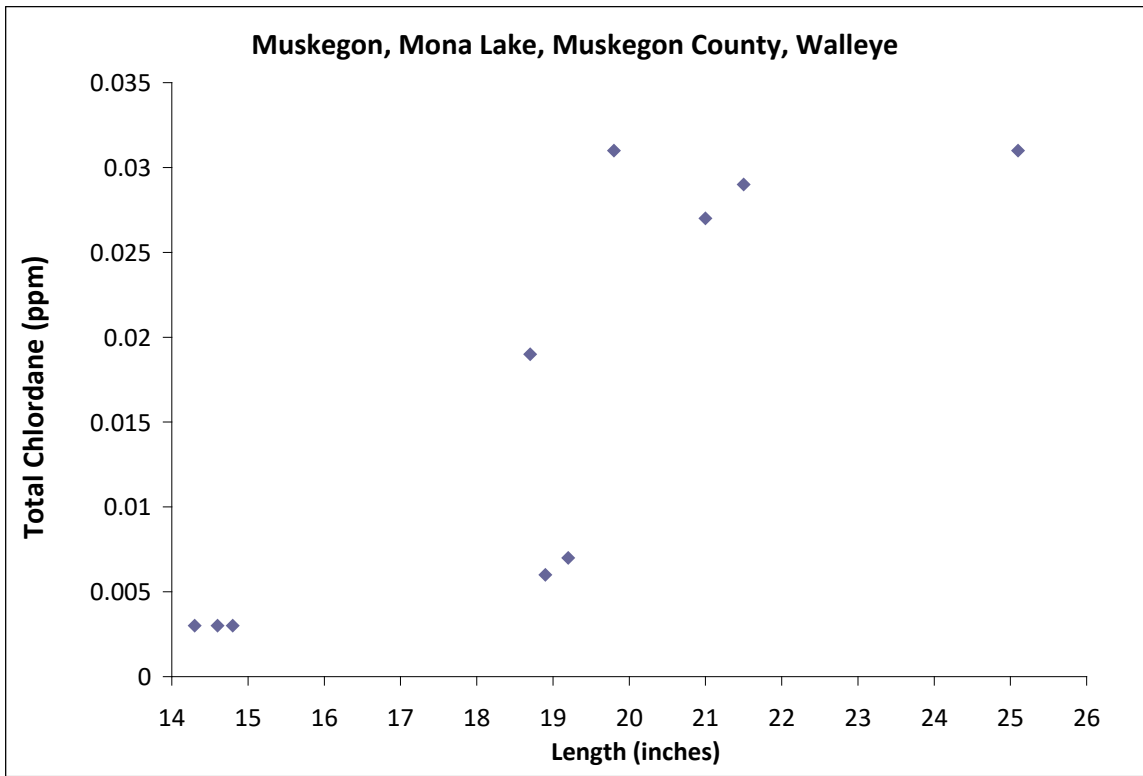
Existing Advisory: Women and children should not eat more than one meal per week of Mona Lake walleye between smaller than 18 inches and no more than one meal per month of Mona Lake walleye larger than 18 inches due to PCBs.

Recommendation: No one should eat more than 1 meal per month of Mona Lake walleye smaller than 20 inches or more than 6 meals per year of those fish larger than 20 inches due to PCBs. Mercury and DDT would cause advisories.

Note: Linear regression used for PCB as it provided more conservative estimates for mid-range lengths.







Pumpkinseed

Pierson Drain

Muskegon County

Hg Analysis:

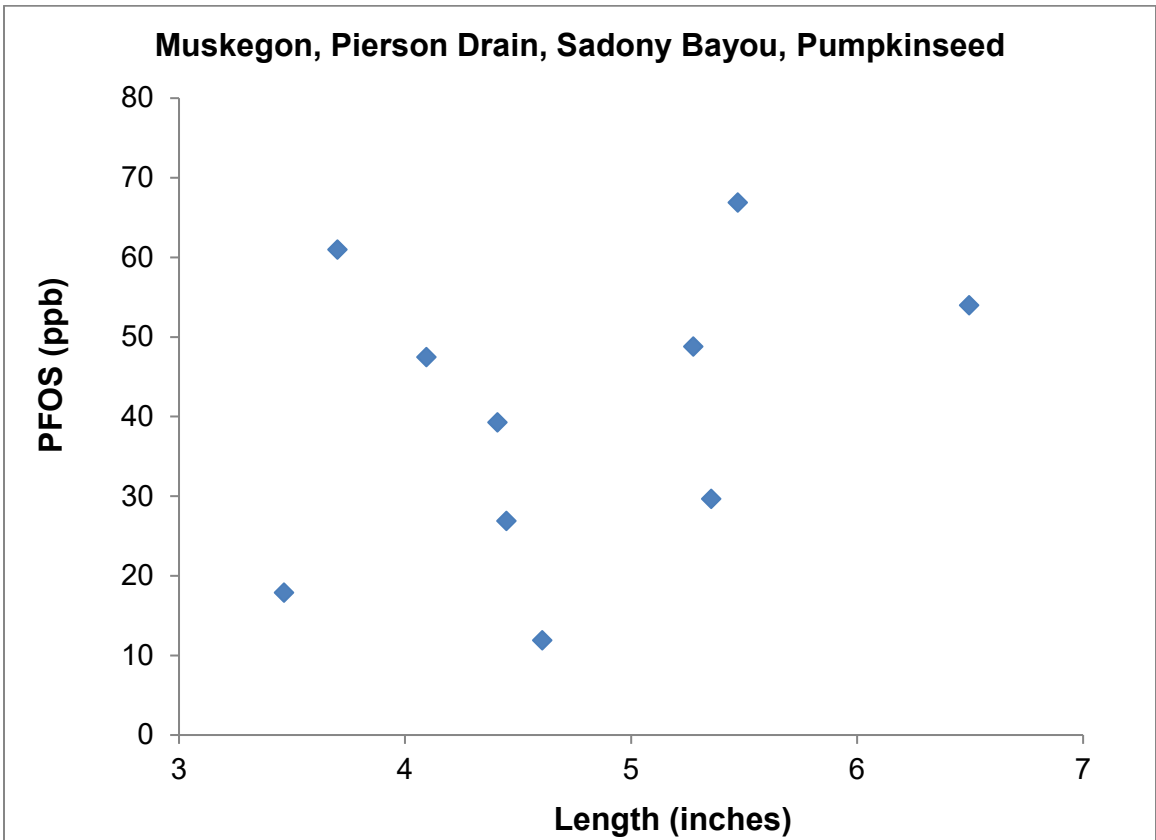
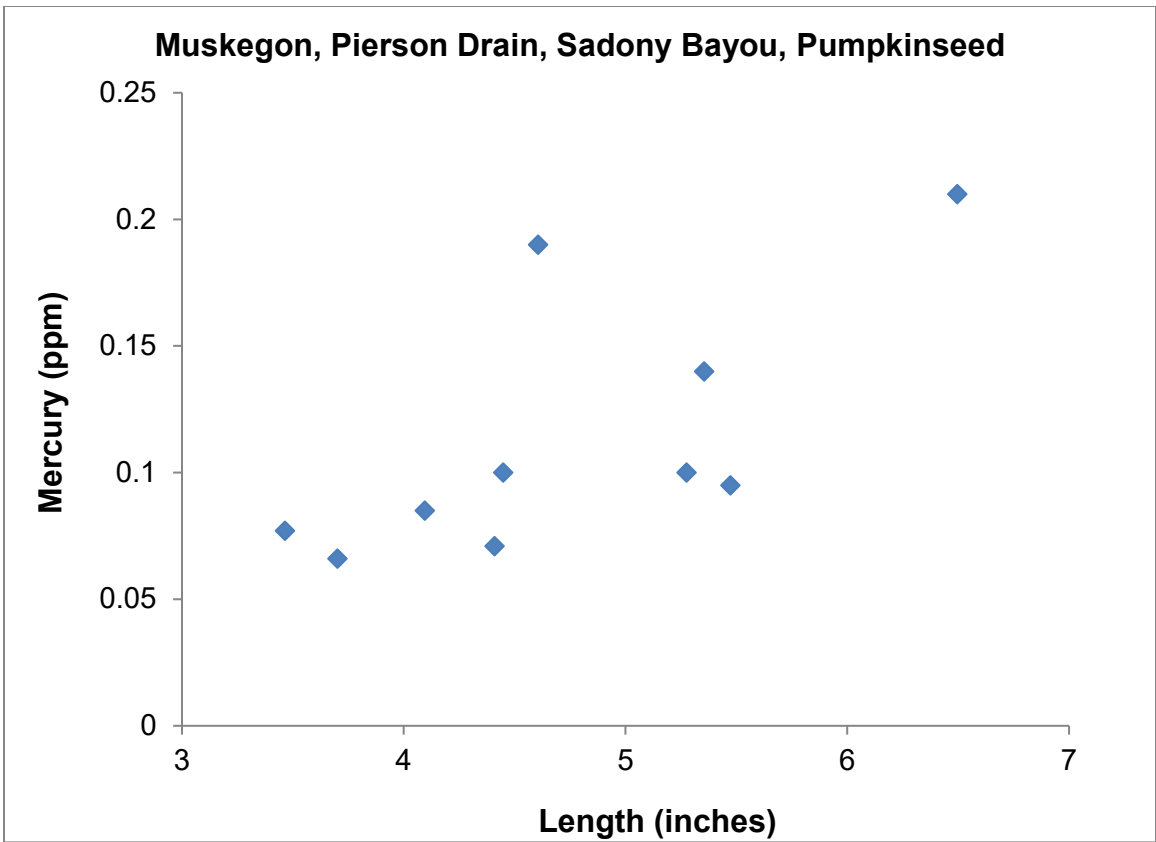
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	3.5	NA	3.5	6.5
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.113	0.066	0.210	0.149	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.475	0.514				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	3.5	NA	3.5	6.5
Datasets available: 2021						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	40.4 ppb	11.9 ppb	66.9 ppb	53.6 ppb	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.117	0.115				
Final meal category based on UCL:						2

Existing MDHHS Advisory: Bluegill and sunfish from the Pierson Drain in Muskegon County are currently covered under the statewide advisory for mercury. No one should eat more than 8 meals per month of bluegill or sunfish of any size.

Recommendation: No one should eat more than 2 meals per month of bluegill or sunfish of any size from the Pierson Drain in Muskegon County due to PFOS. Mercury causes a less restrictive guideline.



Carp

**Ruddiman Creek
Lagoon**

Muskegon County

Hg Analysis:

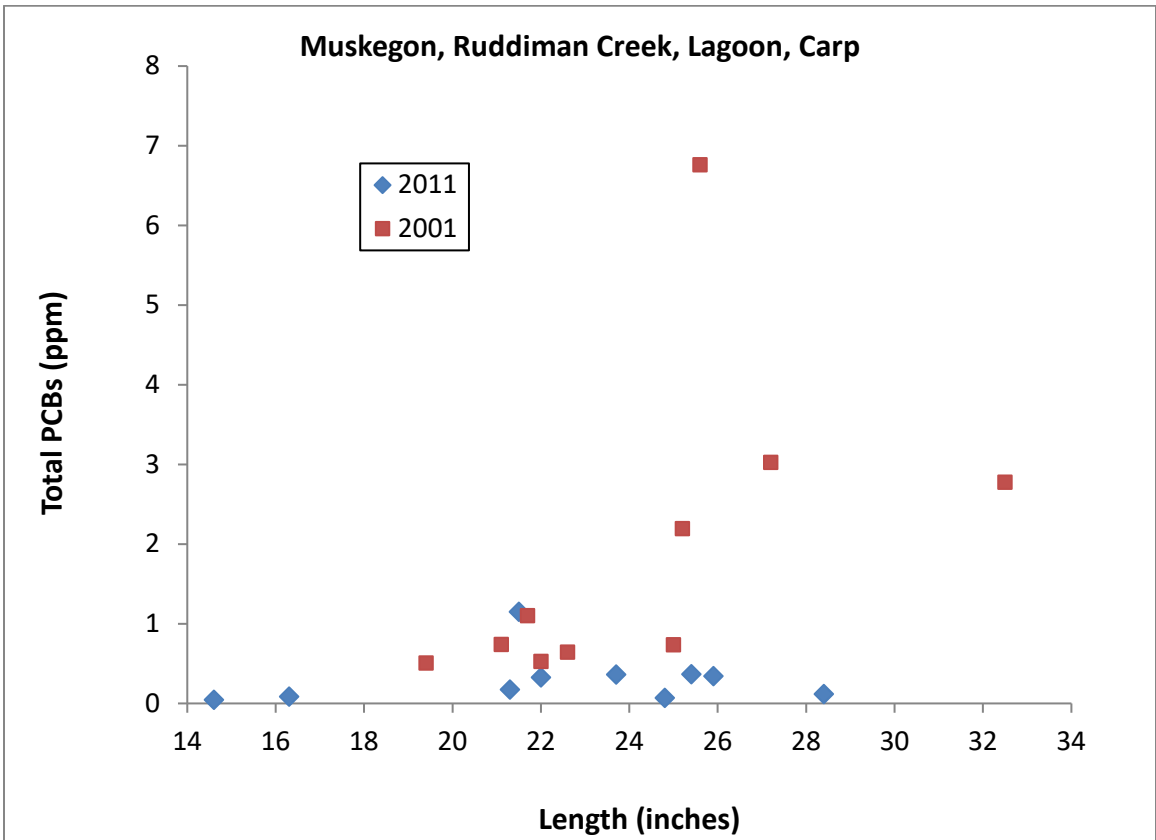
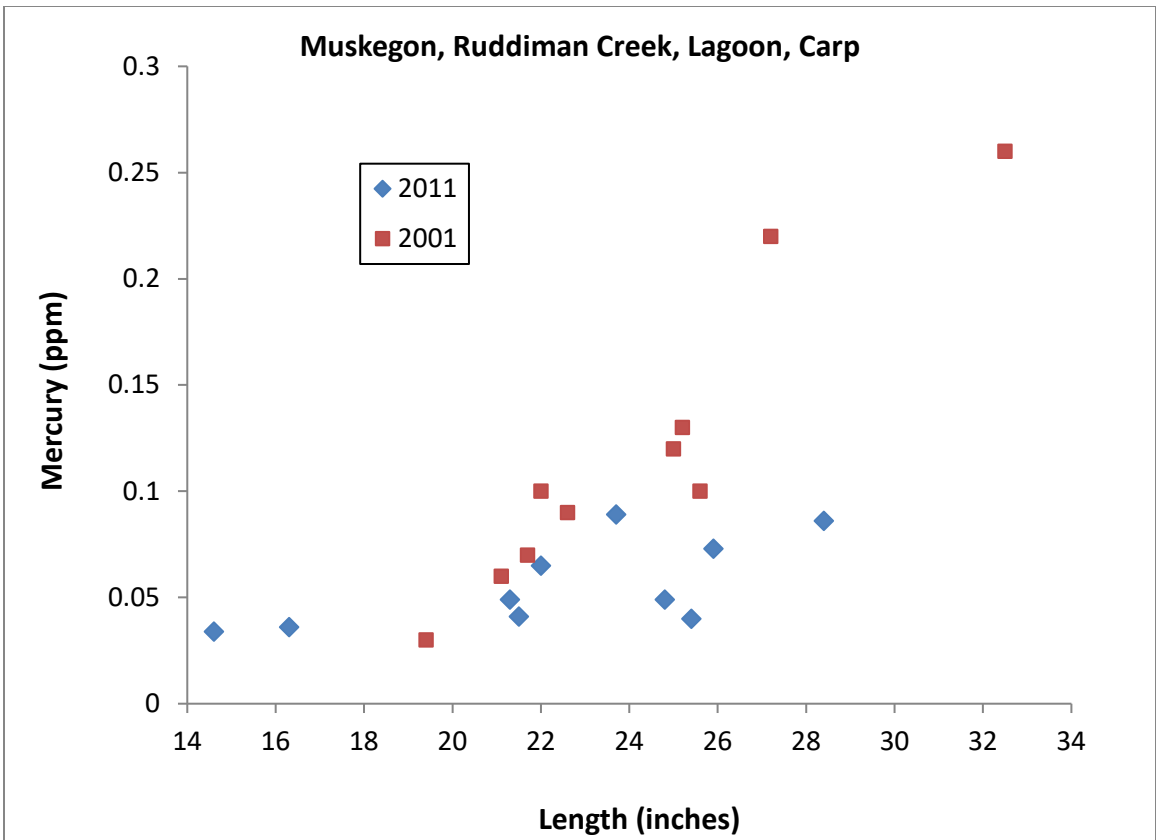
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2011	20	14.6	na	14.6	32.5
Datasets available: 2001, 2011						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.09	0.03	0.26	0.12	8
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.538	0.584				

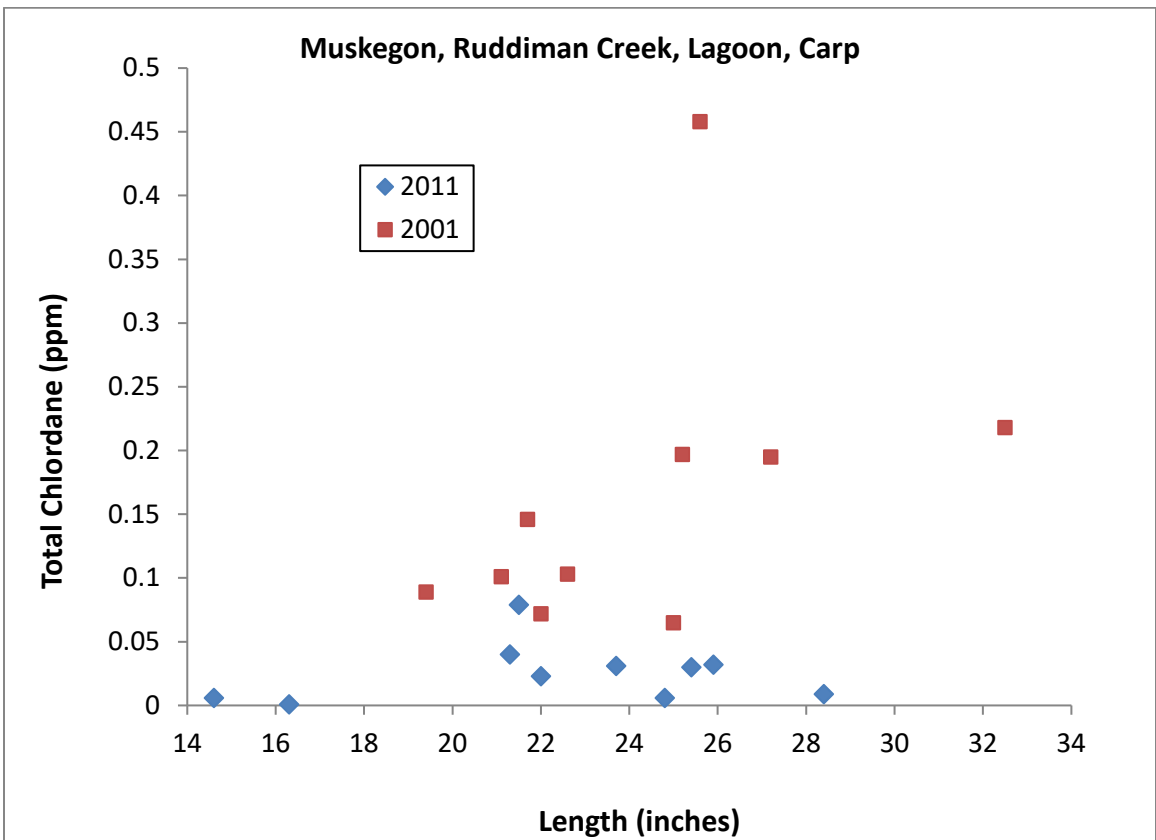
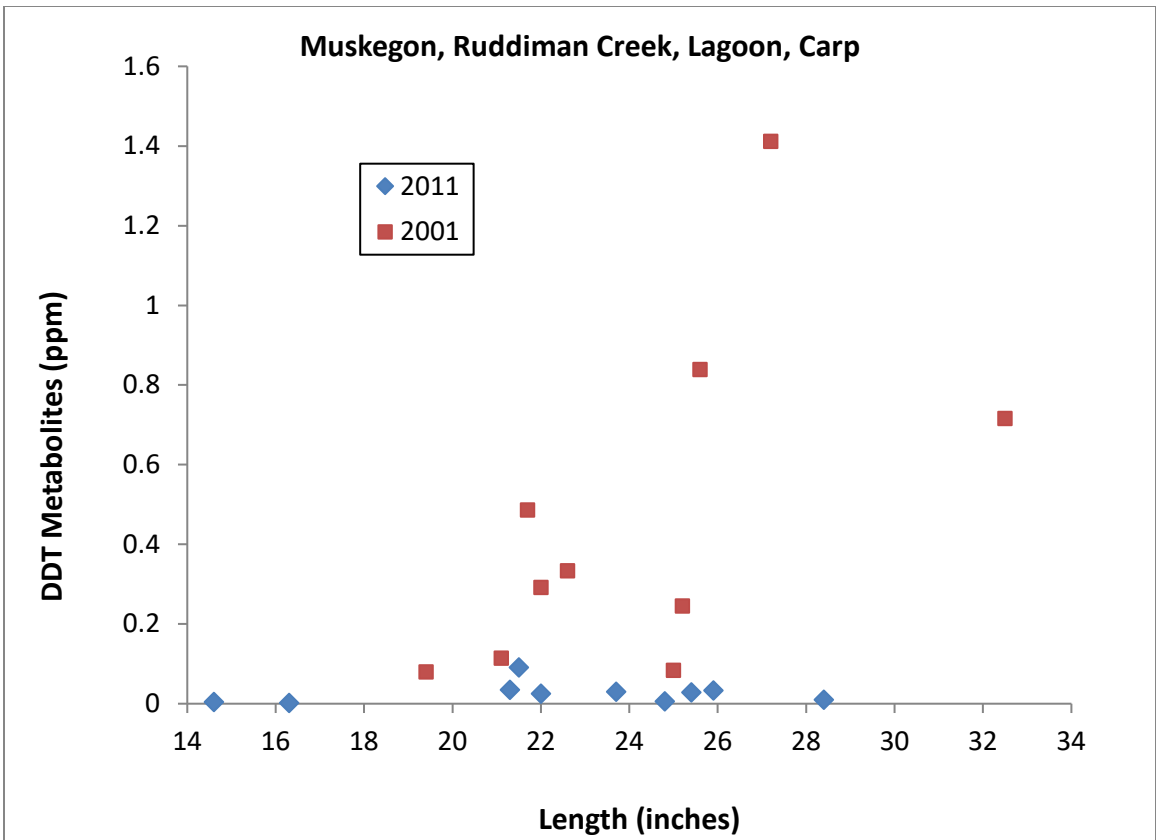
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2011	20	14.6	na	14.6	32.5
Datasets available: 2001, 2011						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	20	1.105	0.049	6.76	1.85	Limited
DDT	20	0.243	0.002	1.41	0.42	4
Chlordane	20	0.095	0.001	0.46	0.15	--
Toxaphene	20	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.169	0.261				
DDT	0.198	0.230				
Chlordane	0.149	0.212				
Toxaphene	--	--				
Final meal category based on UCL:						Limited

Existing Advisory: No one should eat carp from Ruddiman Creek or Ruddiman Creek lagoon due to PCBs. DDT and mercury would cause advisories.

Recommendation: No change. The PCB concentrations may have declined sufficiently to relax the advice, but additional samples are needed to verify the change.





Largemouth Bass

Ruddiman Creek Lagoon

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	11.5	14	13.9	14.7
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.180	0.170	0.190	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.835	0.814				

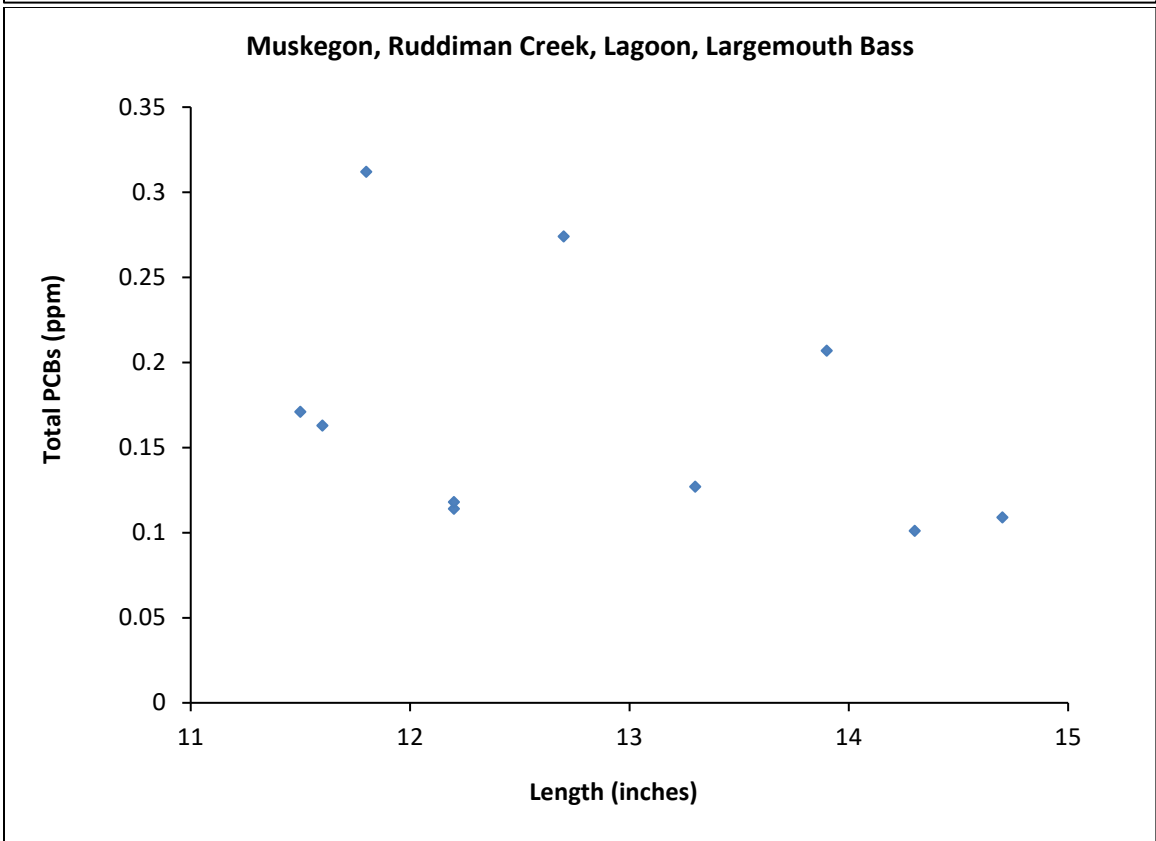
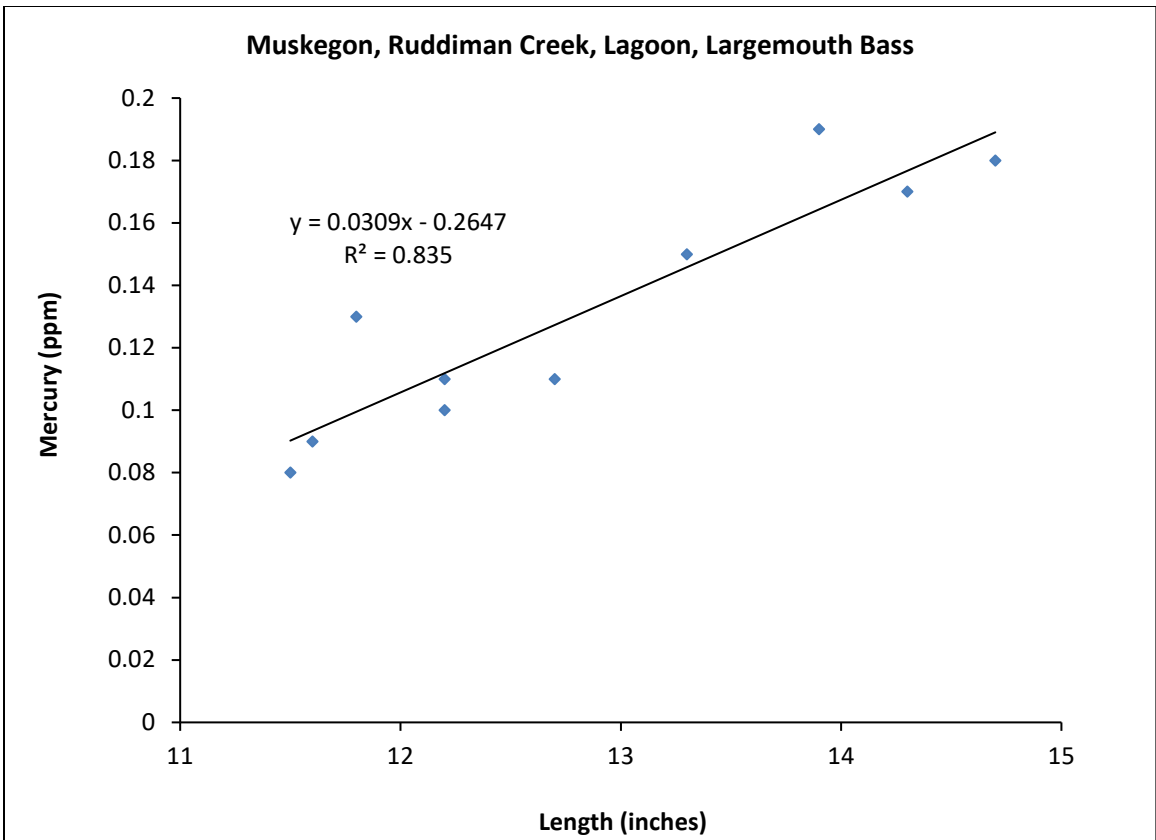
Organics Analysis:

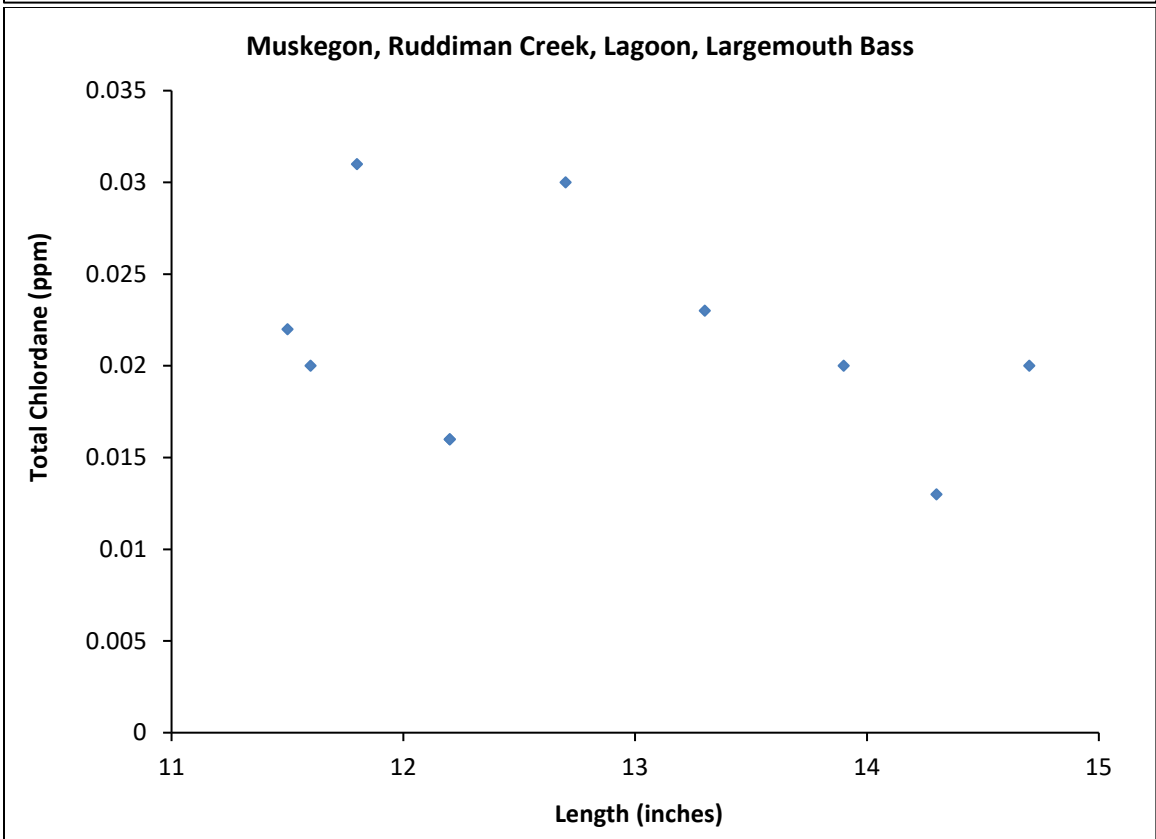
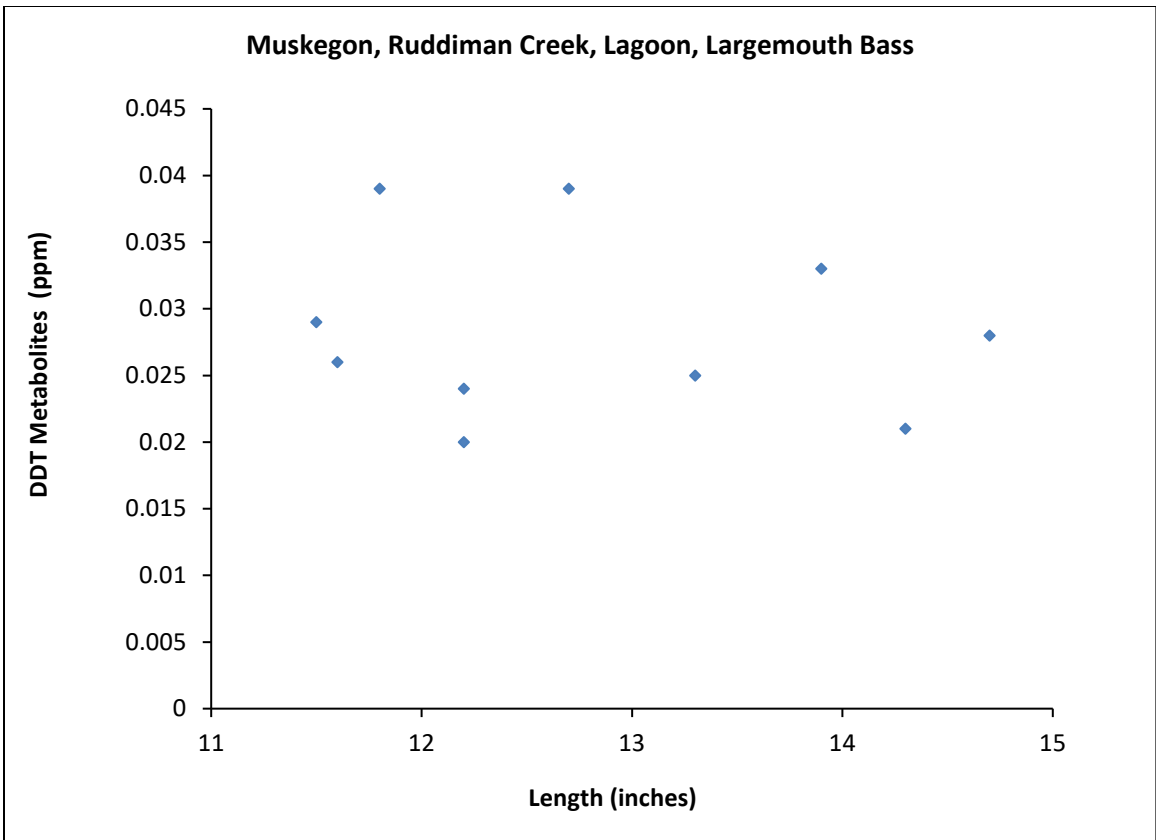
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2001	2001	10	11.5	14	13.9	14.7
Datasets available: 2001						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	0.14	0.10	0.21	--	--
DDT	3	0.03	0.02	0.03	--	--
Chlordane	3	0.02	0.01	0.02	--	--
Toxaphene	3	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.133	0.165				
DDT	0.022	0.019				
Chlordane	0.098	0.103				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Women and children should not eat more than one meal per week of Ruddiman Creek largemouth bass due to PCBs.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for establishing a guideline. However, Ruddiman Creek is connected to Bear and Muskegon Lakes. The smallmouth and largemouth bass guidelines for Ruddiman Creek are set to the Bear and Muskegon Lakes guidelines that state: No one should eat more than 6 meals per year of largemouth or smallmouth bass due to PCBs.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.168	4
15	0.199	4
16	0.230	4
17	0.261	4
18	0.292	2
19	0.322	2
20	0.353	2
21	0.384	2
22	0.415	2
<i>Shaded area denotes extrapolated estimates</i>		





Carp

White Lake

Muskegon County

Hg Analysis:

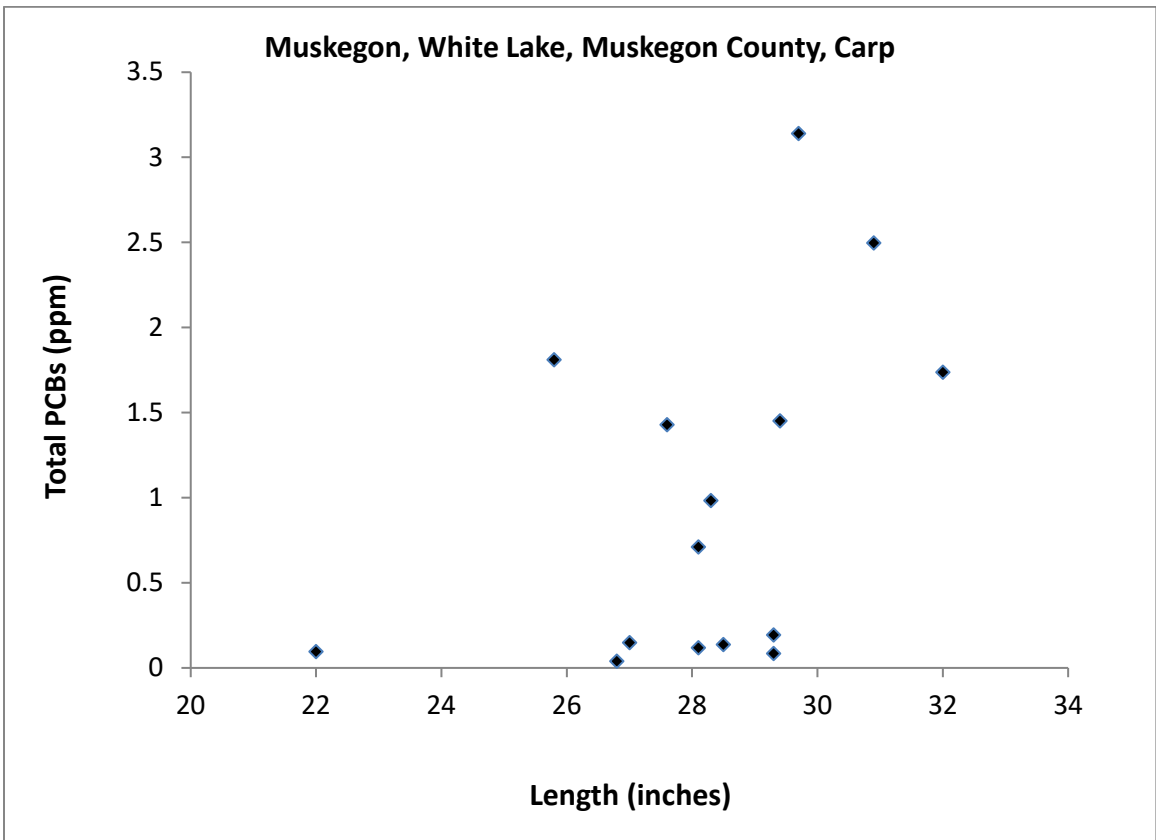
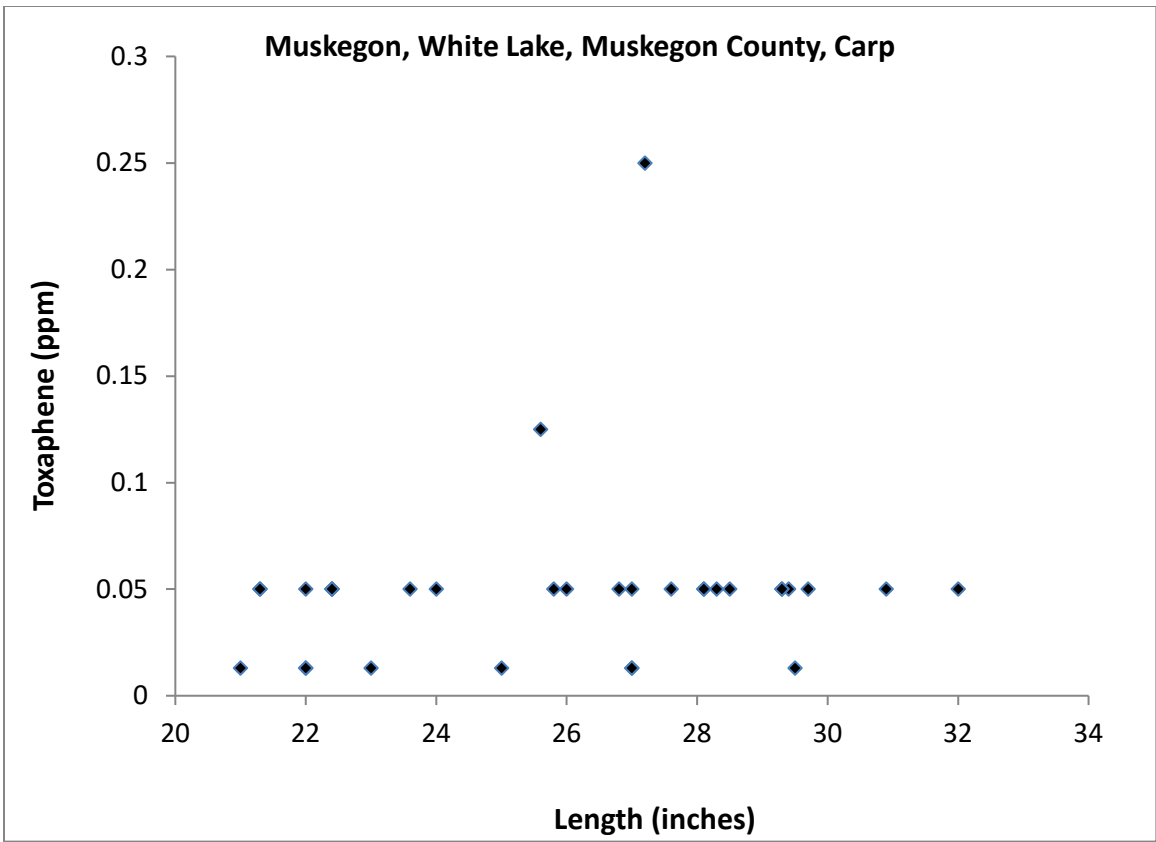
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1980	2007	33	21	na	21	32
Datasets available: 1980, 1984, 1991, 2004, 2007						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	33	0.21	0.05	0.35	0.24	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.236	0.250				

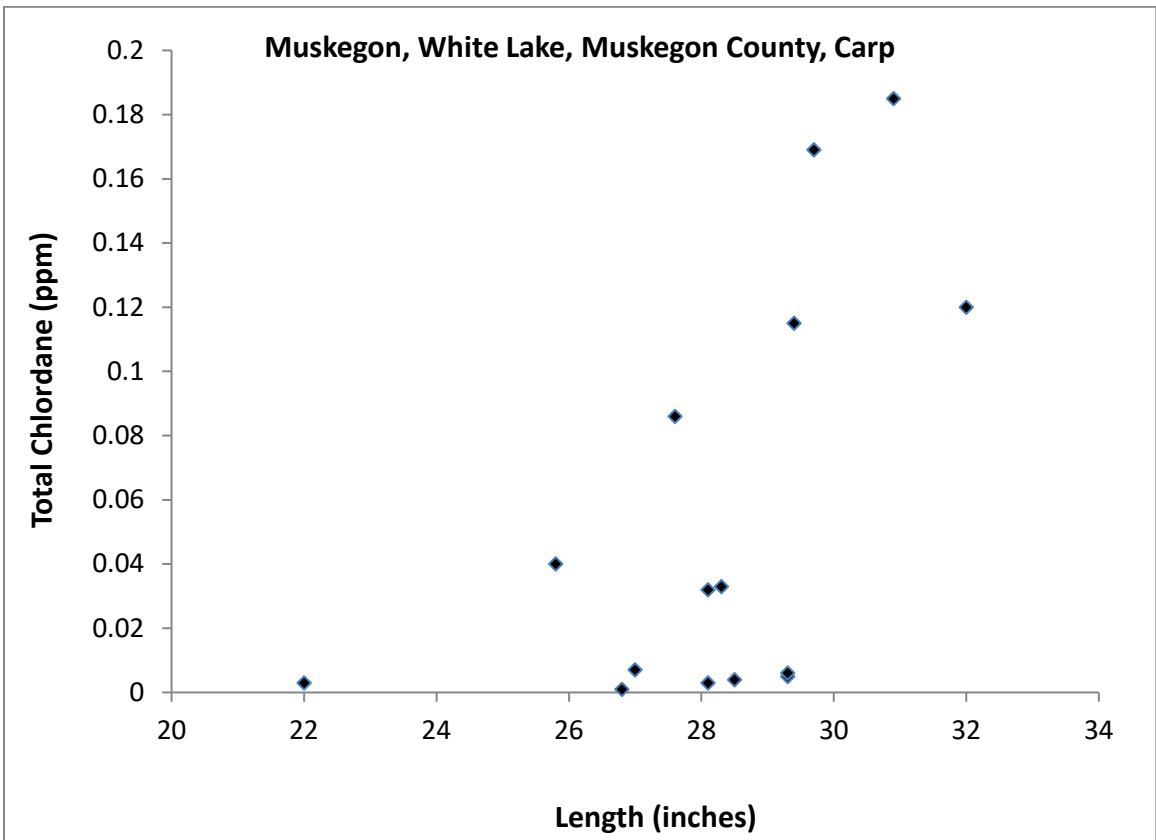
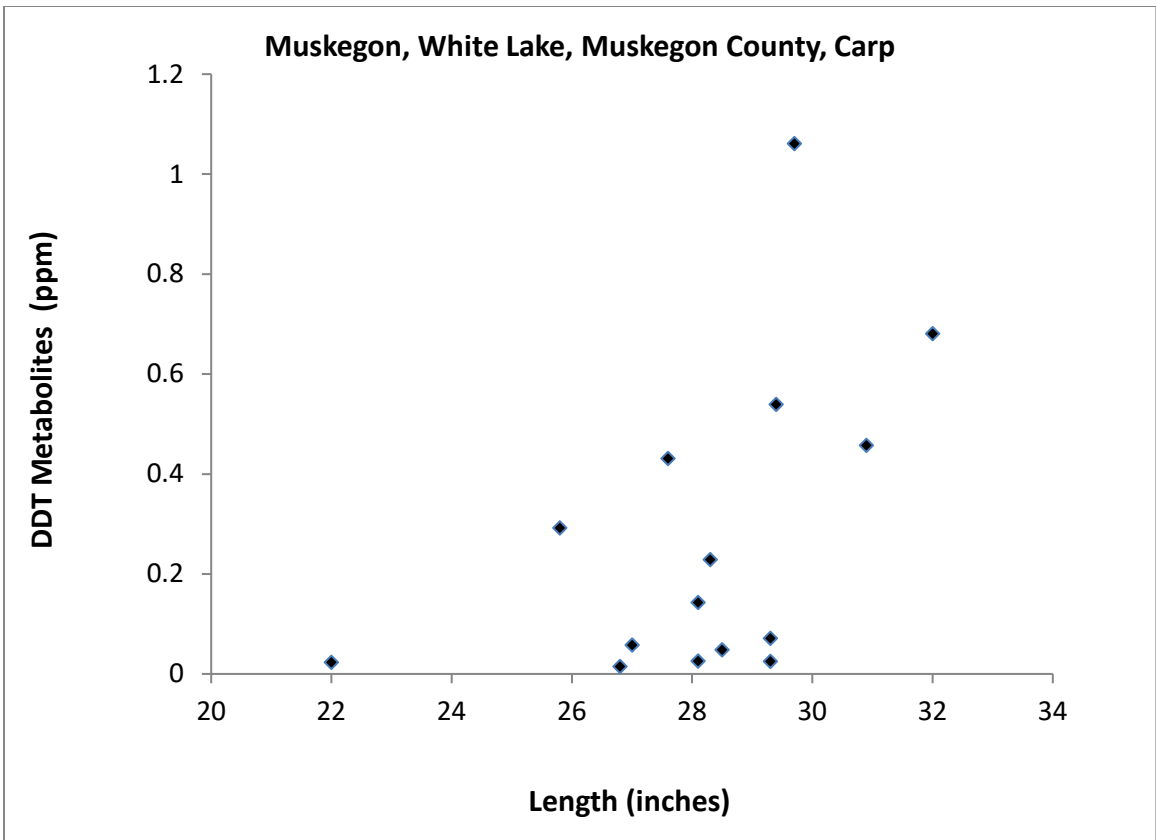
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2007	15	22	na	22	32
Datasets available: 1980, 1984, 1991, 2004, 2007						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	15	0.972	0.040	3.139	1.520	Limited
DDT	15	0.273	0.015	1.061	0.440	4
Chlordane	15	0.054	0.001	0.185	0.090	--
Toxaphene	15	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.194	0.199				
DDT	0.253	0.270				
Chlordane	0.324	0.275				
Toxaphene	--	--				
Final meal category based on UCL:						Limited

Existing Advisory: Women and children should not eat carp from White Lake due to PCBs.

Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of White Lake carp to no more than 1 or 2 meals per year due to PCBs. Mercury and DDT would cause advisories.





Largemouth Bass

White Lake

Muskegon County

Hg Analysis:

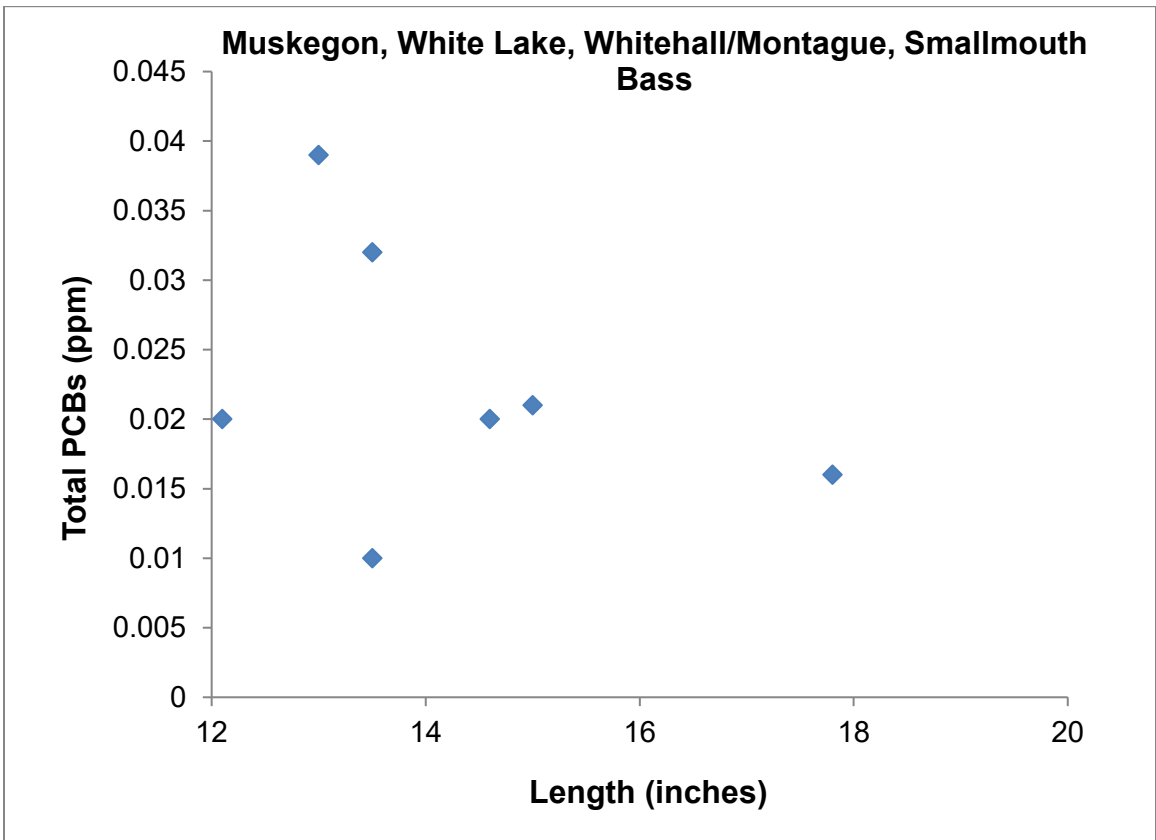
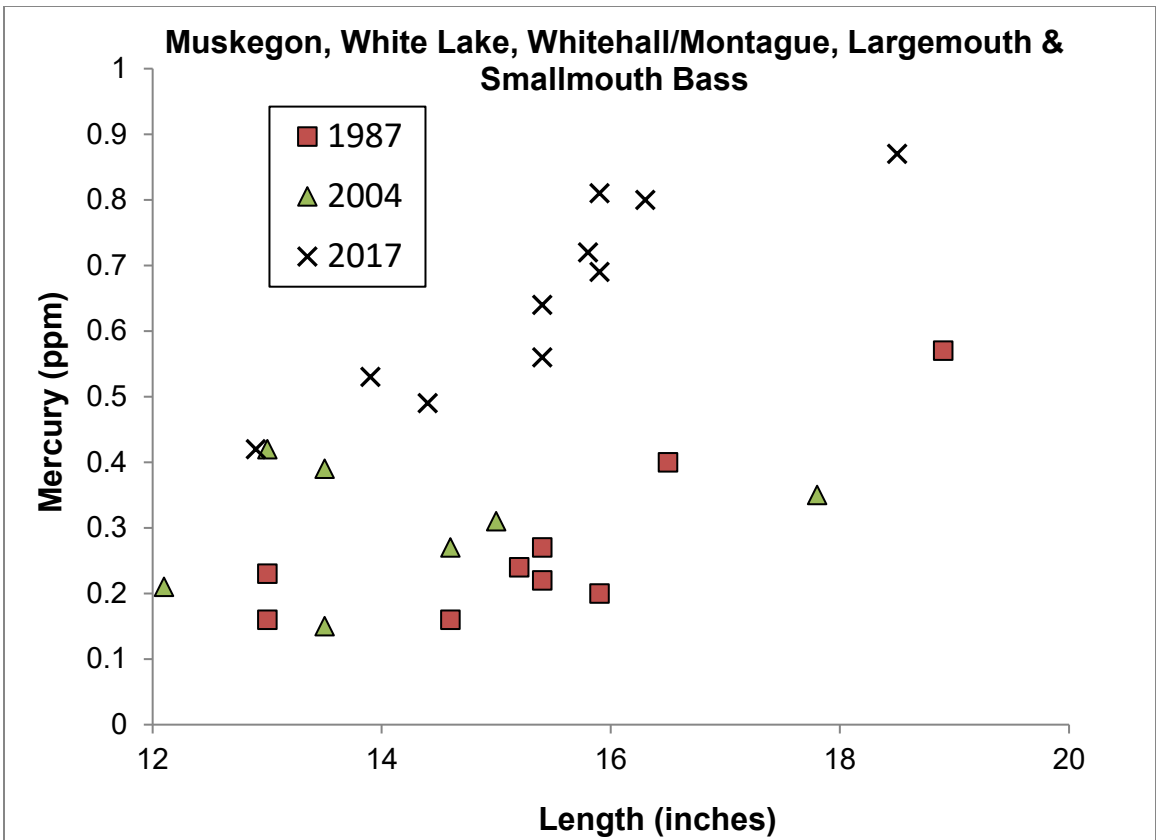
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1987	2017	26	9.9	14	13.5	18.9	
Datasets available: 1987, 2004, 2017							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	21	0.46		0.15	0.87	0.56	1
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.270	0.249					

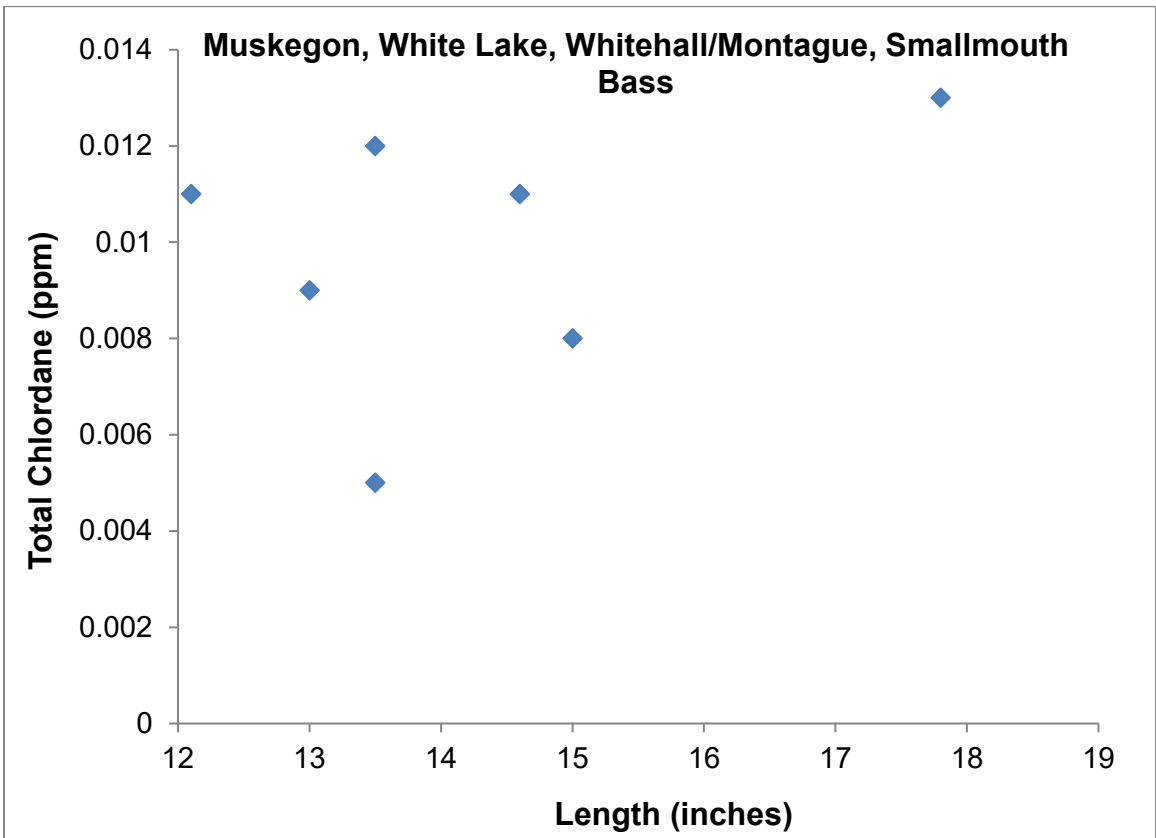
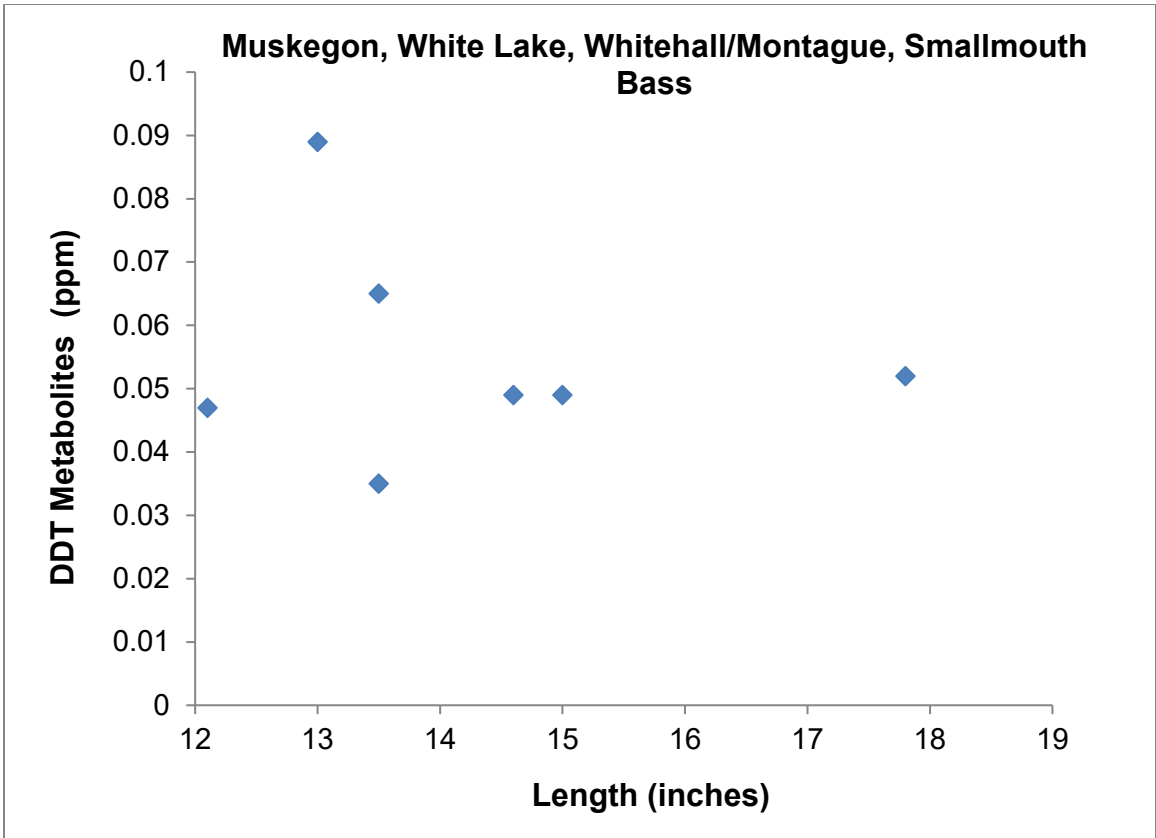
Organics Analysis:

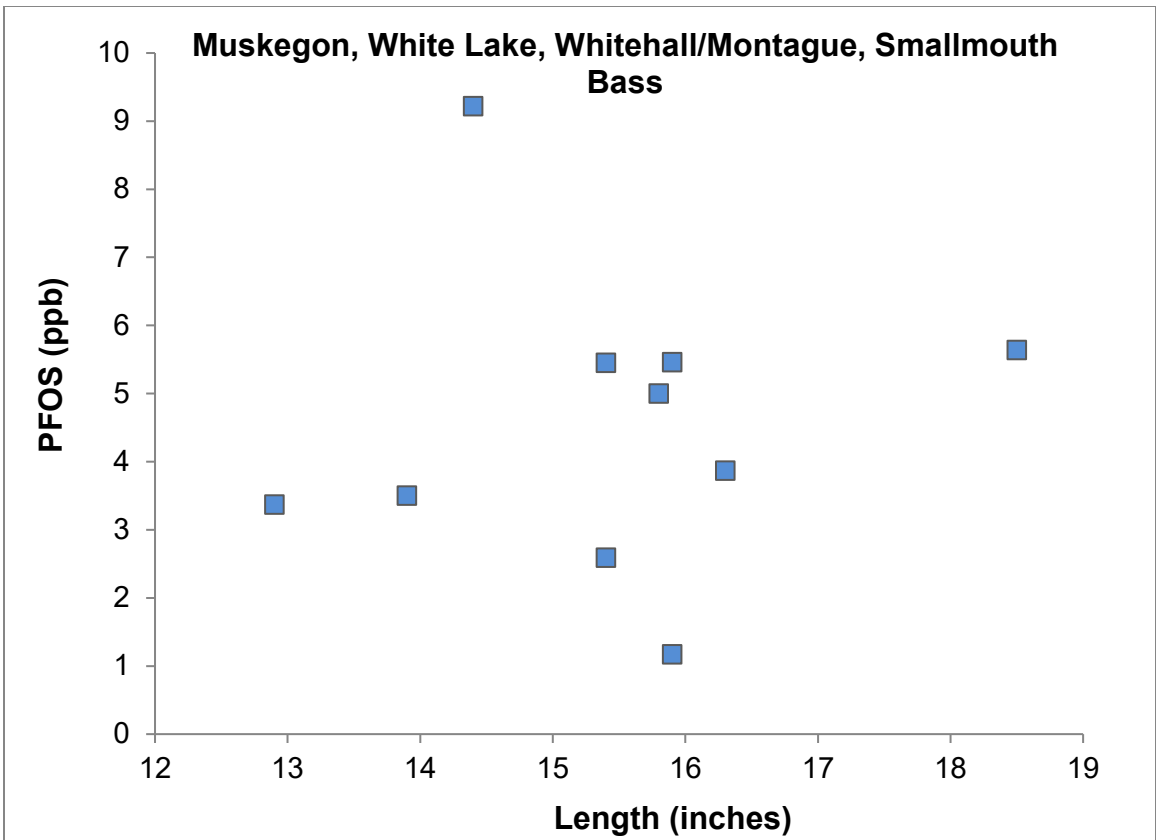
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
PCB: 2004	2004	7	12.1	14	13.5	17.8	
PFOS: 2017	2017	10	12.9	14	13.9	18.5	
Datasets available: PCB – 1980, 1987, 2004; PFOS - 2017							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.02		0.01	0.03	0.03	8
DDT	5	0.05		0.04	0.06	0.06	16
Chlordane	5	0.01		0.005	0.01	0.01	--
Toxaphene	5	ND		--	--	--	--
PFOS	9	4.6 ppb		1.2 ppb	9.2 ppb	6.4 ppb	16
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.122	0.082					
DDT	0.033	0.014					
Chlordane	0.127	0.091					
Toxaphene	--	--					
PFOS	0.003	0.004					
Final meal category based on UCL:							1

Existing MDHHS Advisory: No one should eat more than 2 meals per month of White Lake largemouth or smallmouth bass less than 18 inches, or more than 1 meal per month of largemouth or smallmouth bass greater than 18 inches due to mercury.

Recommendation: No one should eat more than 1 meal per month of White Lake largemouth or smallmouth bass less than 18 inches, or more than 6 meals per year of largemouth or smallmouth bass greater than 18 inches due to mercury. The statewide length break was applied as the size range of the dataset was limited. Additional samples should be collected to determine whether PCBs are still a contaminant of concern.







Northern Pike

White Lake

Muskegon County

Hg Analysis:

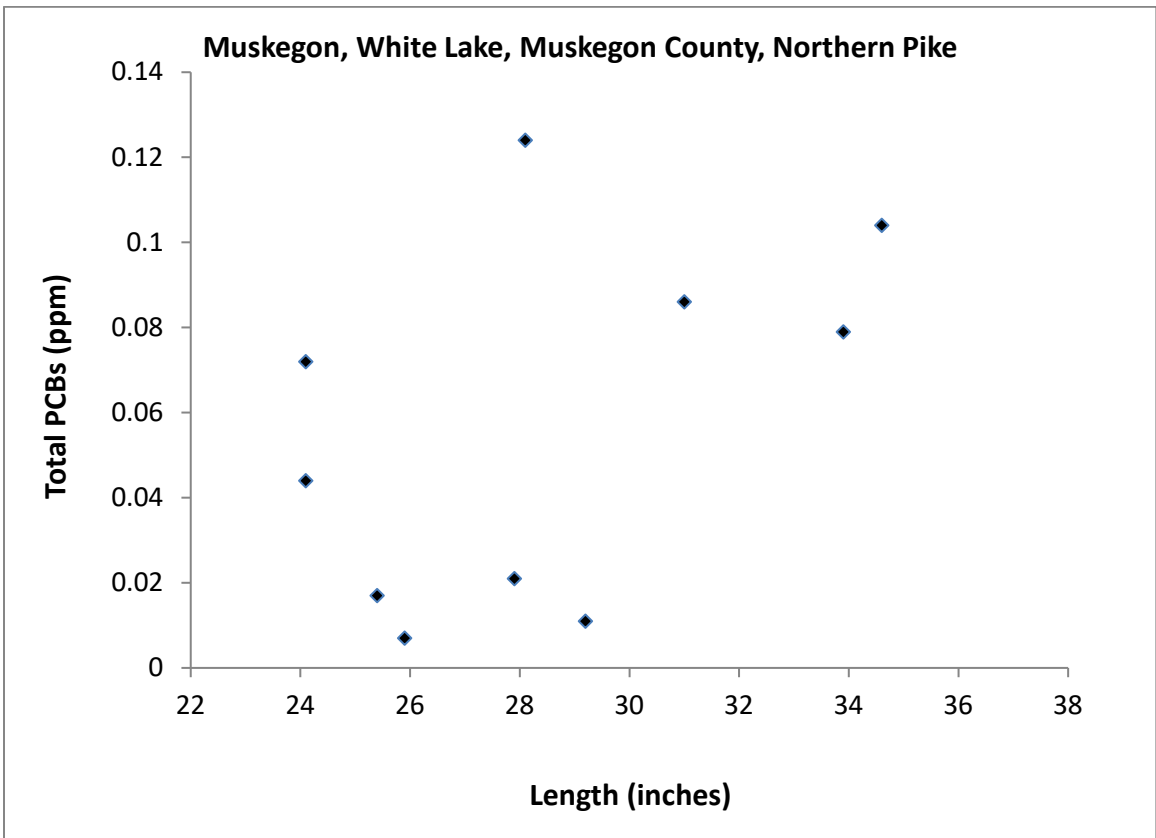
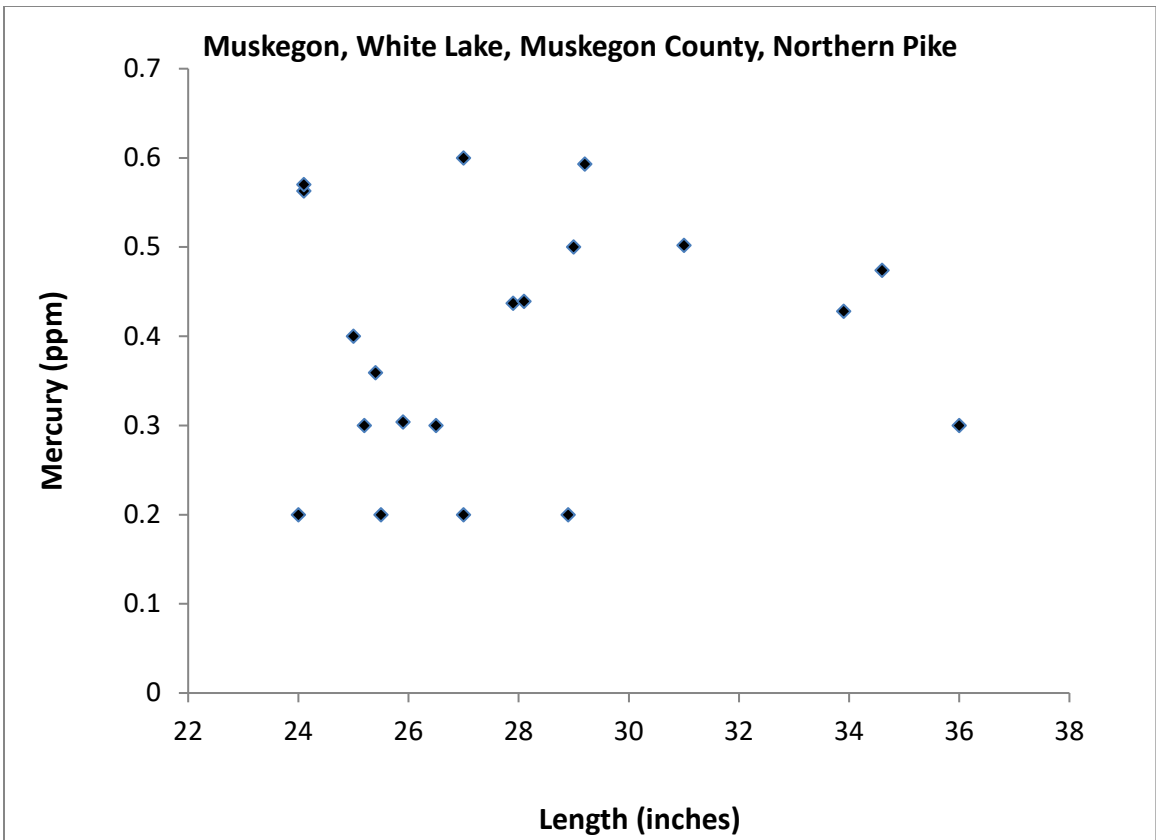
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1984	2007	20	24	24	36	
Datasets available: 1984, 2007						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.39	0.20	0.60	0.46	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.012	0.024				

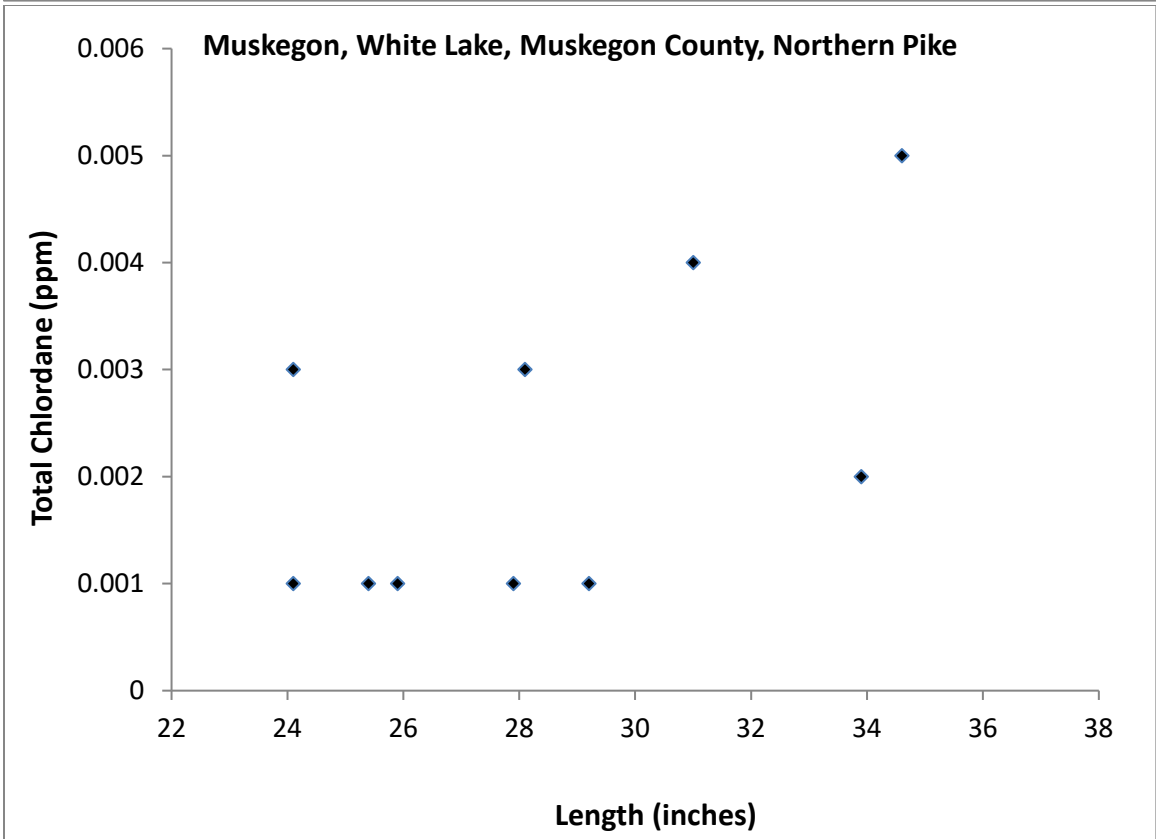
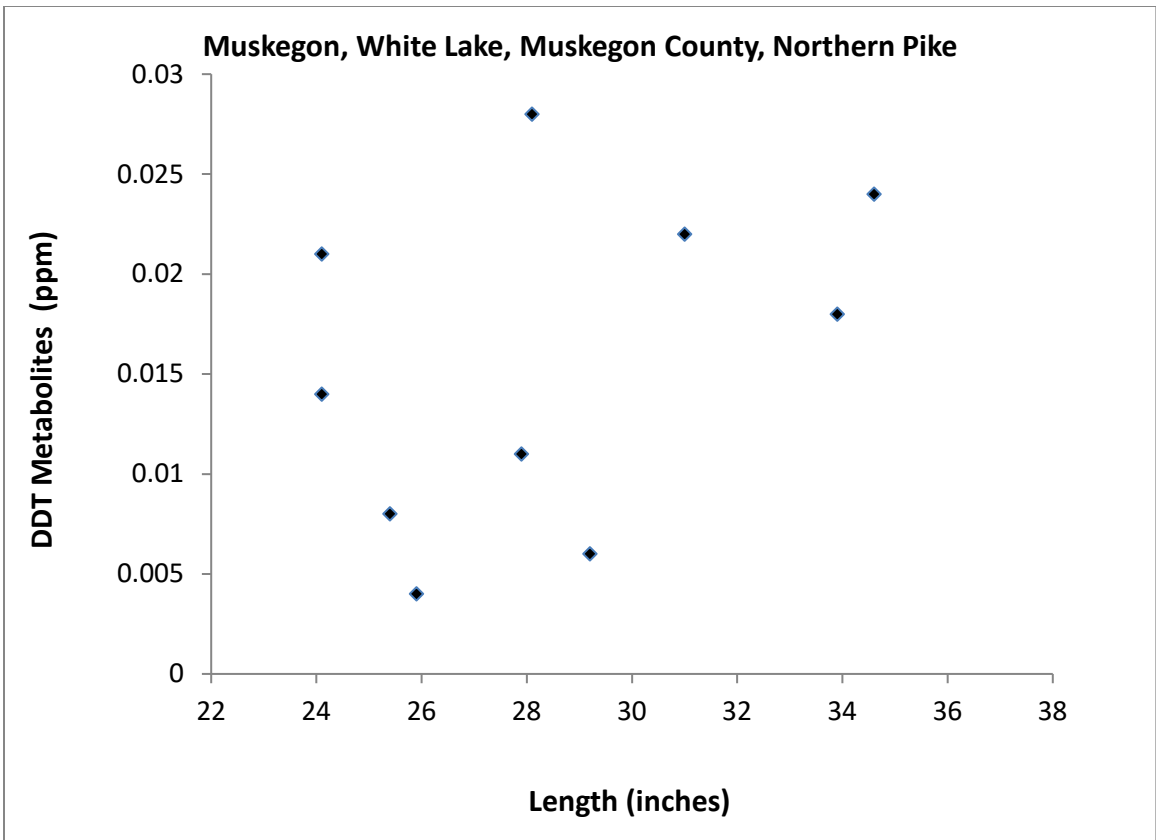
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2007	2007	10	24.1	24.1	34.6	
Datasets available: 1980, 1984, 2007						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.057	0.007	0.124	0.090	2
DDT	10	0.016	0.004	0.028	0.020	16
Chlordane	10	0.002	0.001	0.005	0.003	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.229	0.176				
DDT	0.150	0.137				
Chlordane	0.326	0.295				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Women and children should not eat more than 1 meal per month of White Lake northern pike due to mercury and PCBs.

Recommendation: No one should eat more than 2 meals per month of White Lake northern pike due to mercury and PCBs.





Redhorse Sucker

White Lake

Muskegon County

Hg Analysis:

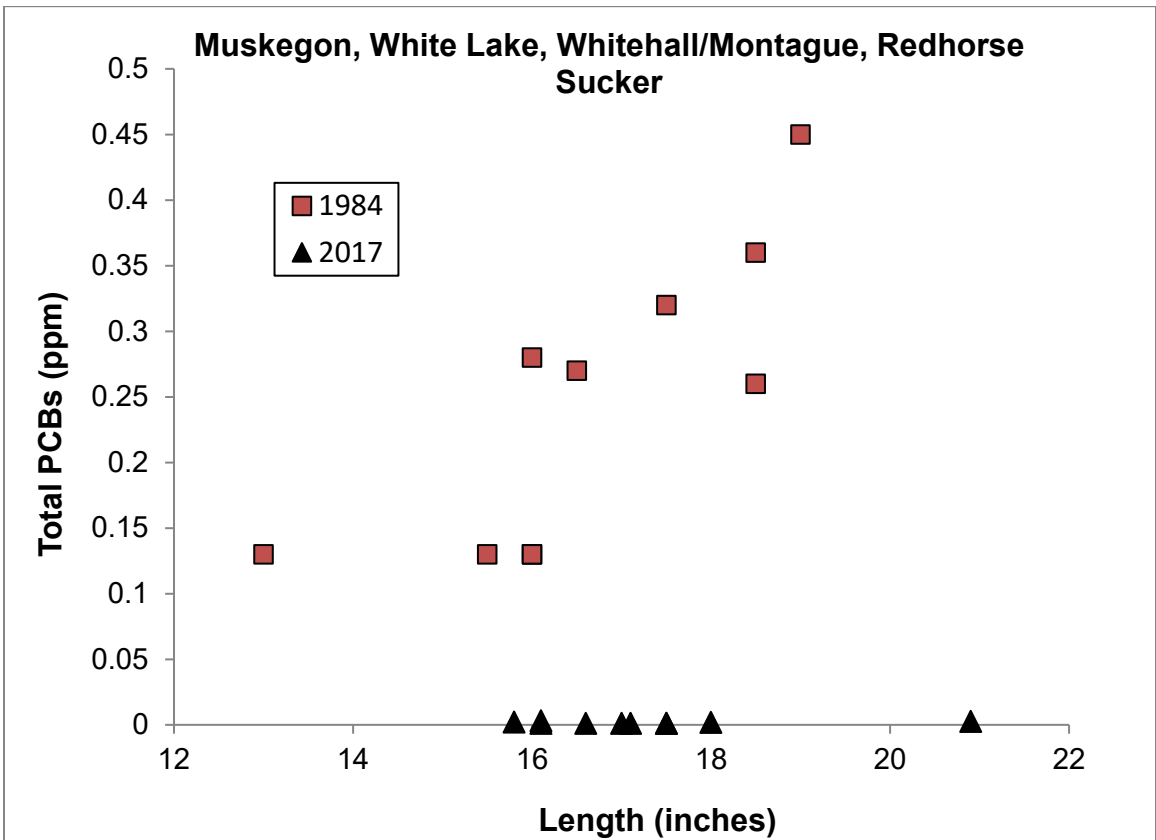
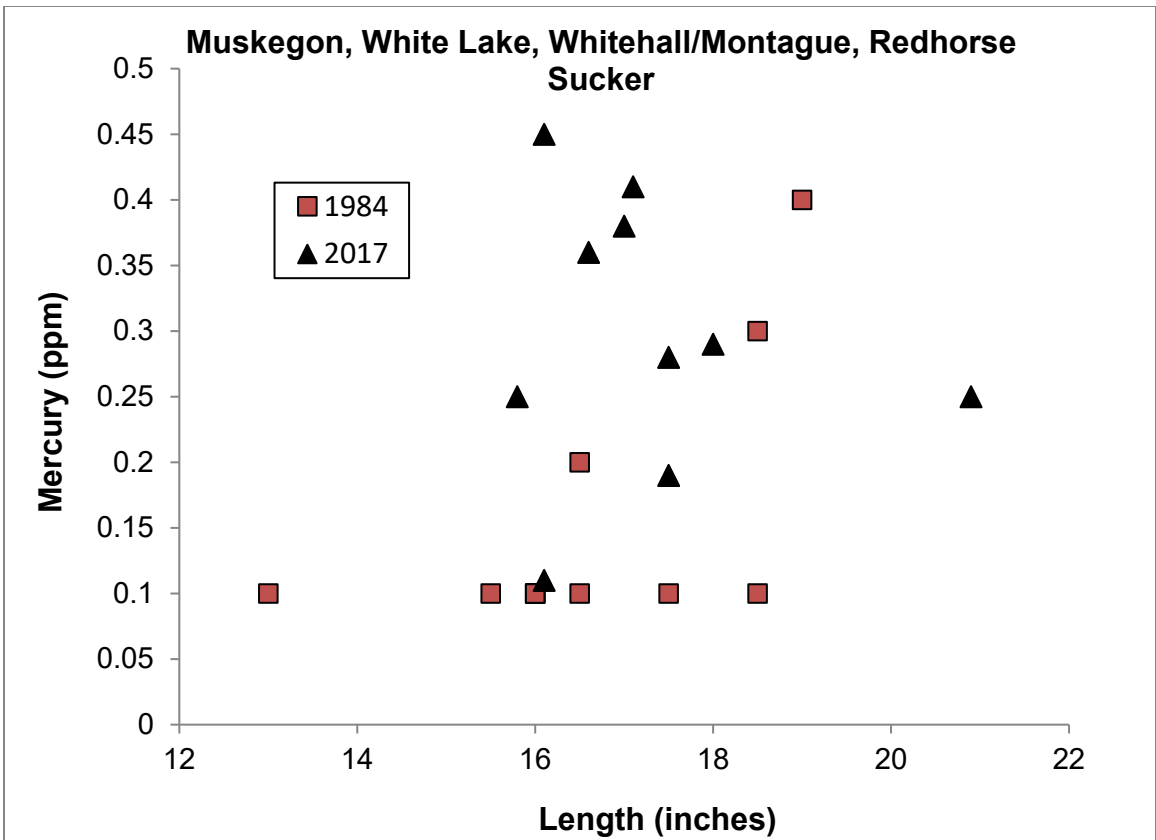
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1984	2017	21	13	na	13	20.9
Datasets available: 1984, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	21	0.22	0.10	0.45	0.28	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.117	0.159				

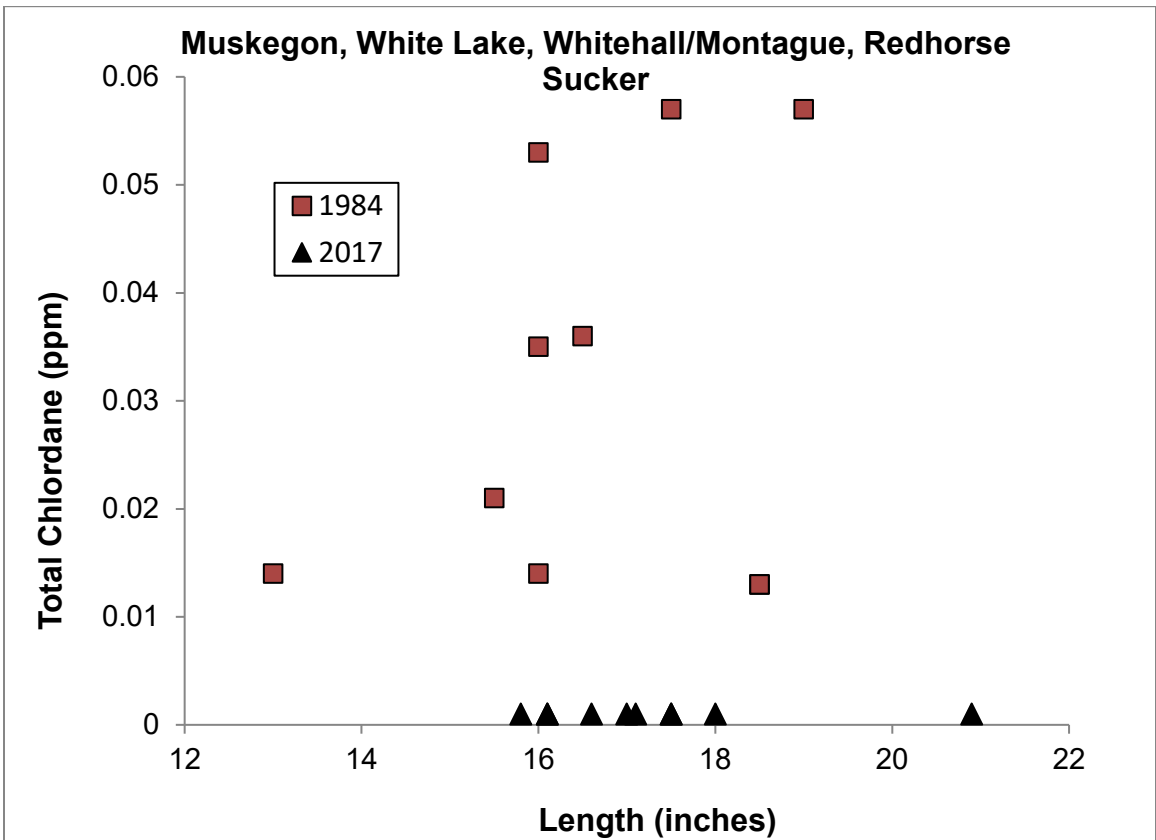
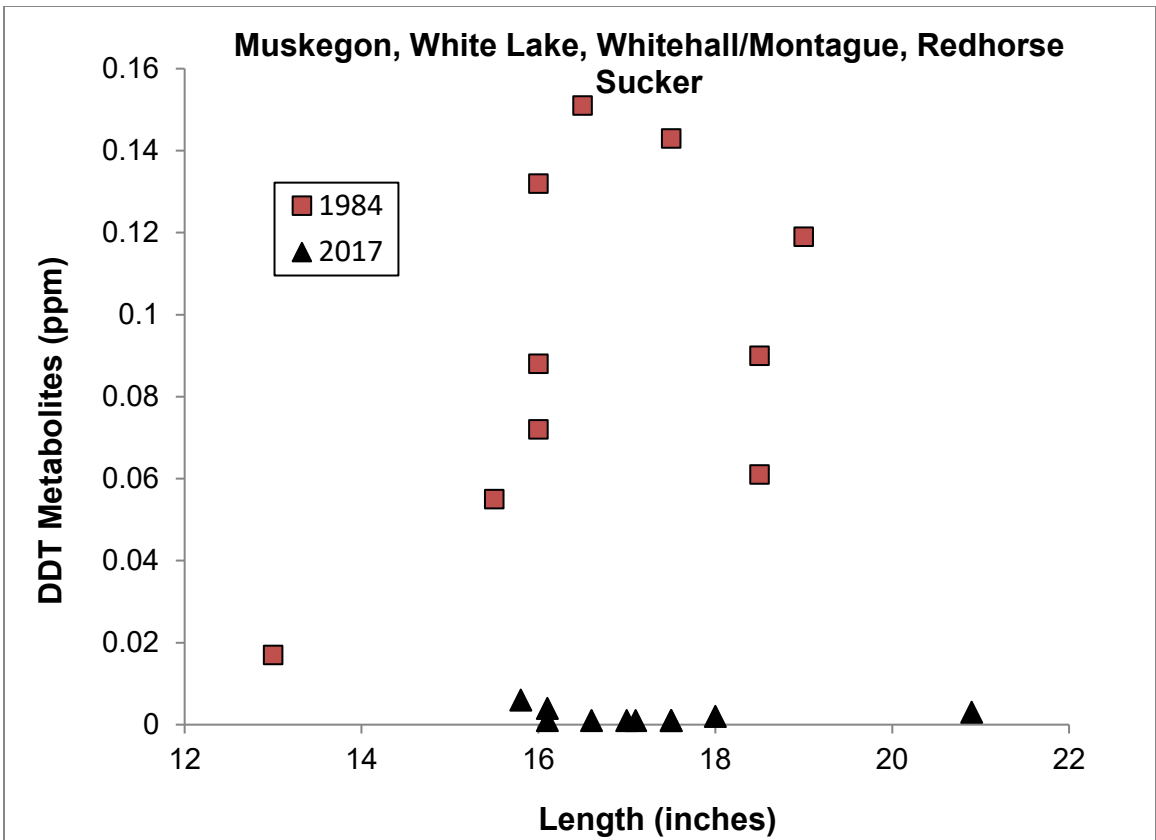
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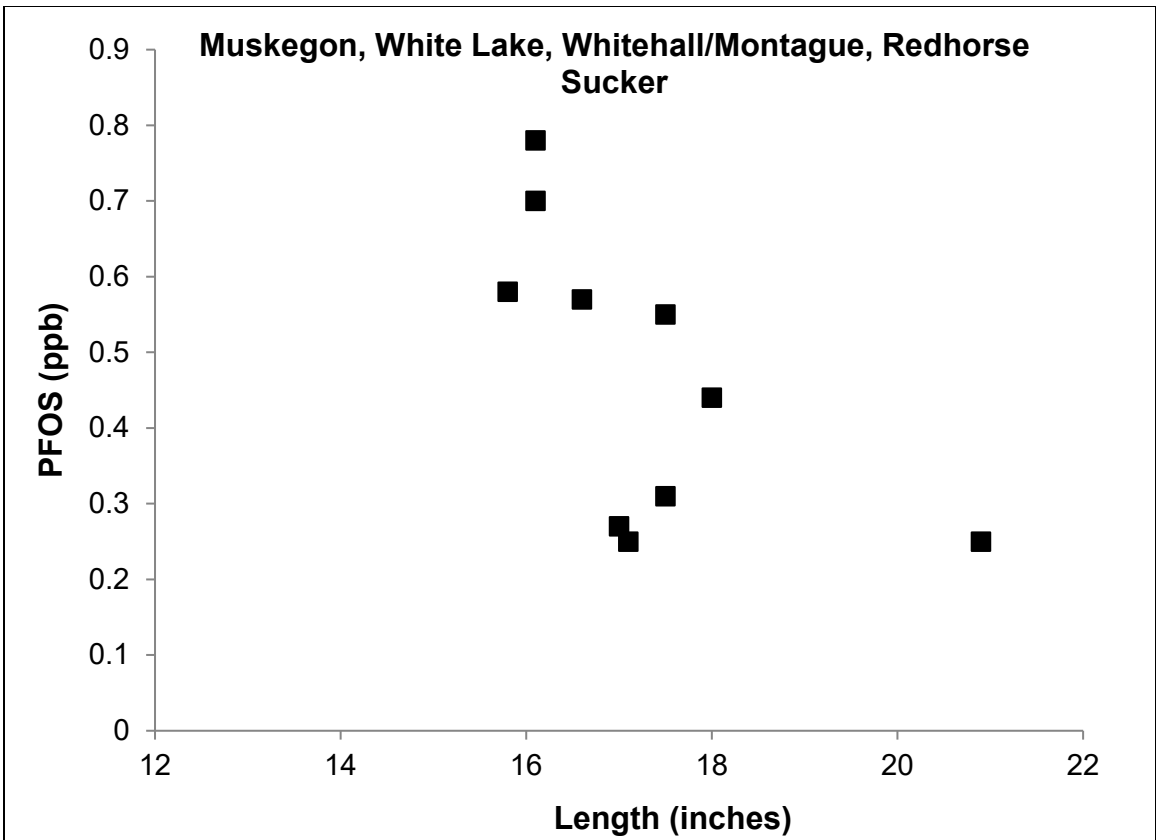
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2017	2017	10	15.8	na	15.8	20.9
Datasets available: 1984, 2017						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.002	< 0.001	0.003	0.002	16
DDT	10	0.002	< 0.001	0.006	0.003	16
Chlordane	10	ND	< 0.001	< 0.001	--	--
Toxaphene	10	ND	< 0.05	< 0.05	--	--
PFOS	10	0.5 ppb	< 0.25 ppb	0.8 ppb	0.7 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.062	0.072				
DDT	0.015	0.001				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.394	0.398				
Final meal category based on UCL:						2

Existing MDHHS Advisory: No one should eat more than 1 meal per month of suckers from White Lake due to PCBs. Mercury would cause an advisory.

Recommendation: No one should eat more than 2 meals per month of suckers from White Lake due to mercury. PCBs can be removed from the list of contaminants causing an advisory.







Walleye

White Lake

Muskegon County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1984	2004	27	15.2	15	15.2	27.2	
Datasets available: 1984, 1987, 1991, 2004							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	27	0.32		0.10	0.64	0.39	2
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
Mercury	0.627	0.643					

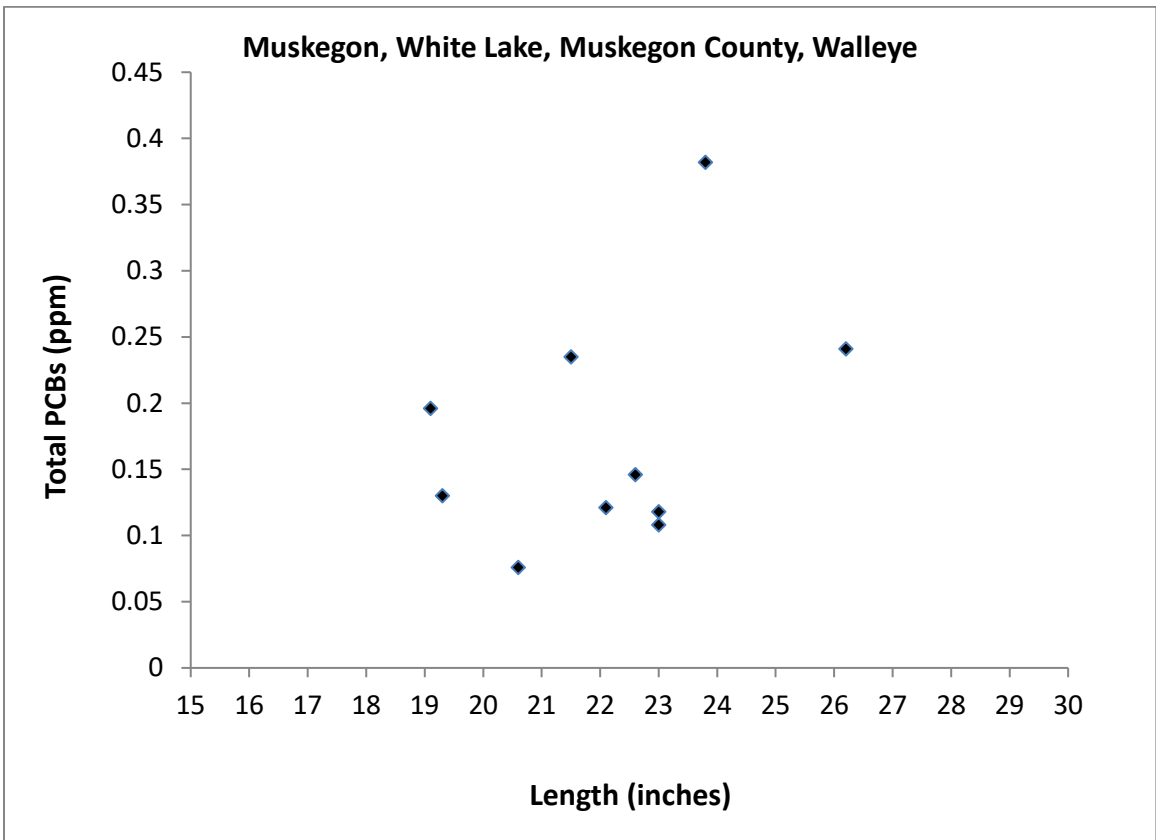
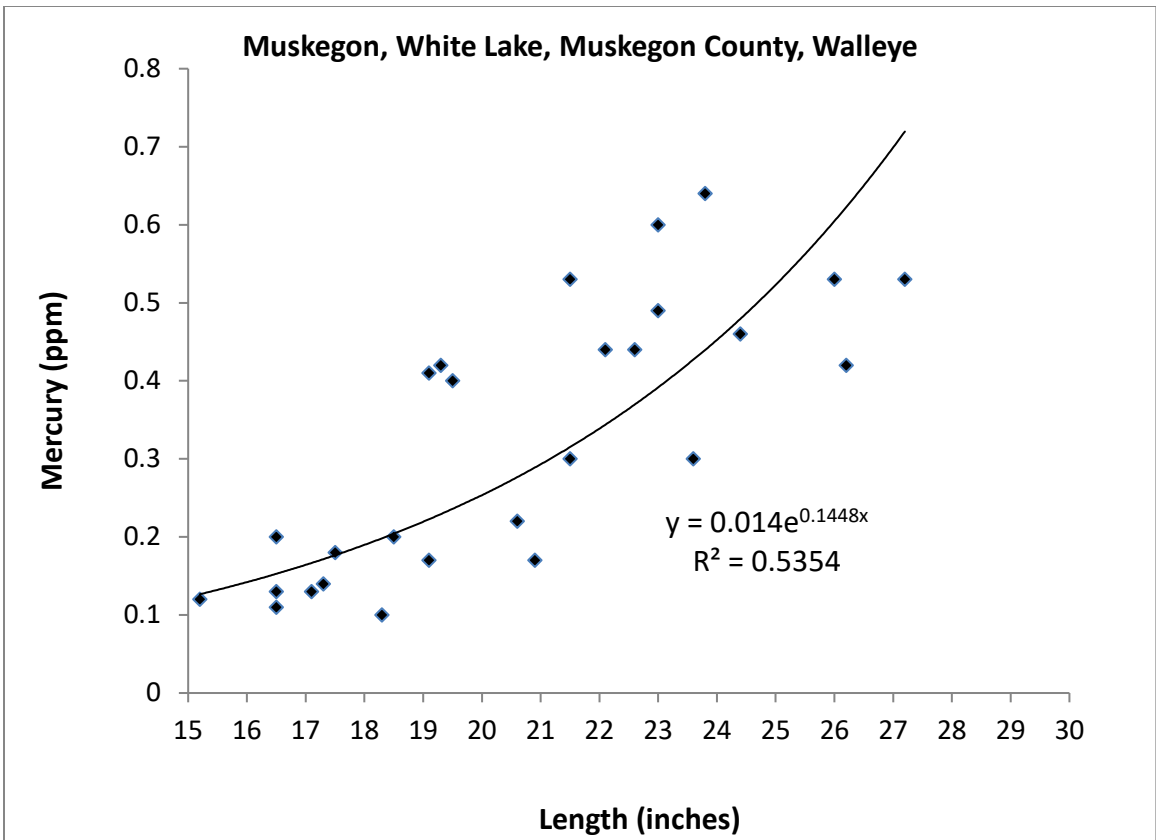
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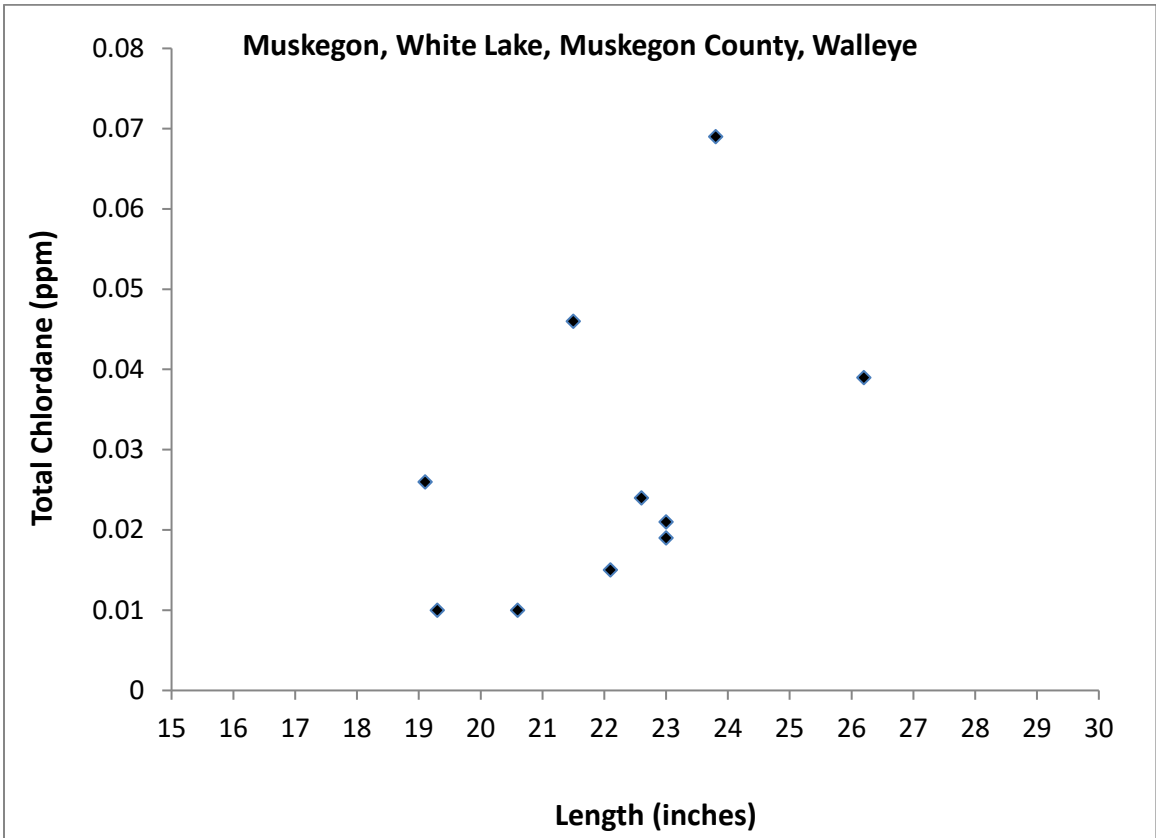
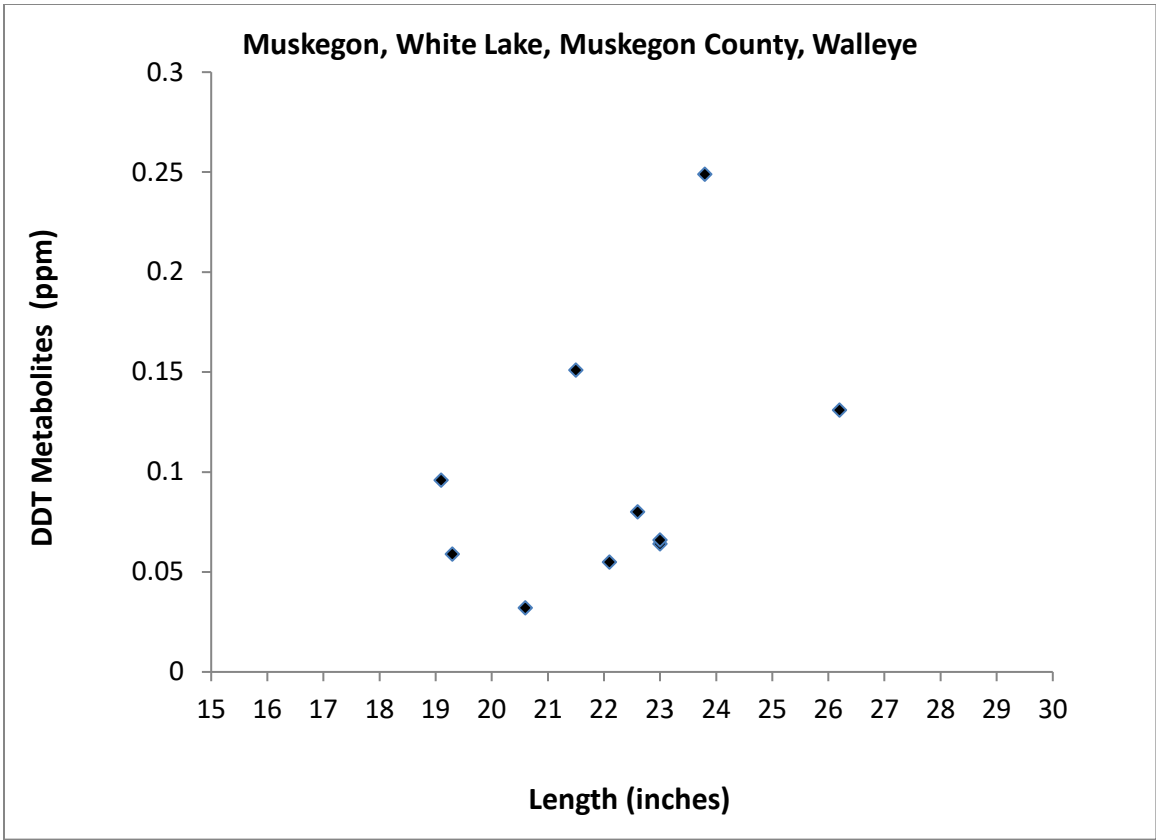
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2004	2004	10	19.1	15	19.1	26.2	
Datasets available: 1984, 1987, 1991, 2004							
Chemical	Sample Size (Legal)	Mean (ppm)		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.175		0.076	0.382	0.240	0.5
DDT	10	0.098		0.032	0.249	0.140	12
Chlordane	10	0.028		0.010	0.069	0.040	--
Toxaphene	10	ND		--	--	--	--
Chemical	Linear Regression	Exponential Regression					
	R ²	R ²					
PCB	0.148	0.134					
DDT	0.169	0.186					
Chlordane	0.231	0.295					
Toxaphene	--	--					
Final meal category based on UCL:							0.5

Existing Advisory: Women and children should not eat more than 1 meal per week of White Lake walleye less than 26 inches or more than 1 meal per month of walleye larger than 26 inches due to mercury and PCBs.

Recommendation: No one should eat more than 6 meals per year of White Lake walleye due to PCBs. Mercury and DDT would cause advisories.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.11	8
16	0.14	4
18	0.19	4
20	0.25	4
22	0.34	2
24	0.45	2
26	0.6	1
28	0.81	1
30	1.08	1
<i>Shaded area denotes extrapolated estimates</i>		





Yellow Perch

White Lake

Muskegon County

Hg Analysis:

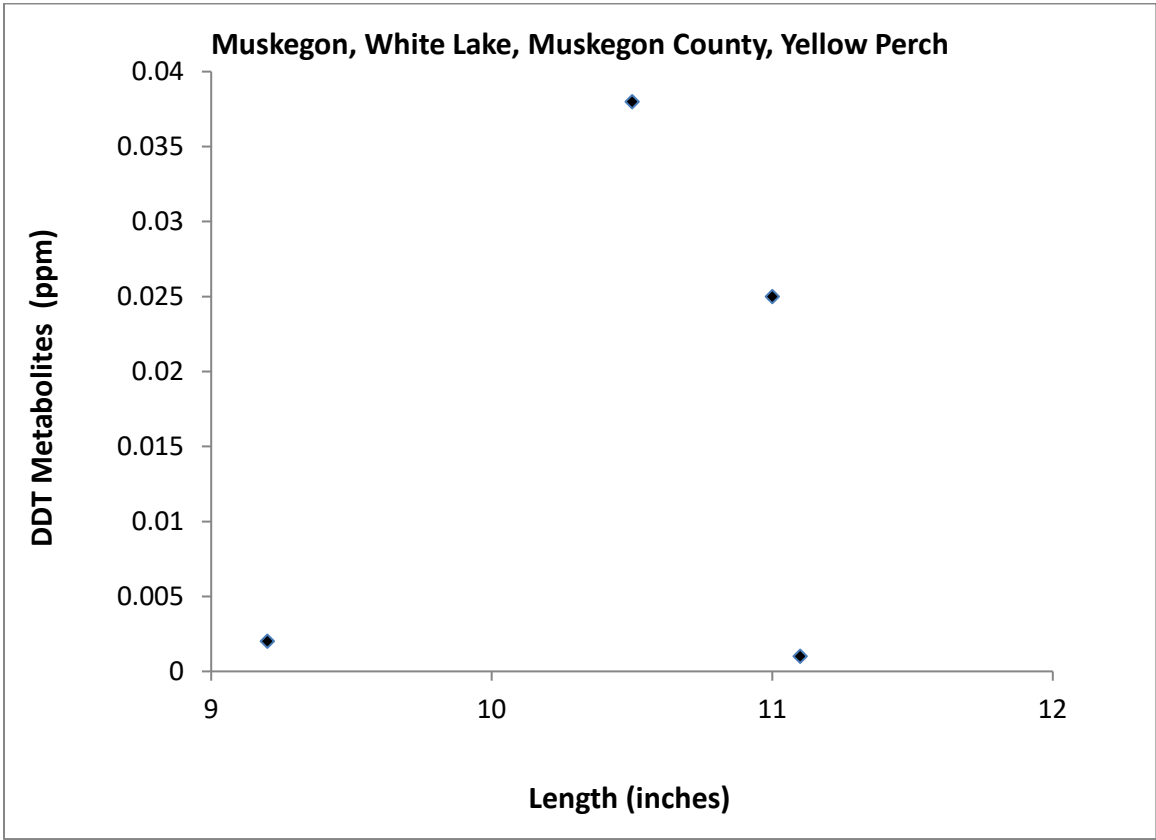
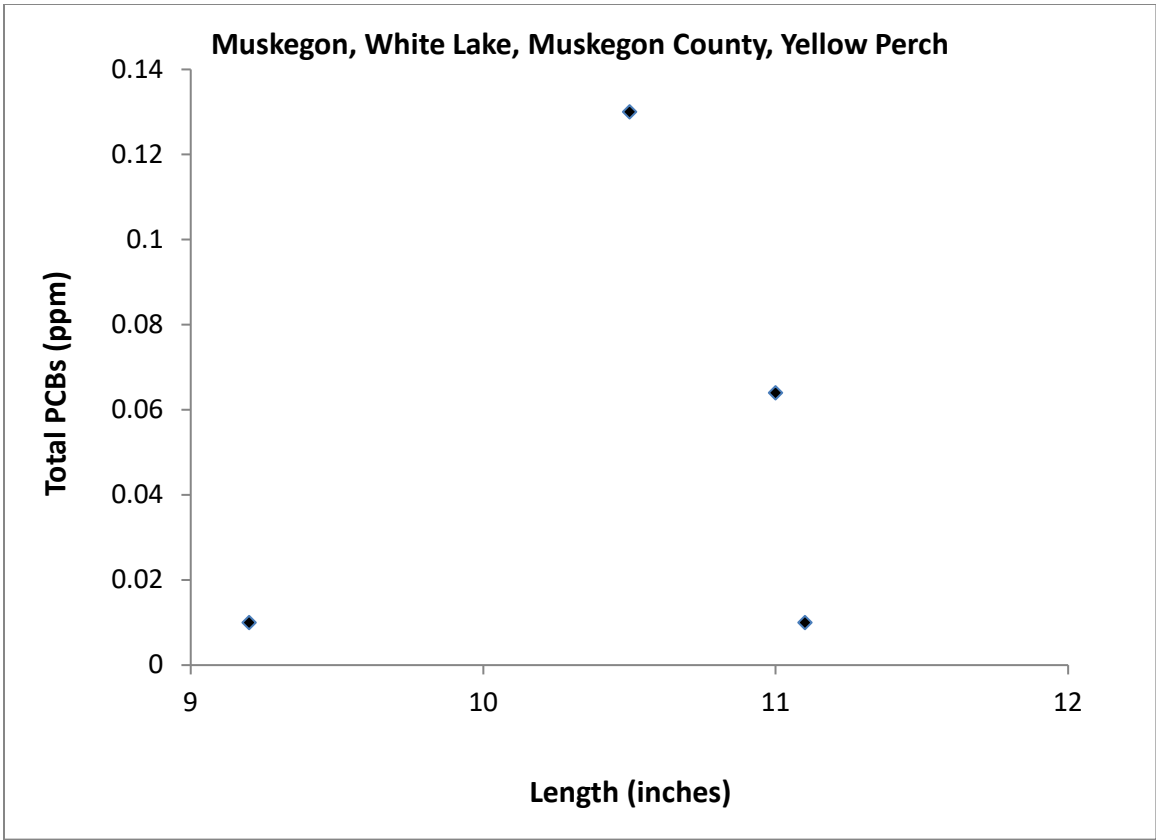
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	na	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

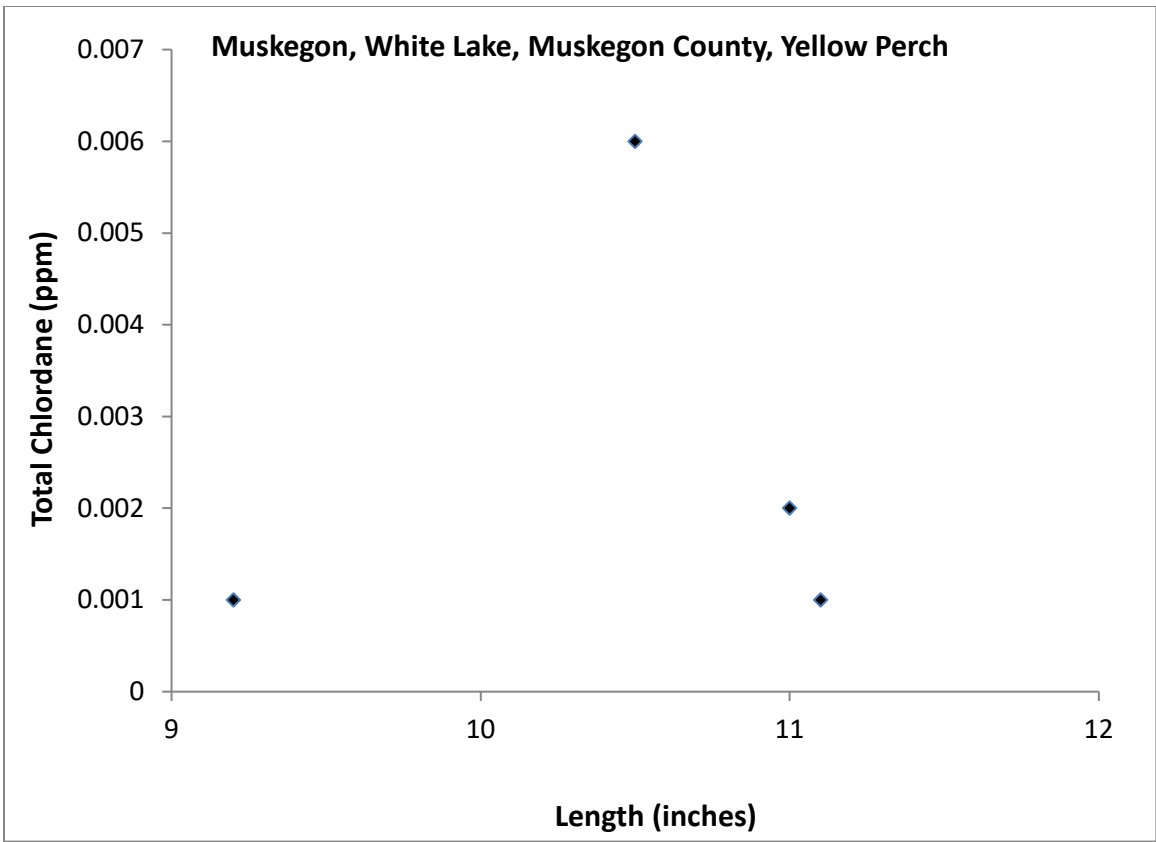
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1980	1980	4	9.2	na	9.2	11.1
Datasets available: 1980						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	0.054	0.010	0.130	--	--
DDT	4	0.017	0.001	0.038	--	--
Chlordane	4	0.003	0.001	0.006	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.057	0.112				
DDT	0.084	0.052				
Chlordane	0.016	0.045				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: White Lake yellow perch are covered under the statewide inland lake mercury advisory.

Recommendation: Insufficient dataset to provide a waterbody-species specific guideline. Statewide guideline applies that recommends no more than four meals per month of any size yellow perch.





Muskegon River Muskegon, Mecosta, and Newaygo Counties

Walleye

**Muskegon River
Croton Dam Impoundment**

Newaygo County

Hg Analysis:

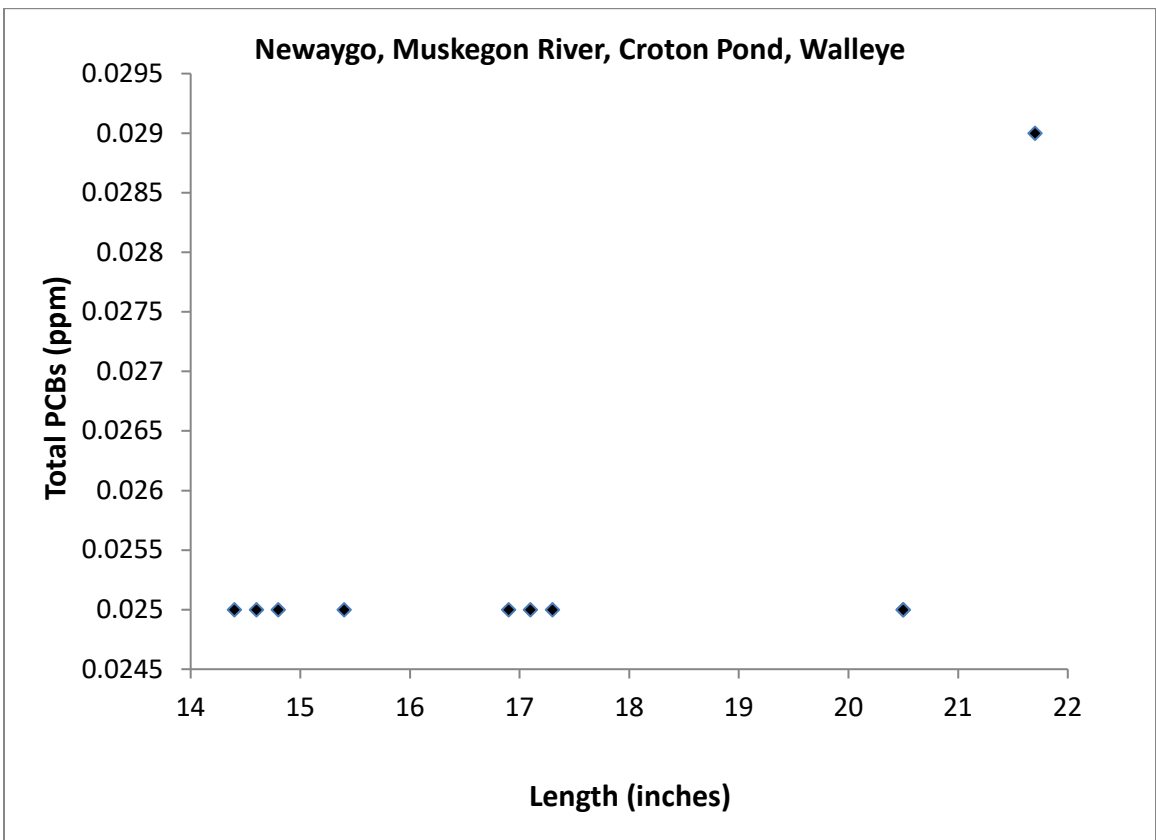
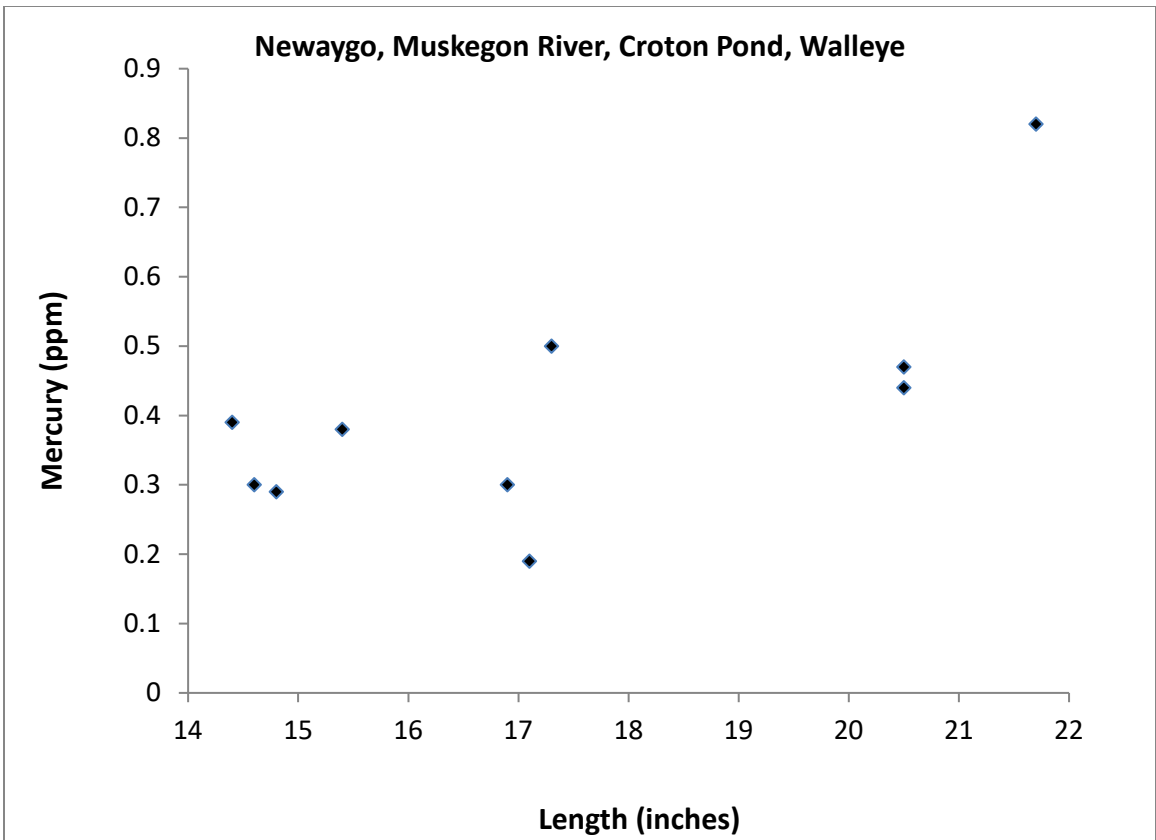
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	14.4	15	14.6	21.7
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.41	0.19	0.82	0.55	1
Chemical	Linear Regression	Exponential Regression				
Mercury	0.474	0.393				

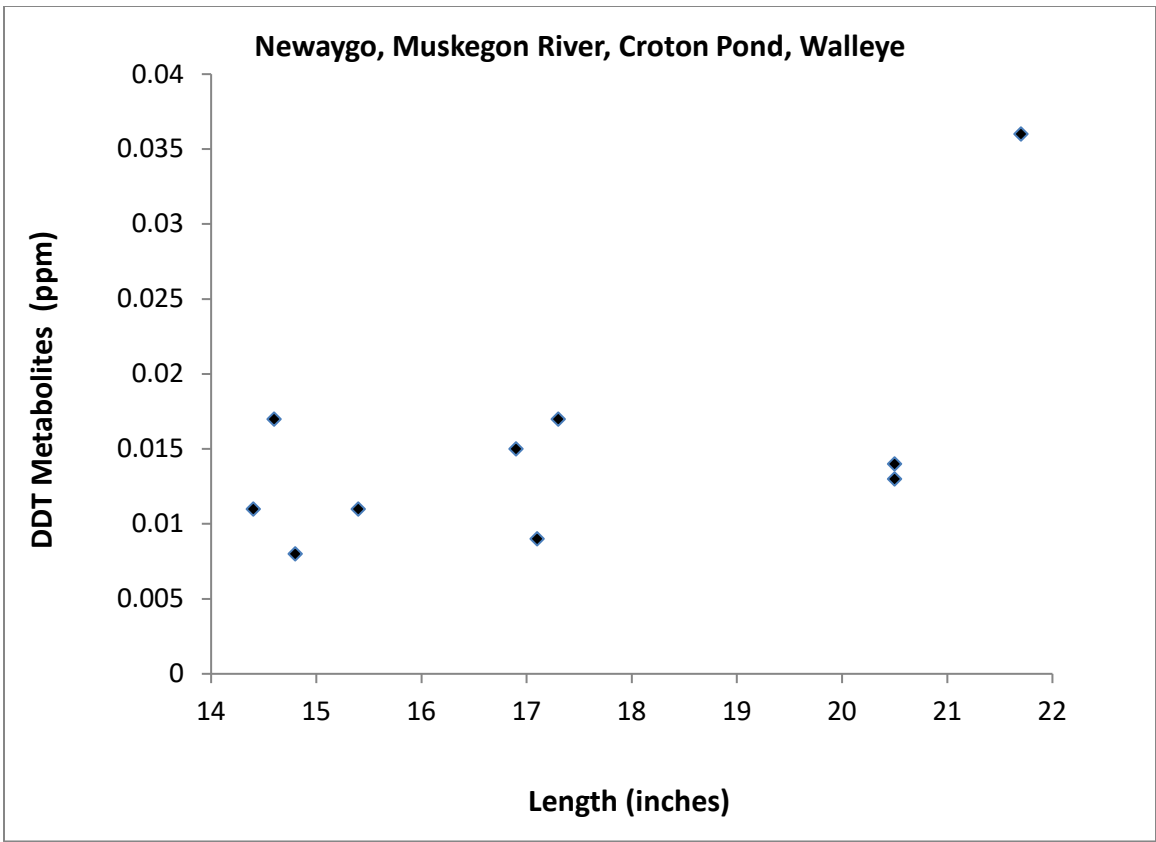
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	14.4	15	14.6	21.7
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.025	0.025	0.029	0.03	8
DDT	9	0.015	0.008	0.036	0.02	16
Chlordane	9	ND	--	--	0.004	--
Toxaphene	9	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.325	0.325				
DDT	0.355	0.345				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Croton Impoundment walleye are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 1 meal per month of walleye from the Muskegon River between Hardy and Croton Dams due to mercury. PCBs would cause an advisory.





White Sucker

**Muskegon River
Croton Dam Impoundment**

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	7	11.2	na	11.2	18.5
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.24	0.06	0.46	0.38	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.533	0.724				

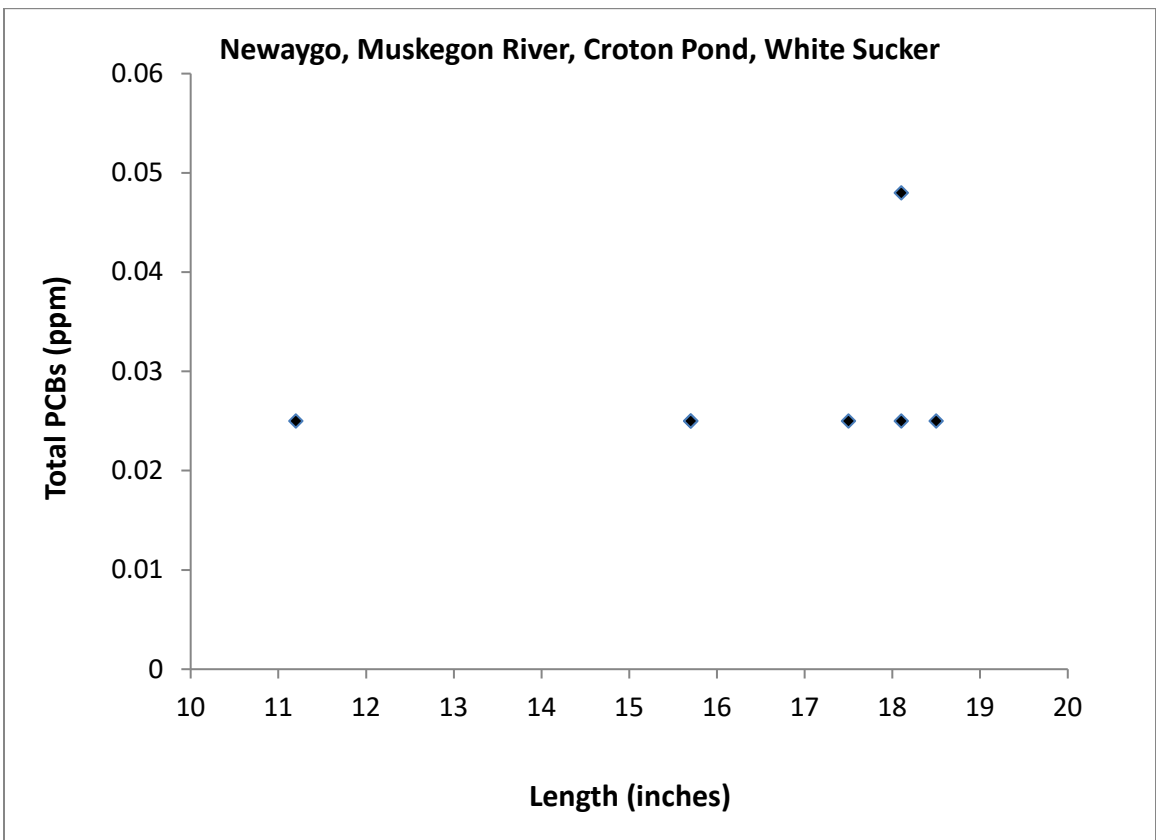
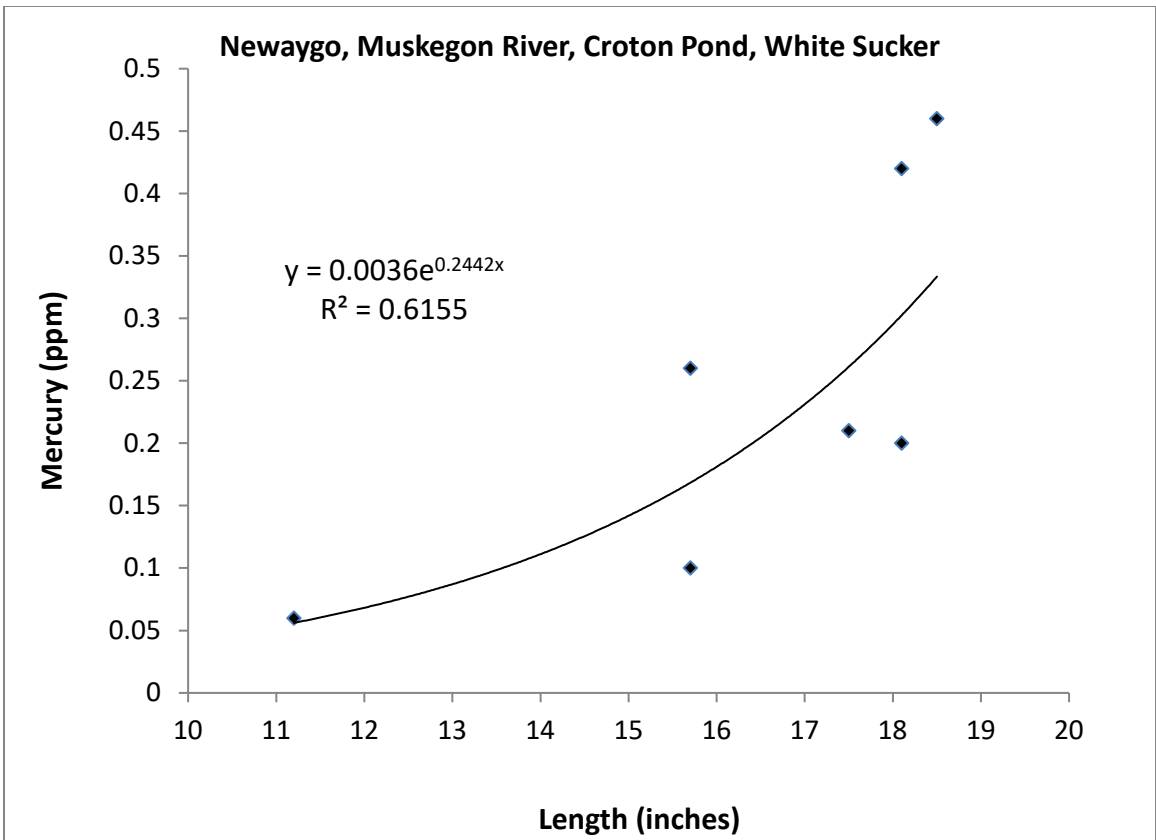
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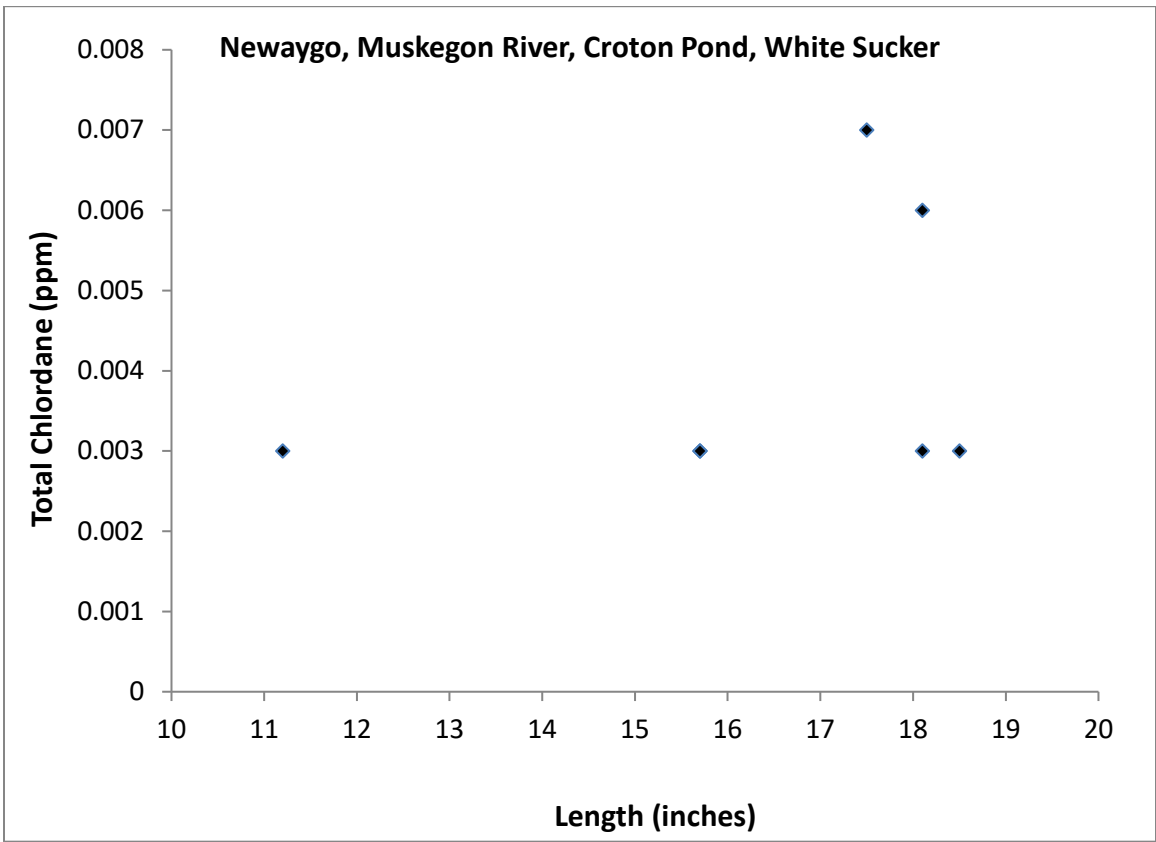
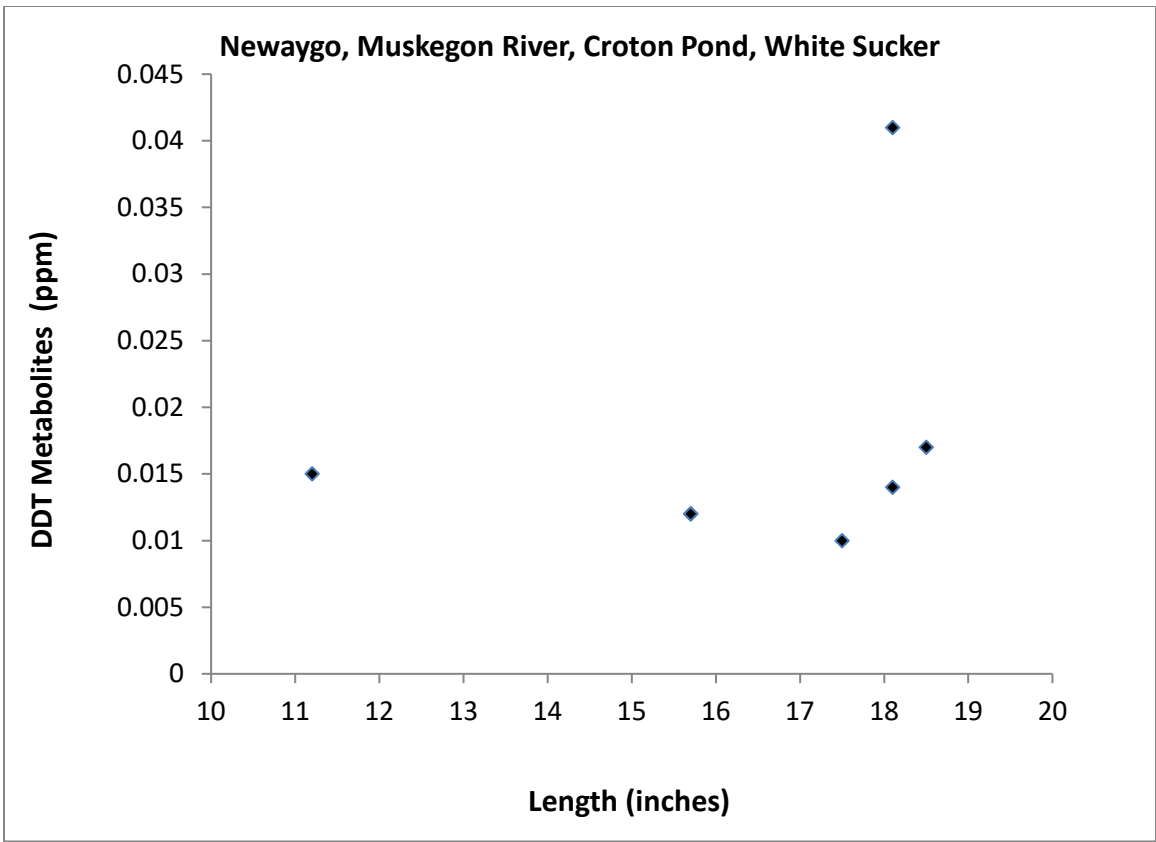
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	7	11.2	na	11.2	18.5
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.028	0.02	0.05	0.04	4
DDT	7	0.017	0.01	0.04	0.03	16
Chlordane	7	0.004	0.003	0.007	0.01	--
Toxaphene	7	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.086	0.086				
DDT	0.076	0.058				
Chlordane	0.127	0.131				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Croton Impoundment sucker are not covered by an advisory.

Recommendation: No one should eat more than 4 meals per month of sucker smaller than 18 inches from the Muskegon River between Hardy and Croton Dams due to PCBs and mercury, or more than 2 meals per month of those fish larger than 18 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
10	0.04	16
11	0.05	16
12	0.07	16
13	0.09	12
14	0.11	8
15	0.14	4
16	0.18	4
17	0.23	4
18	0.29	2
<i>Shaded area denotes extrapolated estimates</i>		





Redhorse Sucker

**Muskegon River
Downstream of Croton Dam**

**Muskegon and Newaygo
Counties**

Hg Analysis:

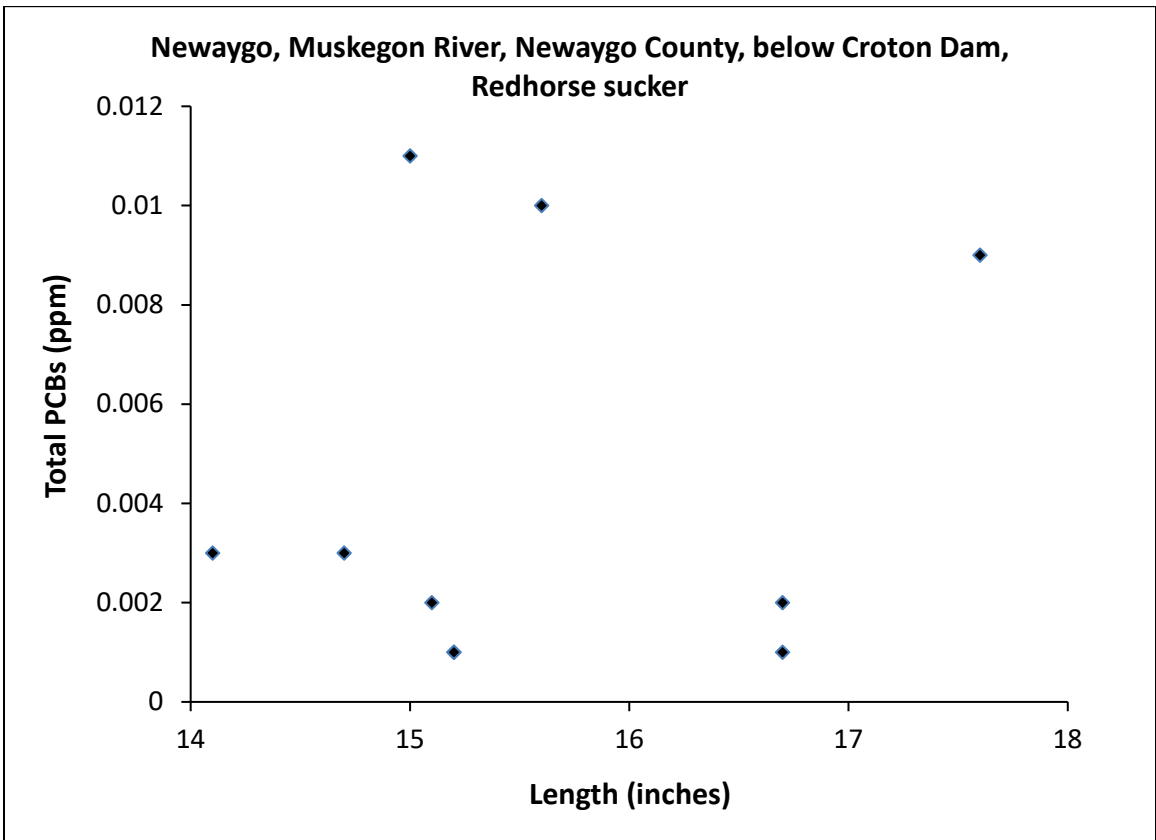
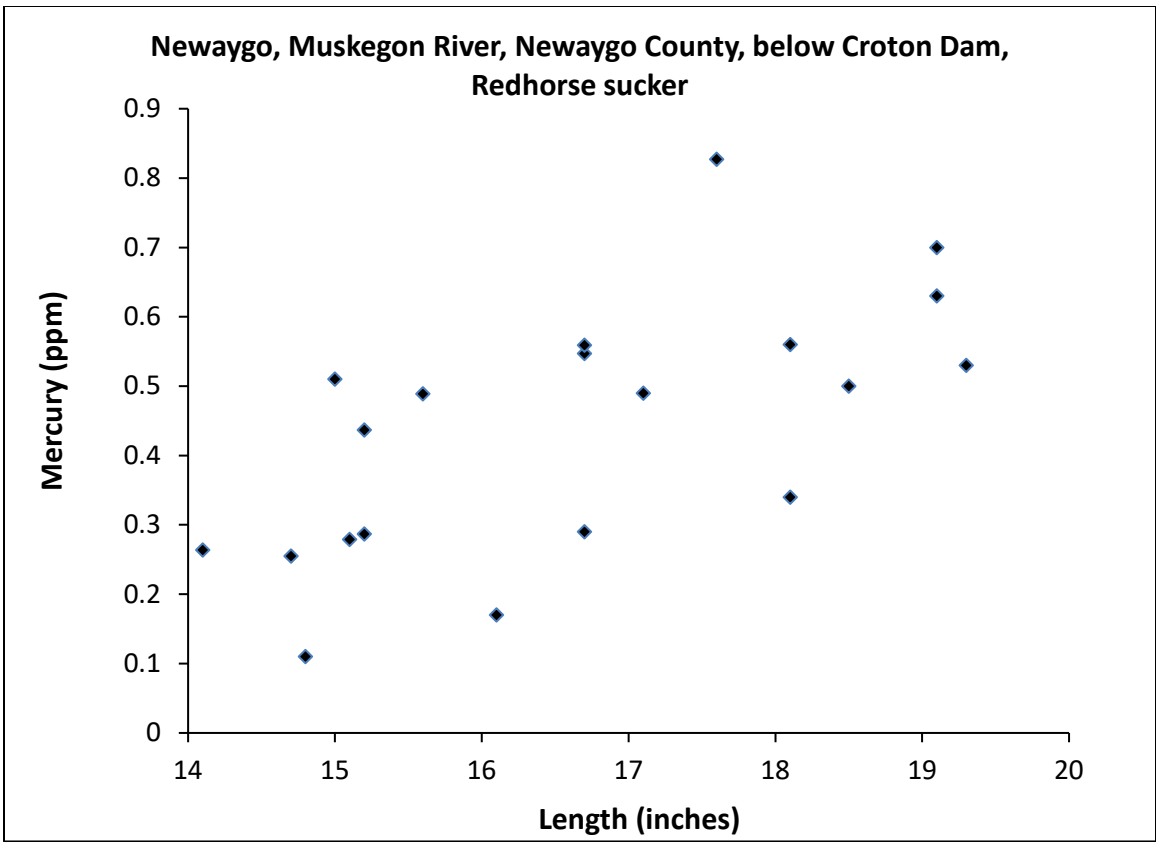
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1996	2008	20	14.1	na	14.1	19.3
Datasets available: 1996, 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.44	0.11	0.83	0.52	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.419	0.383				

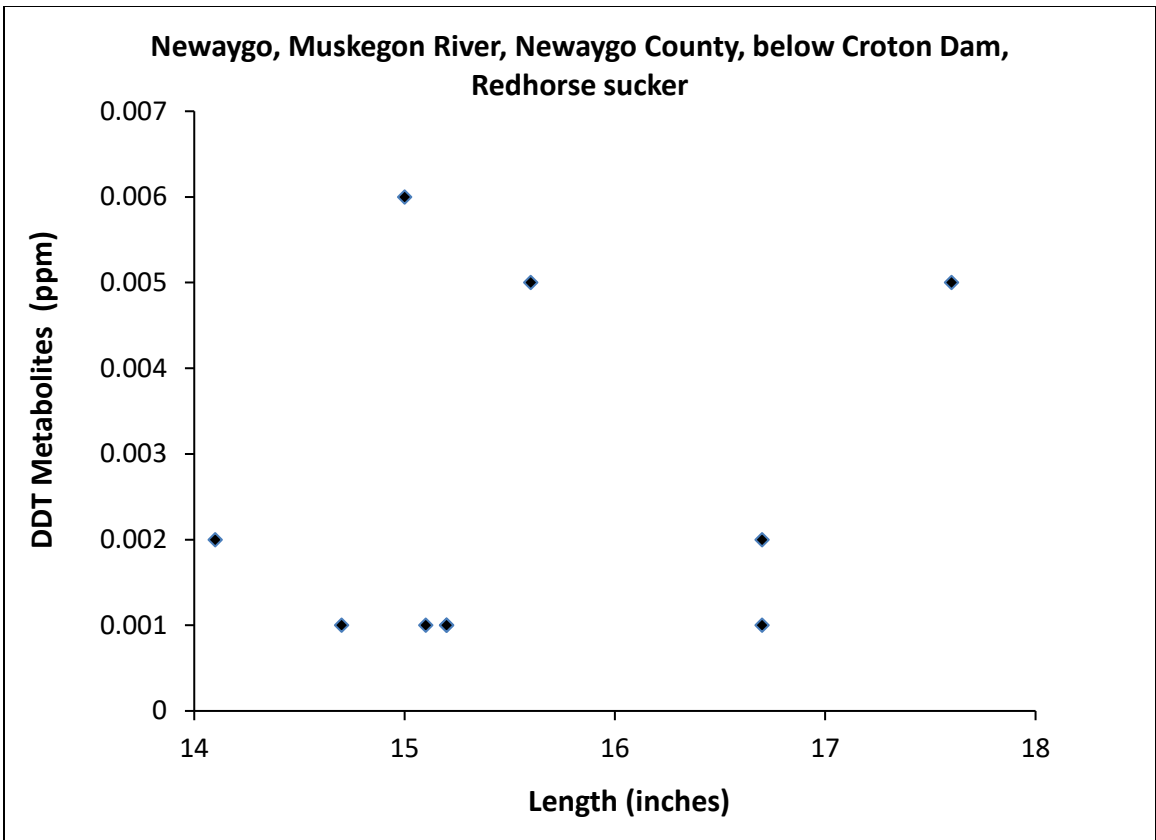
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2008	2008	10	14.1	na	14.1	17.6
Datasets available: 1996, 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.004	0.001	0.01	0.01	16
DDT	10	0.003	0.001	0.006	0.004	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.025	0.008				
DDT	0.059	0.068				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Women and children should not eat more than one meal per month of Muskegon River redhorse sucker between larger than 30 inches due to mercury and PCBs.

Recommendation: No one should eat more than 2 meals per month of sucker from the Muskegon River downstream of the Croton Dam due to mercury.





Walleye

**Muskegon River
Downstream of Croton Dam**

**Muskegon and Newaygo
Counties**

Hg Analysis:

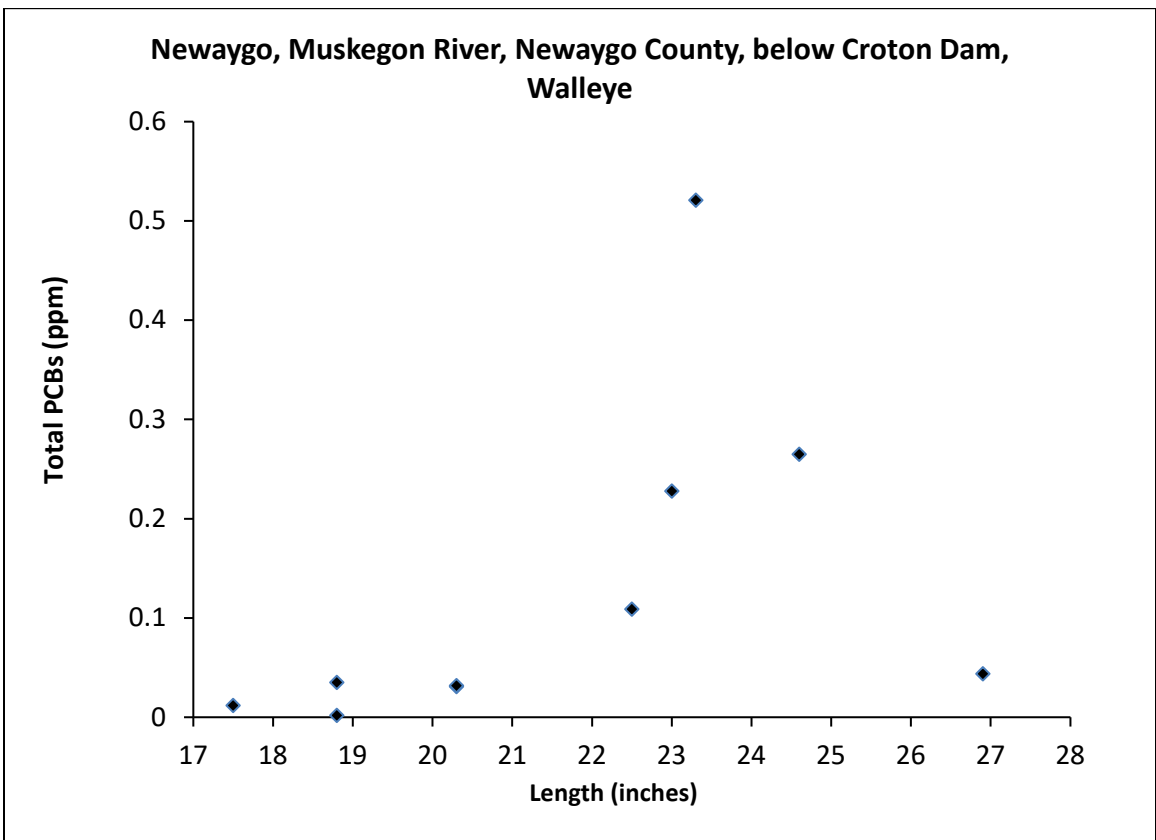
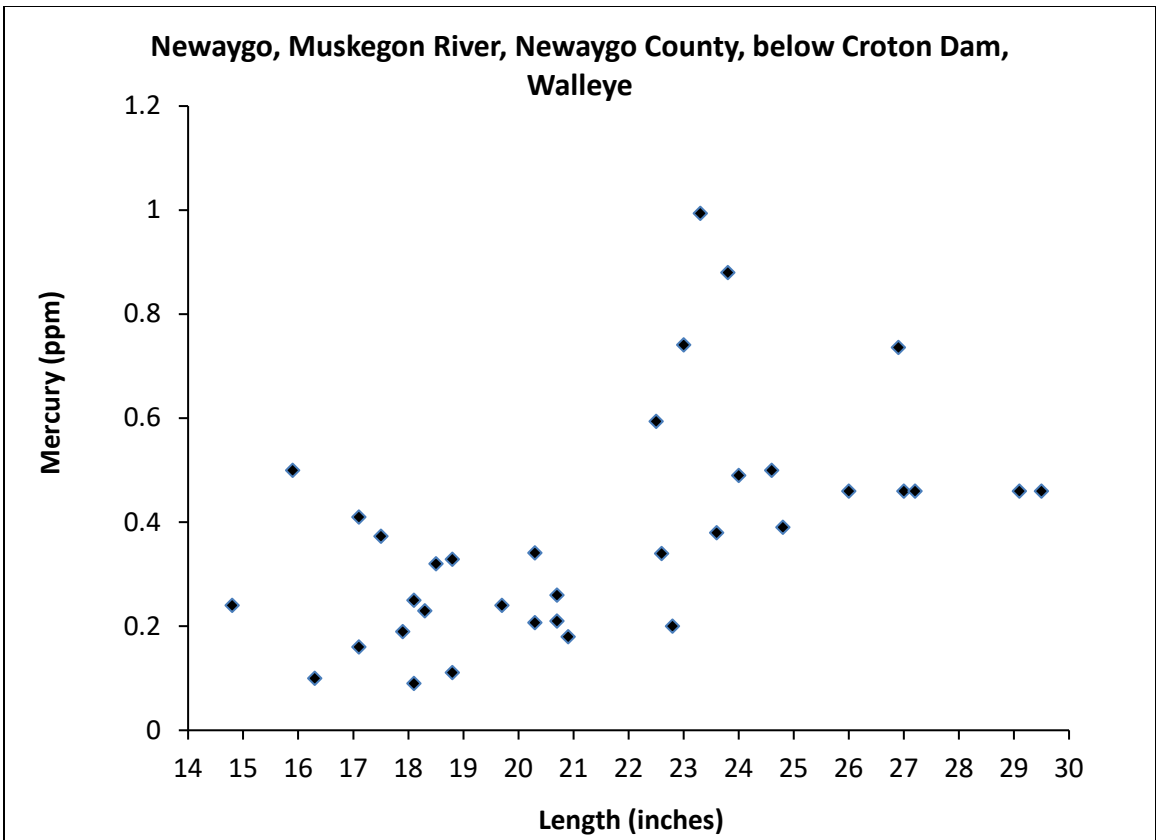
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1993	2008	35	14.8	15	14.8	29.5
Datasets available: 1993, 1996, 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	35	0.38	0.09	0.99	0.45	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.277	0.332				

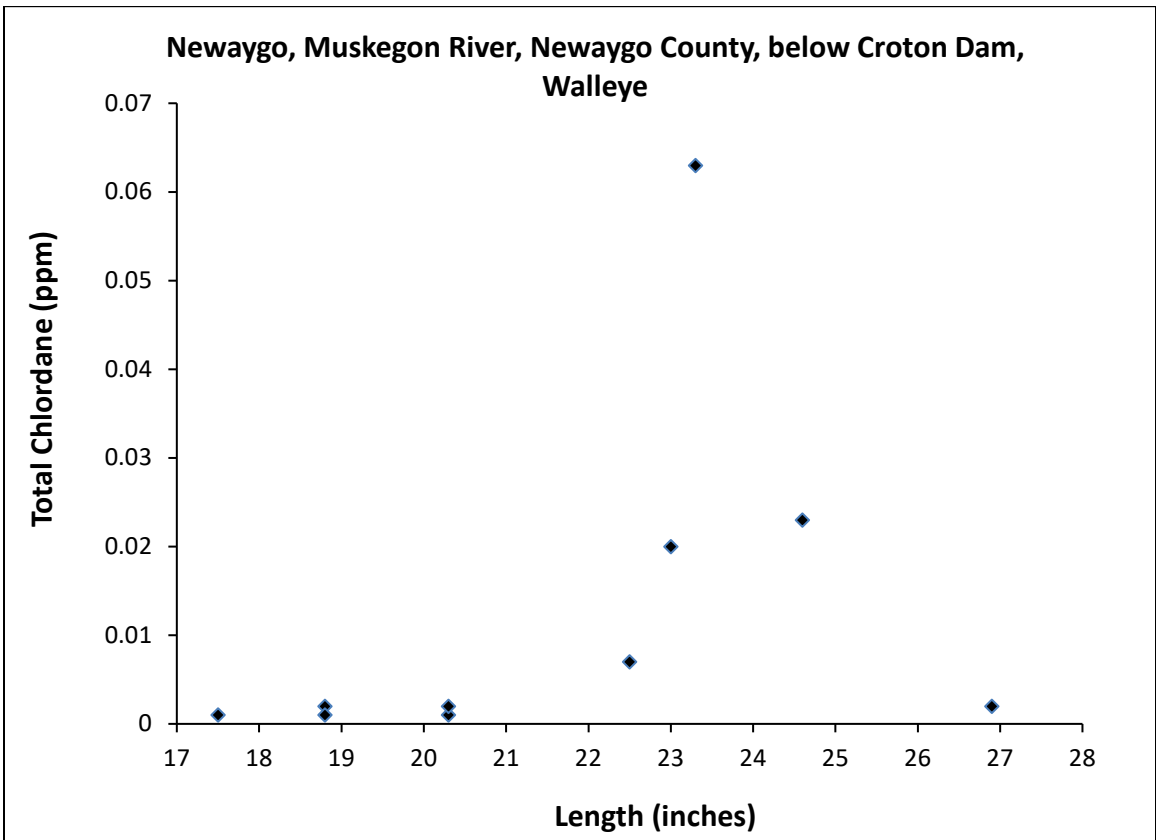
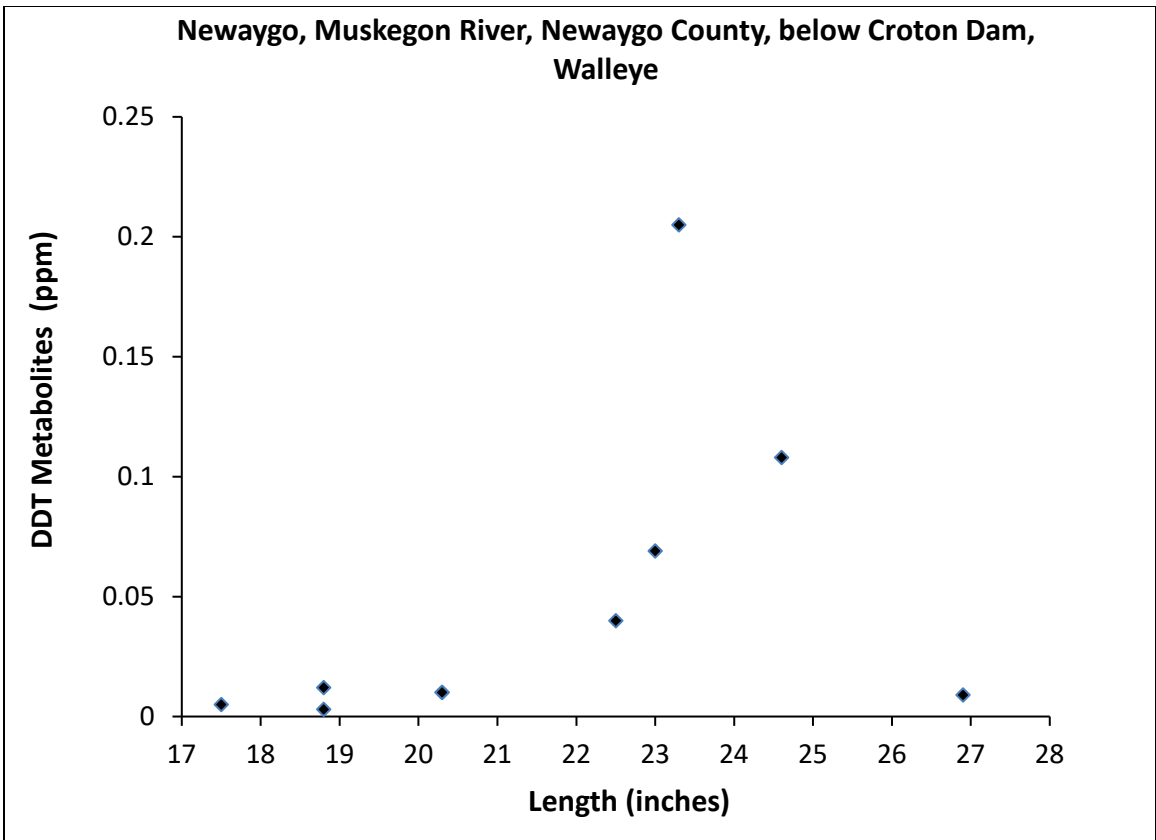
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2008	2008	10	17.5	15	17.5	26.9
Datasets available: 1993, 1996, 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.13	0.001	0.56	0.25	0.5
DDT	10	0.05	0.001	0.44	0.09	16
Chlordane	10	0.01	0.001	0.12	0.03	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.226	0.419				
DDT	0.194	0.329				
Chlordane	0.153	0.331				
Toxaphene	--	--				
Final meal category based on UCL:						0.5

Existing Advisory: Women and children should not eat more than one meal per week of Muskegon River walleye smaller than 18 inches and no more than one meal per month of those fish larger than 18 inches due to PCBs.

Recommendation: No one should eat more than 6 meals per year of walleye from the Muskegon River downstream of Croton Dam due to PCBs. Mercury would cause an advisory.





Bluegill

**Muskegon River
Upstream of Rogers Dam**

Mecosta County

Hg Analysis:

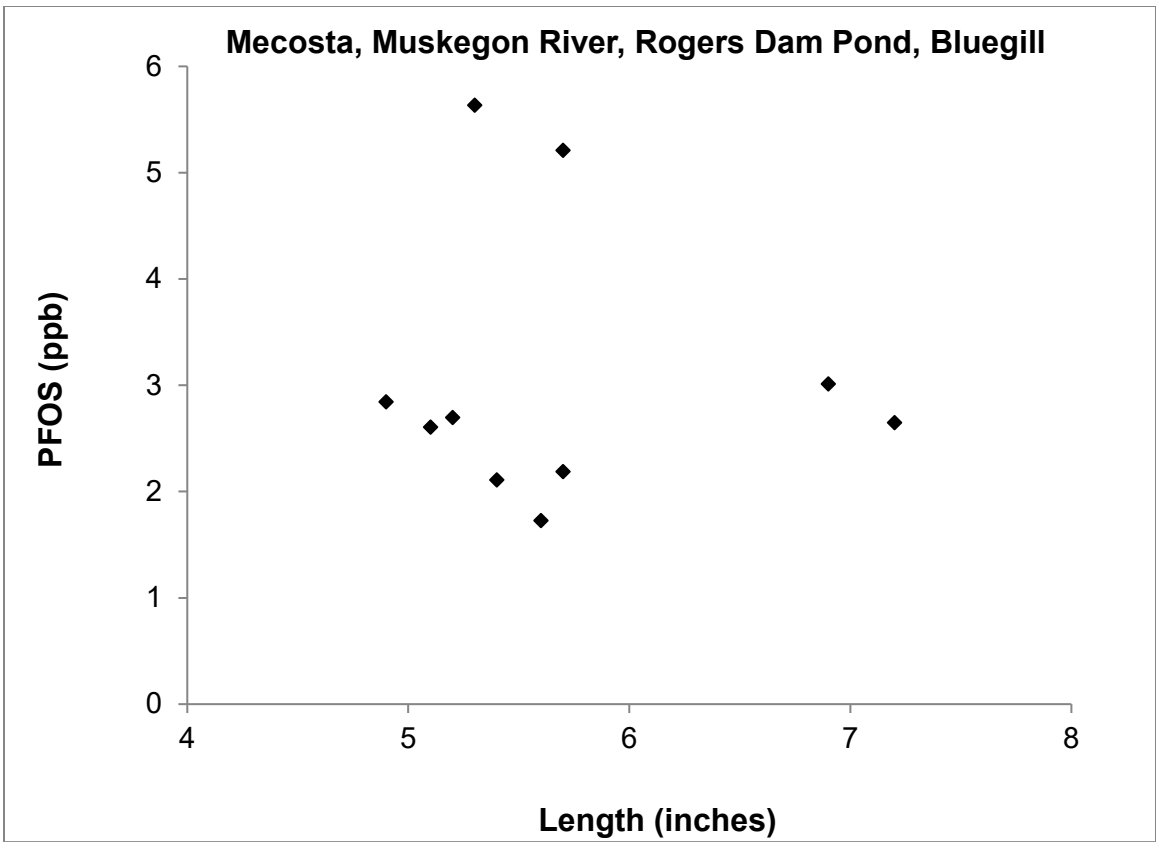
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	--	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	4.9	na	4.9	7.2
Datasets available: 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--
PFOS	10	3 ppb	2 ppb	6 ppb	4 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.005	0.001				
Final meal category based on UCL:						16

Existing Advisory: Muskegon River bluegill and sunfish are covered under the Statewide Guidelines. No one should eat more than 8 meals per month of bluegill, pumpkinseed, or other sunfish due to mercury.

Recommendation: No change is recommended. Bluegill and sunfish are not listed specifically in the Muskegon River guidelines as they are covered under the Statewide Safe Fish Guidelines.



Carp

Muskegon River
Upstream of Rogers Dam

Mecosta County

Hg Analysis:

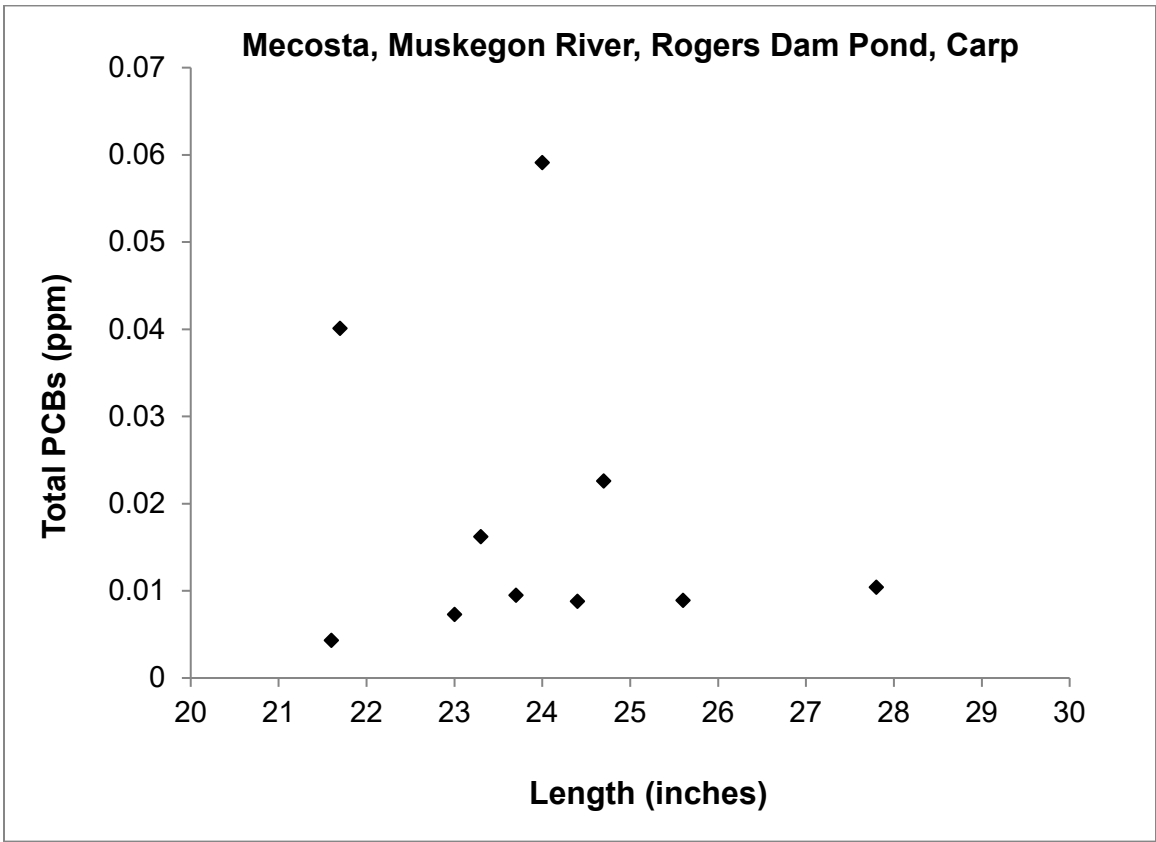
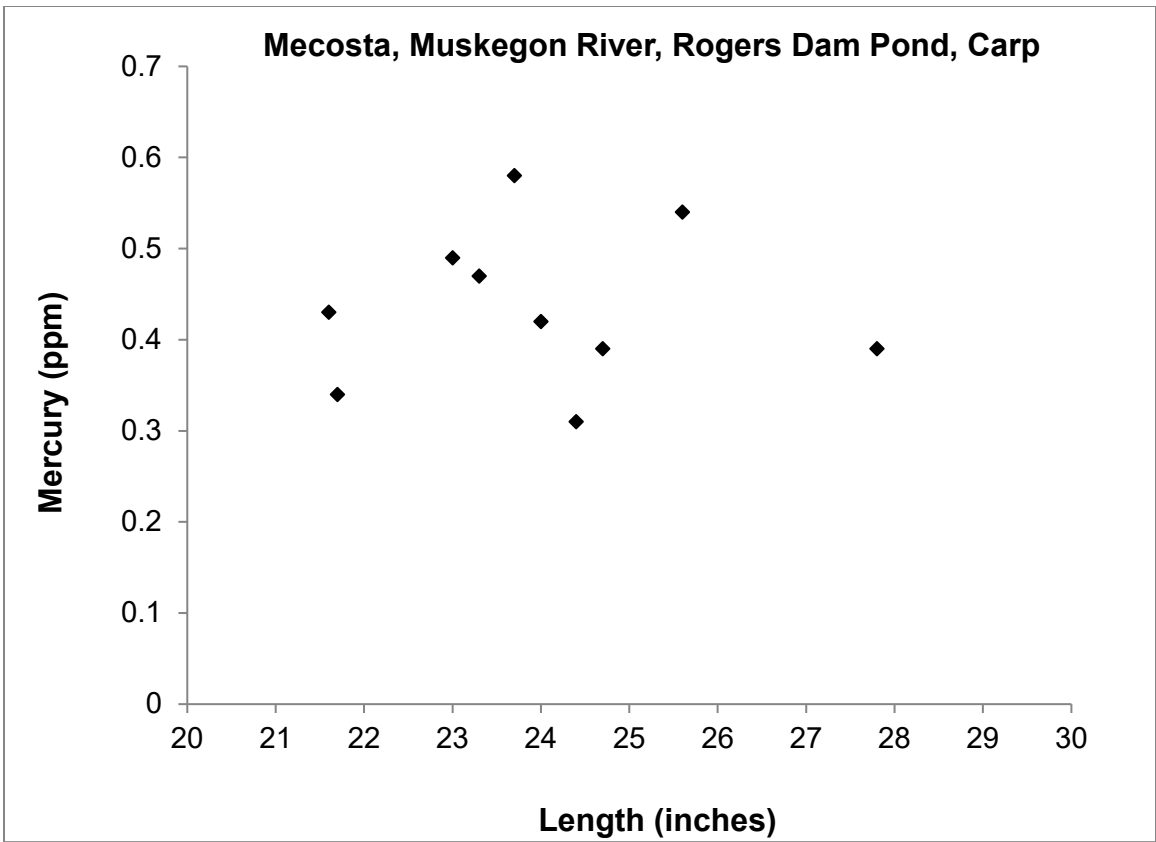
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	21.6	na	21.6	27.8
Datasets available: 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.44	0.31	0.58	0.50	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.000	0.000				

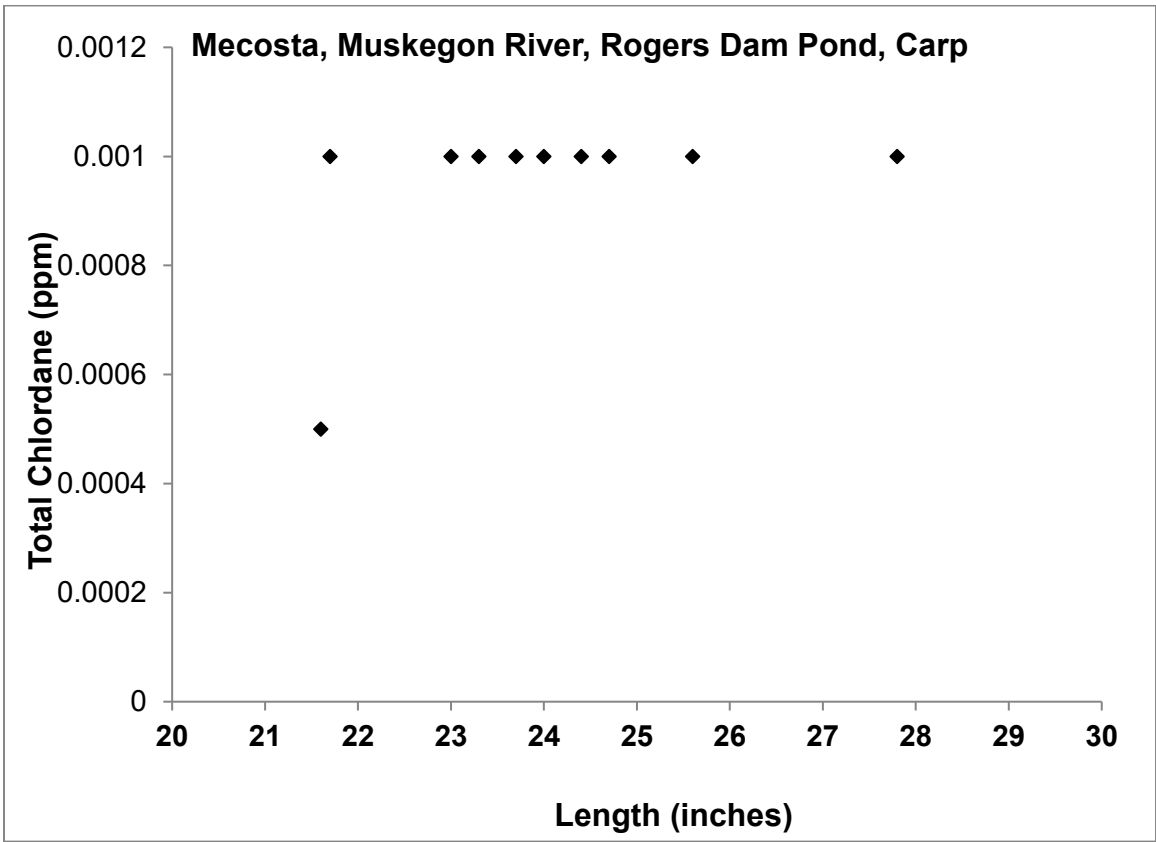
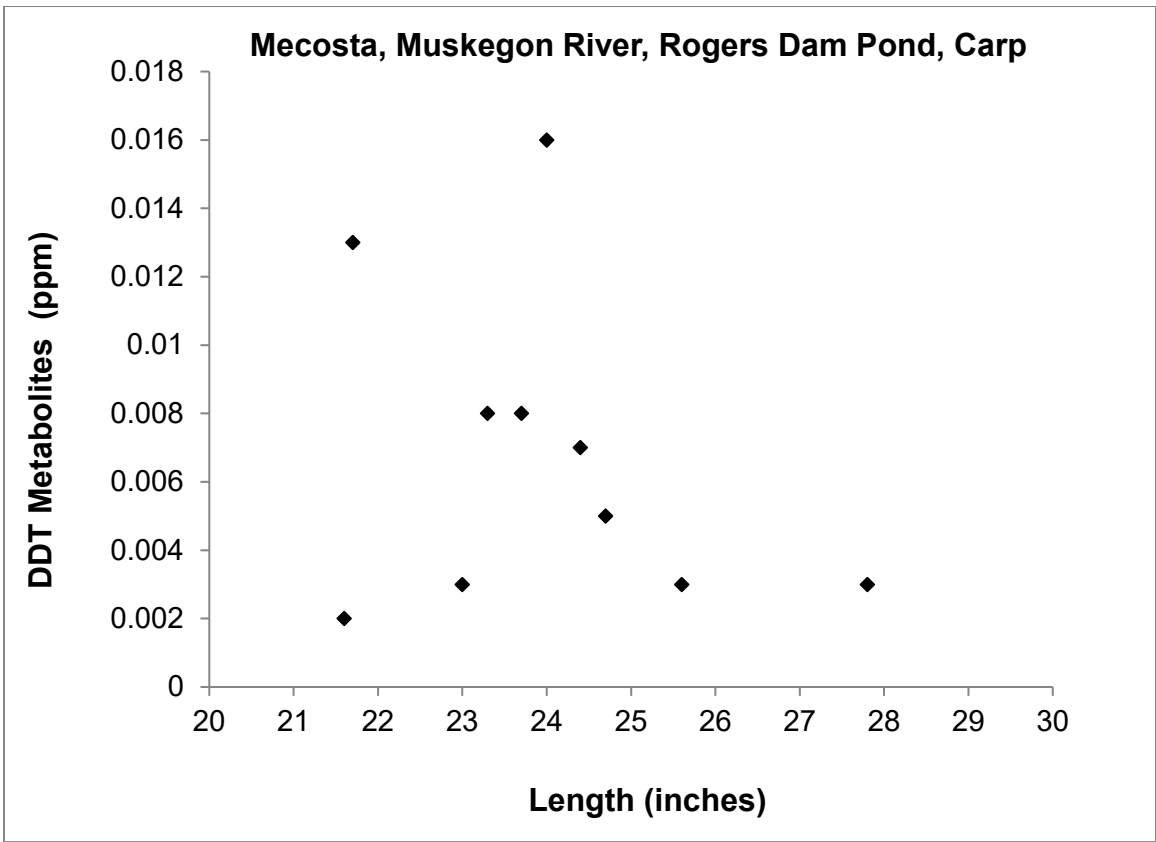
Organics Analysis:

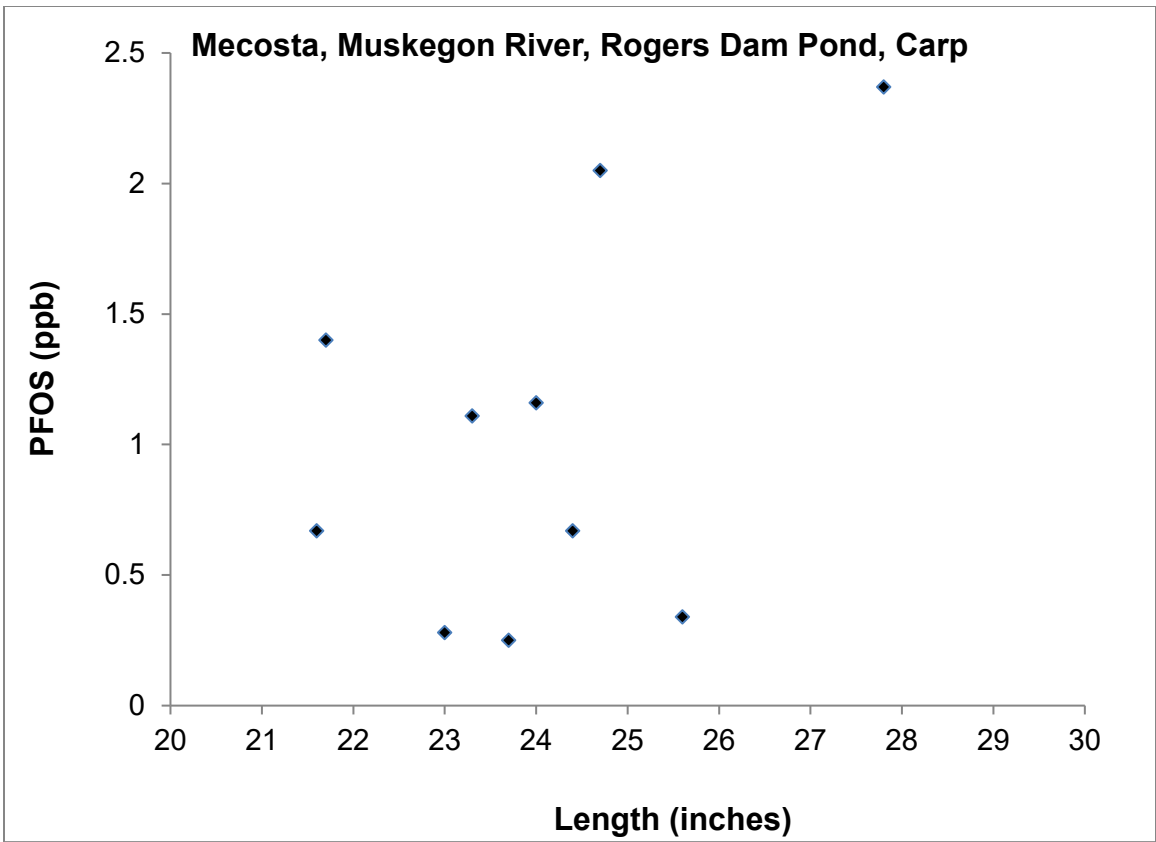
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	21.6	na	21.6	27.8
Datasets available: 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.019	0.004	0.06	0.03	4
DDT	10	0.007	0.002	0.02	0.01	16
Chlordane	10	0.001	0.0005	0.001	0.001	--
Toxaphene	10	ND	--	--	--	--
PFOS	10	1 ppb	<0.25 ppb	2 ppb	2 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.026	0.002				
DDT	0.081	0.050				
Chlordane	0.208	0.208				
Toxaphene	--	--				
PFOS	0.204	0.075				
Final meal category based on UCL:						2

Existing Advisory: Rogers Dam Pond carp are covered under the Statewide Guidelines. No one should eat more than 2 meals per month of carp due to PCBs.

Recommendation: No one should eat more than 2 meals per month of carp from the Muskegon River upstream of the Rogers Dam due to mercury. PCBs would cause an advisory.







**Largemouth
and Smallmouth Bass
Hg Analysis:**

**Muskegon River
Upstream of Rogers Dam**

Mecosta County

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	14.6	14	14.6	17.8
Datasets available: 2013						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.58	0.28	0.92	0.74	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.799	0.790				

Organics Analysis:

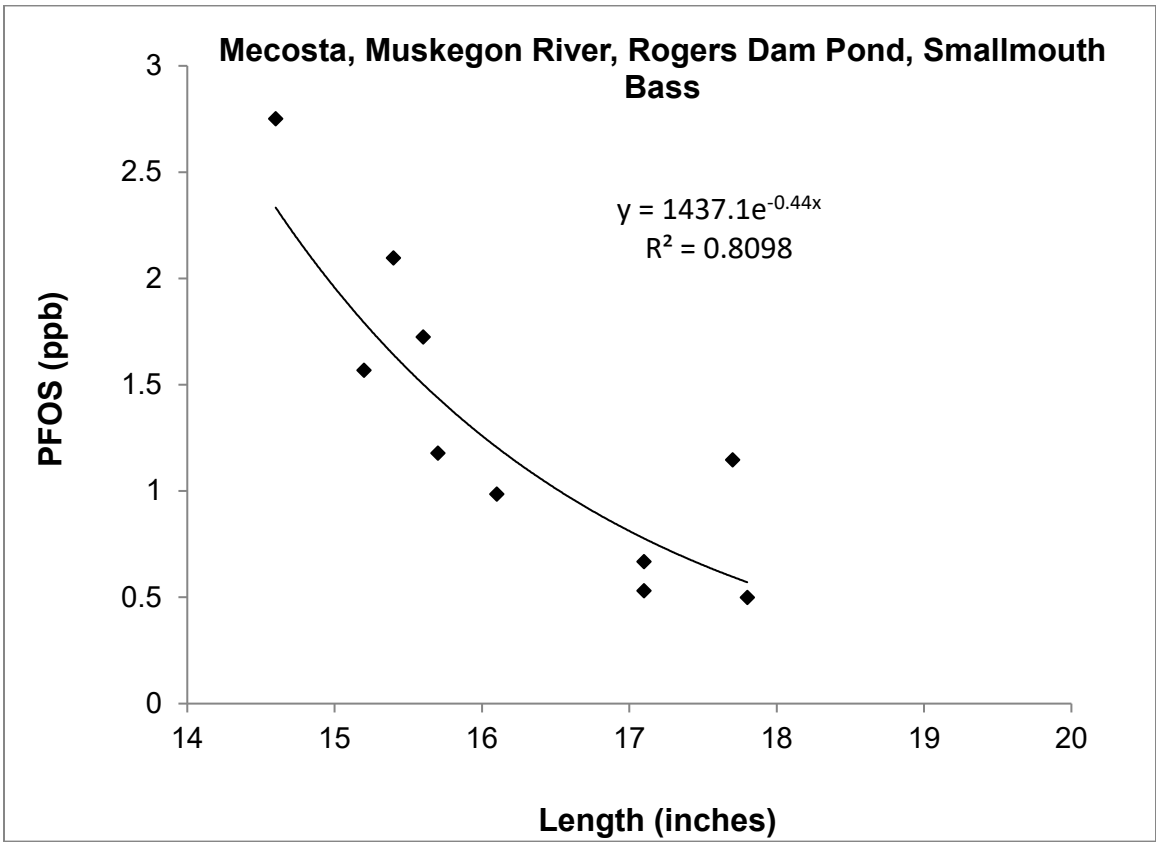
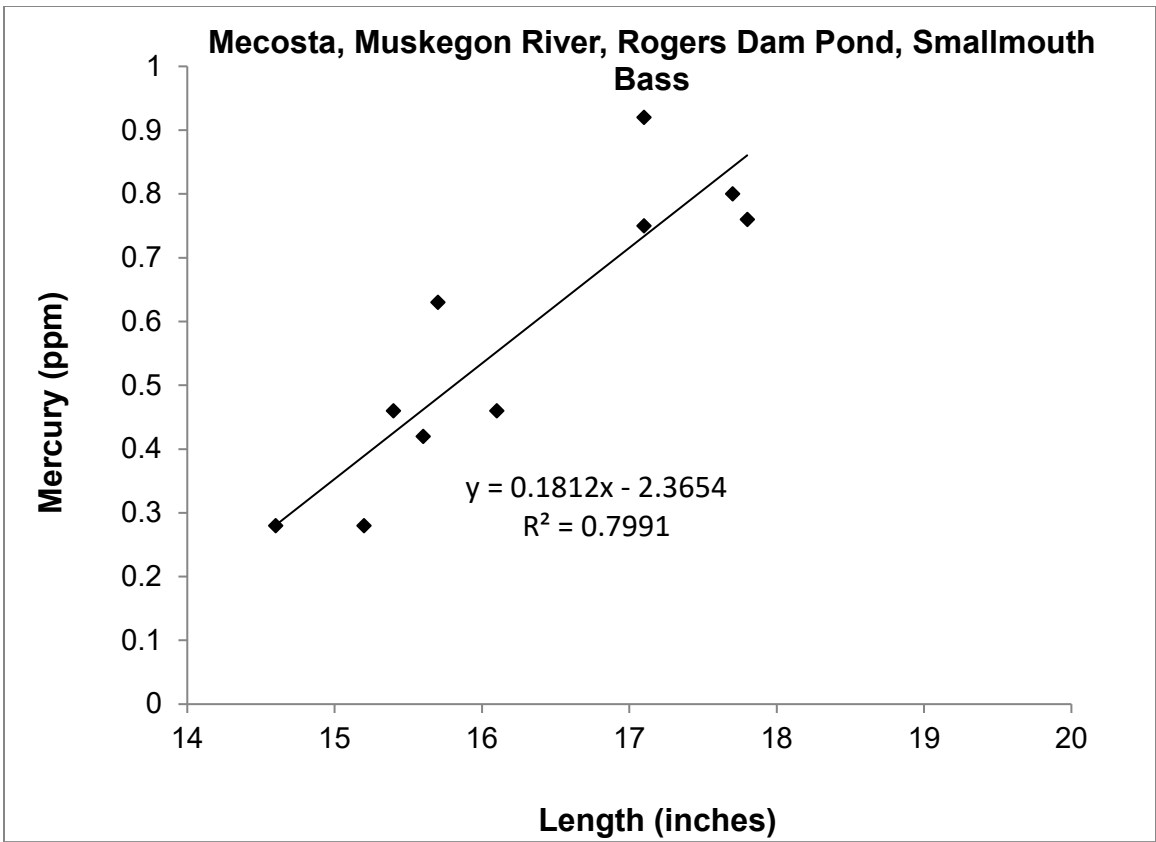
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2013	2013	10	14.6	14	14.6	17.8
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	1 ppb	0.5 ppb	3 ppb	2 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--	* - negative slope			
Toxaphene	--	--				
PFOS	0.710*	0.727*	Final meal category based on UCL:			1

Existing Advisory: Largemouth and smallmouth bass from the Muskegon River upstream of Rogers Dam are covered under the Statewide Guidelines. No one should eat more than 2 meals per month of largemouth or smallmouth bass under 18 inches or more than 1 meal per month of those fish over 18 inches in length.

Recommendation: No one should eat more than 1 meal per month of largemouth or smallmouth bass from the Muskegon River upstream of Rogers Dam smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. The statewide length break was applied as the size range of the fish was limited. The PFOS regression estimates were not used as the slope was negative.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.17	4
15	0.35	2
16	0.53	2
17	0.72	1
18	0.9	1
19	1.08	1
20	1.26	0.5

Shaded area denotes extrapolated estimates



Newaygo County

Largemouth Bass

Bills Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	10	11.4	14	13.6	16.9
Datasets available:						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.66	0.51	0.75	0.78	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.608	0.545				

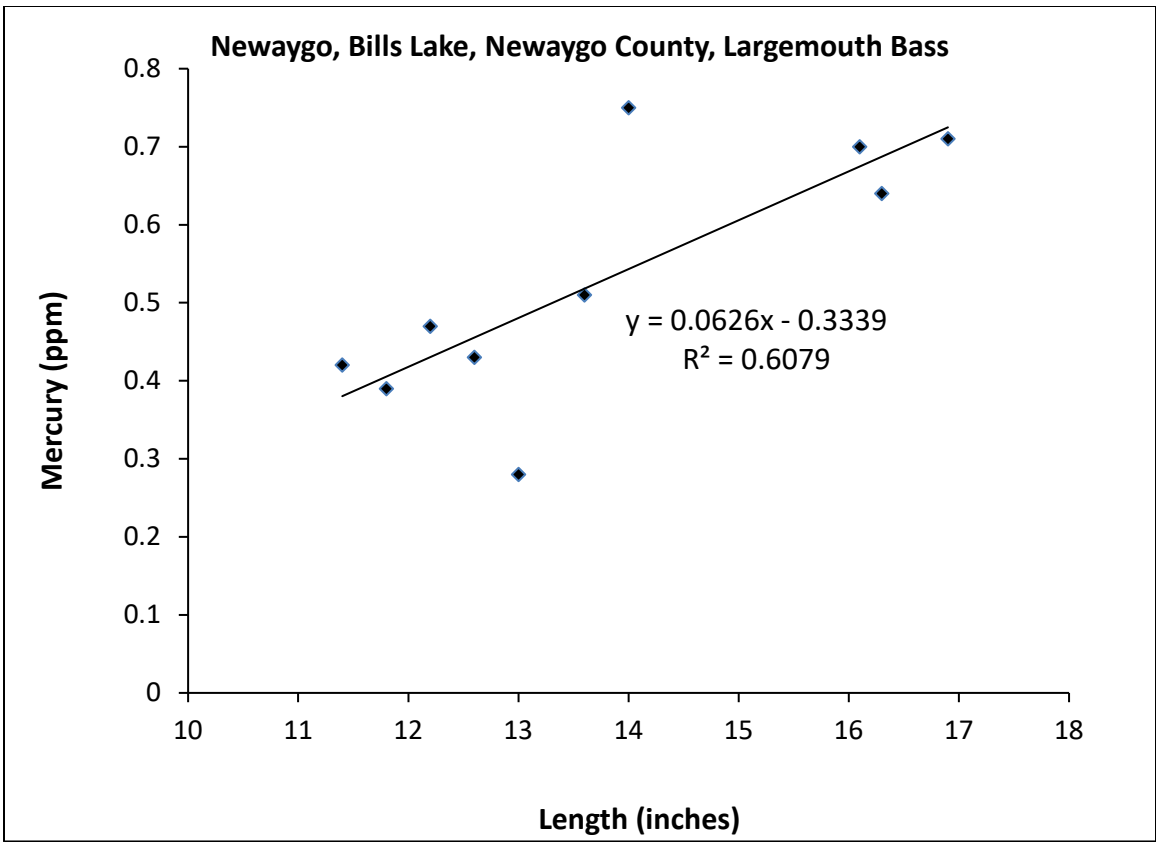
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Bills Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 1 meal per month of Bills Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. Statewide length break applied.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.54	1
16	0.67	1
18	0.79	1
20	0.92	1
22	1.04	1
24	1.17	0.5
<i>Shaded area denotes extrapolated estimates</i>		



Walleye

Bills Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1988	1988	4	13.2	15	16.7	16.7
Datasets available: 1988						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.39	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Bills Lake walleye are covered under the statewide mercury advisory.

Recommendation: Insufficient dataset to set a waterbody-species specific guideline. No one should eat more than 1 meal per month of walleye over 20 inches in length or more than 2 meals per month of legal size walleye under 20 inches in length.

Black Crappie

Brooks Lake

Newaygo County

Hg Analysis:

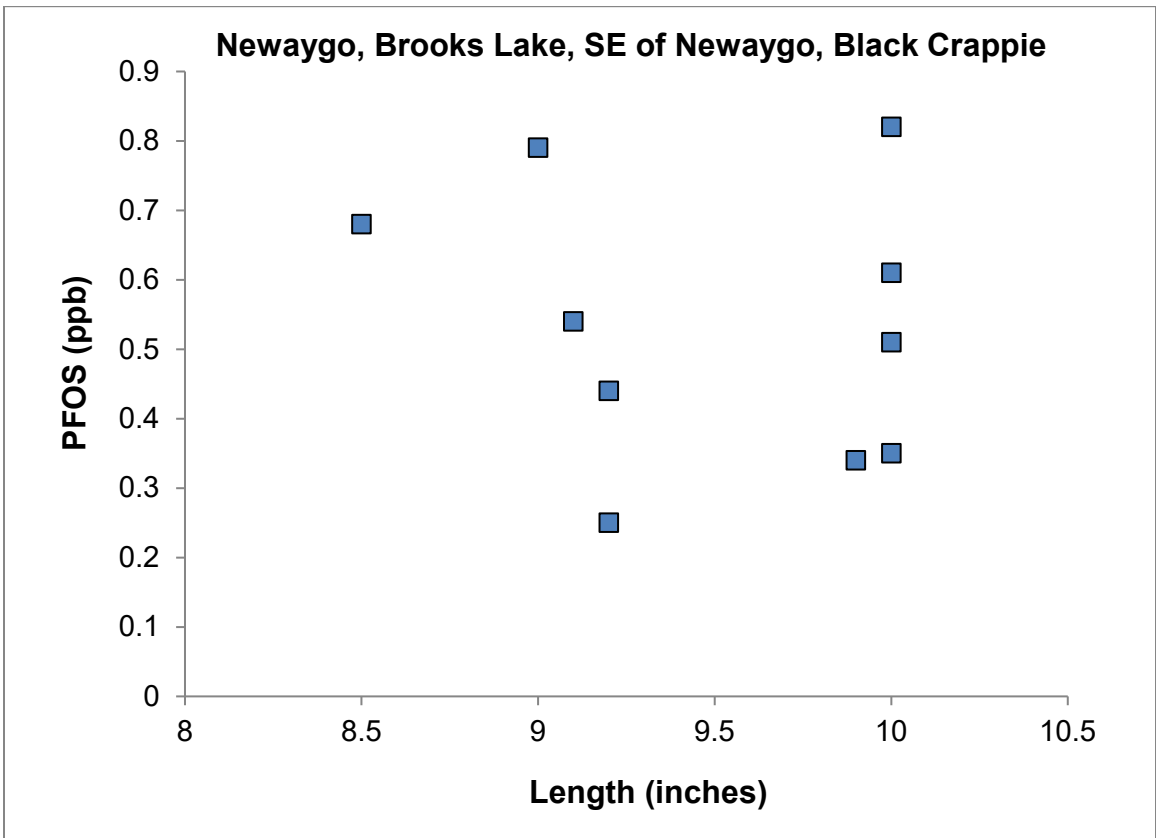
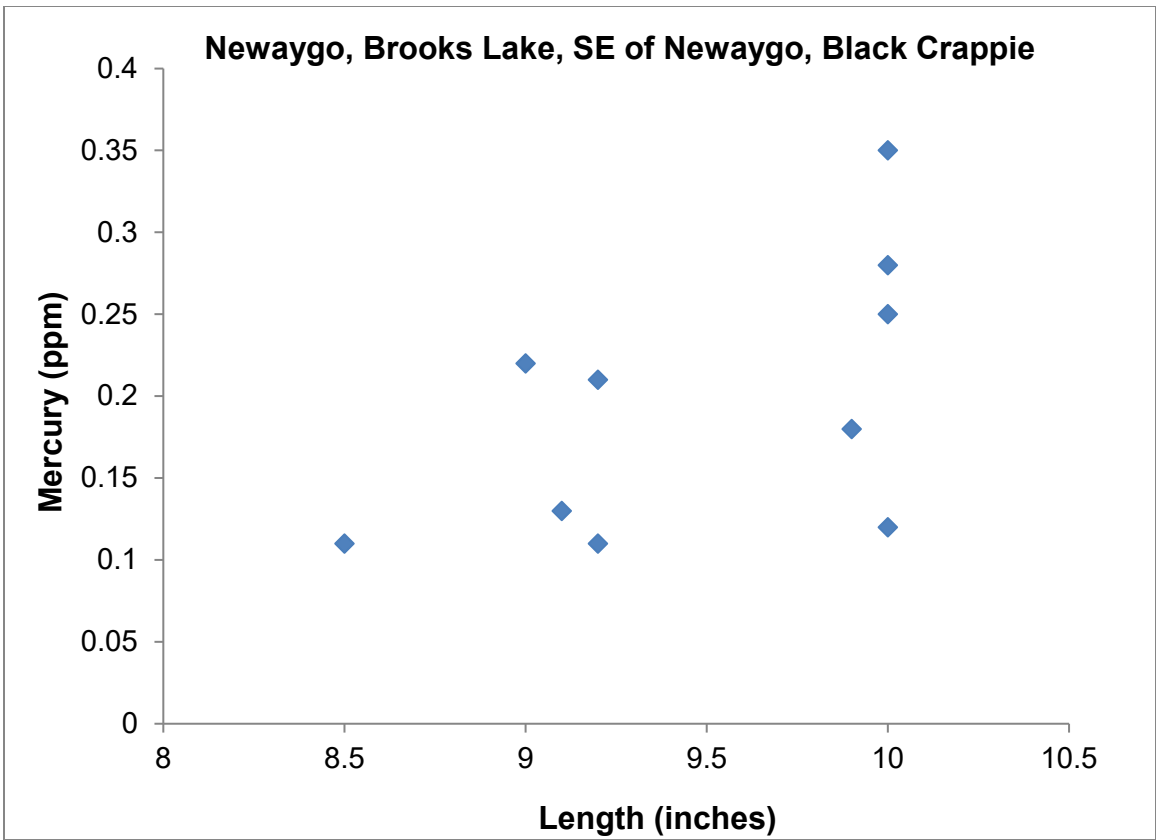
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	8.5	na	8.5	10
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.20	0.11	0.35	0.25	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.305	0.302				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2018	2018	10	8.5	na	8.5	10
Datasets available: 2018						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	0.5 ppb	< 0.25 ppb	0.8 ppb	0.7 ppb	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
PFOS	0.029	0.023				
Final meal category based on UCL:						4

Existing MDHHS Advisory: Brooks Lake crappie are covered by the statewide advisory due to mercury: no one should eat more than 4 meals per month of black or white crappie of any size due to mercury.

Recommendation: No one should eat more than 4 meals per month of black crappie or white crappie of any size from Brooks Lake due to mercury.



Largemouth Bass

Diamond Lake

Newaygo County

Hg Analysis:

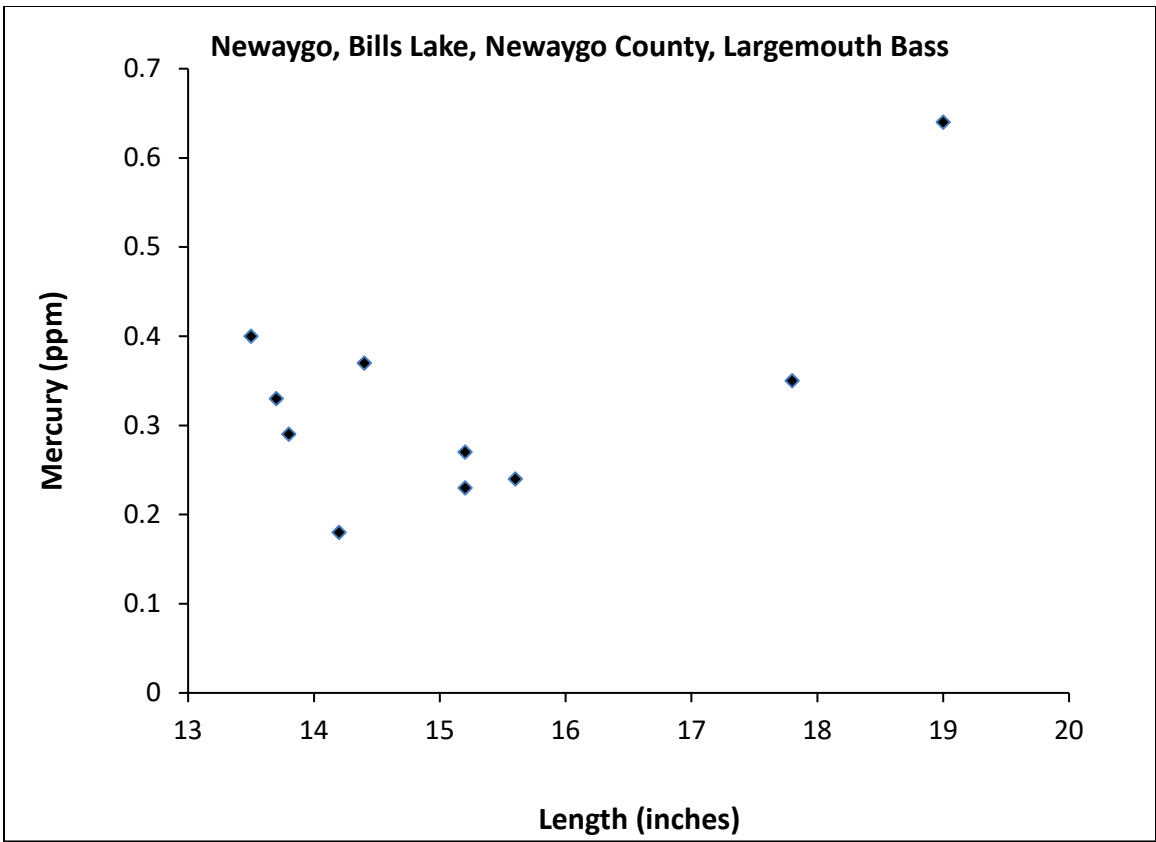
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2008	2008	10	13.5	14	13.5	19
Datasets available: 2008						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.33	0.18	0.64	0.42	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.348	0.257				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Diamond Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 2 meals per month of legal size Diamond Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury. Statewide length break applied.



Largemouth Bass

Emerald Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	4	14	14	14.0	16.7
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.59	0.38	1.19	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Emerald Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: Dataset is limited due to sample size. Statewide guidelines apply that recommend no one should eat more than 2 meals per month of legal size largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Northern Pike

Emerald Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	6	23.1	24	23.7	33.3
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.53	0.33	0.77	0.73	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.690	0.596				

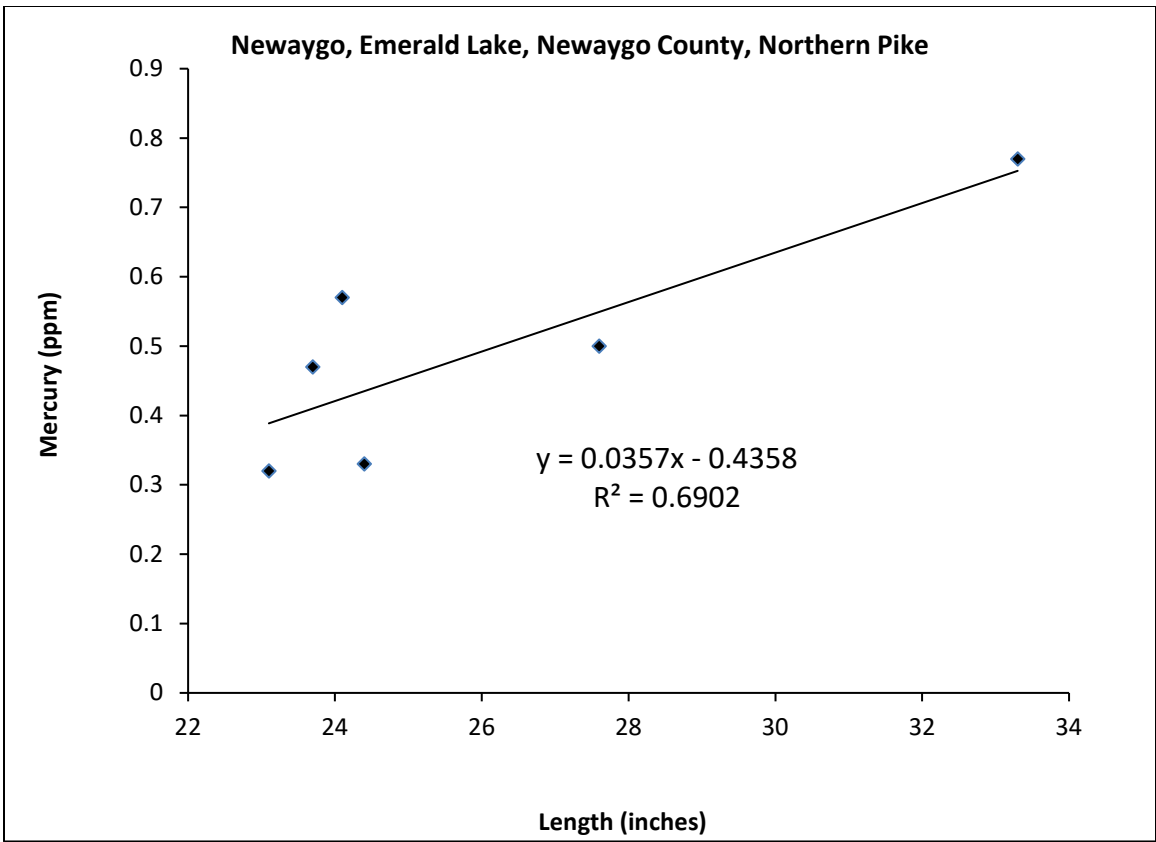
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Emerald Lake northern pike are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 1 meal per month of Emerald Lake northern pike larger than 26 inches or more than 2 meals per month of those fish smaller than 26 inches in length due to mercury. Length break based on the regression line.

Length (Inches)	Regression Equation Estimate (ppm)	Meal Category
22	0.35	2
24	0.42	2
26	0.49	2
28	0.56	1
30	0.64	1
32	0.71	1
34	0.78	1
36	0.85	1
<i>Shaded area denotes extrapolated estimates</i>		



Carp

Fremont Lake

Newaygo County

Hg Analysis:

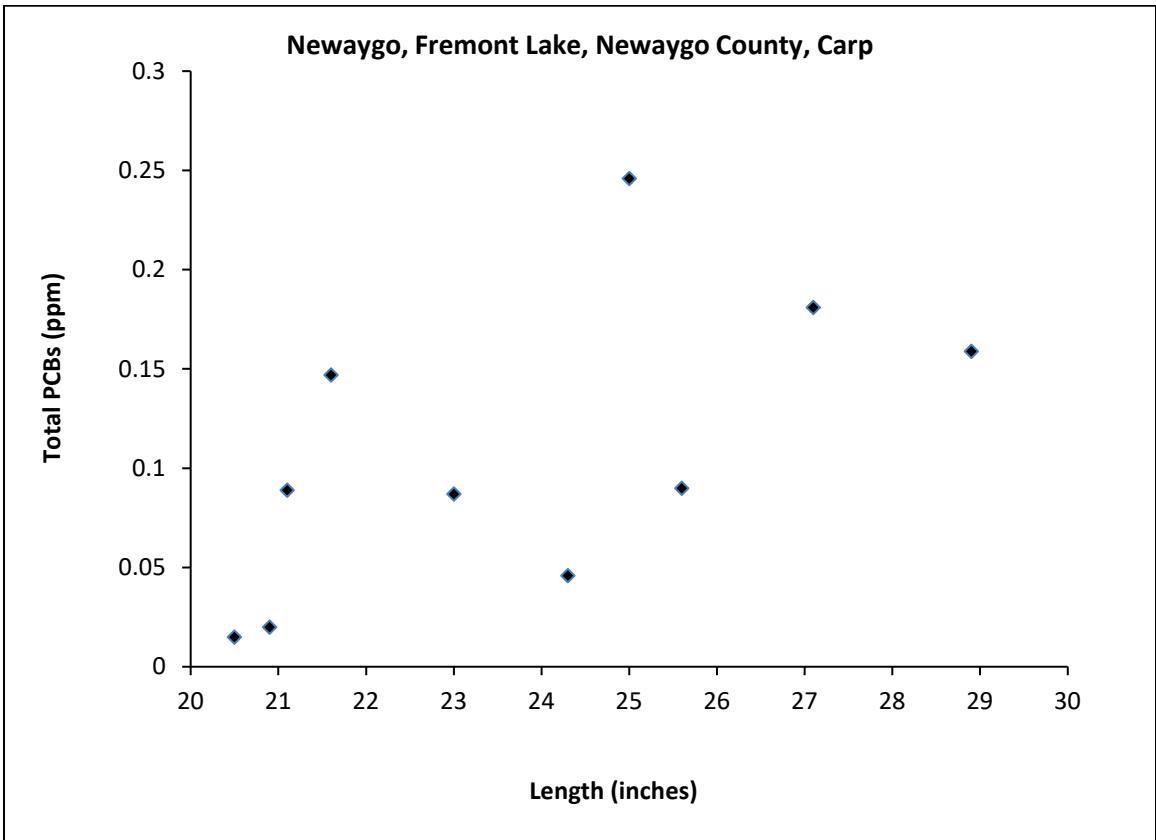
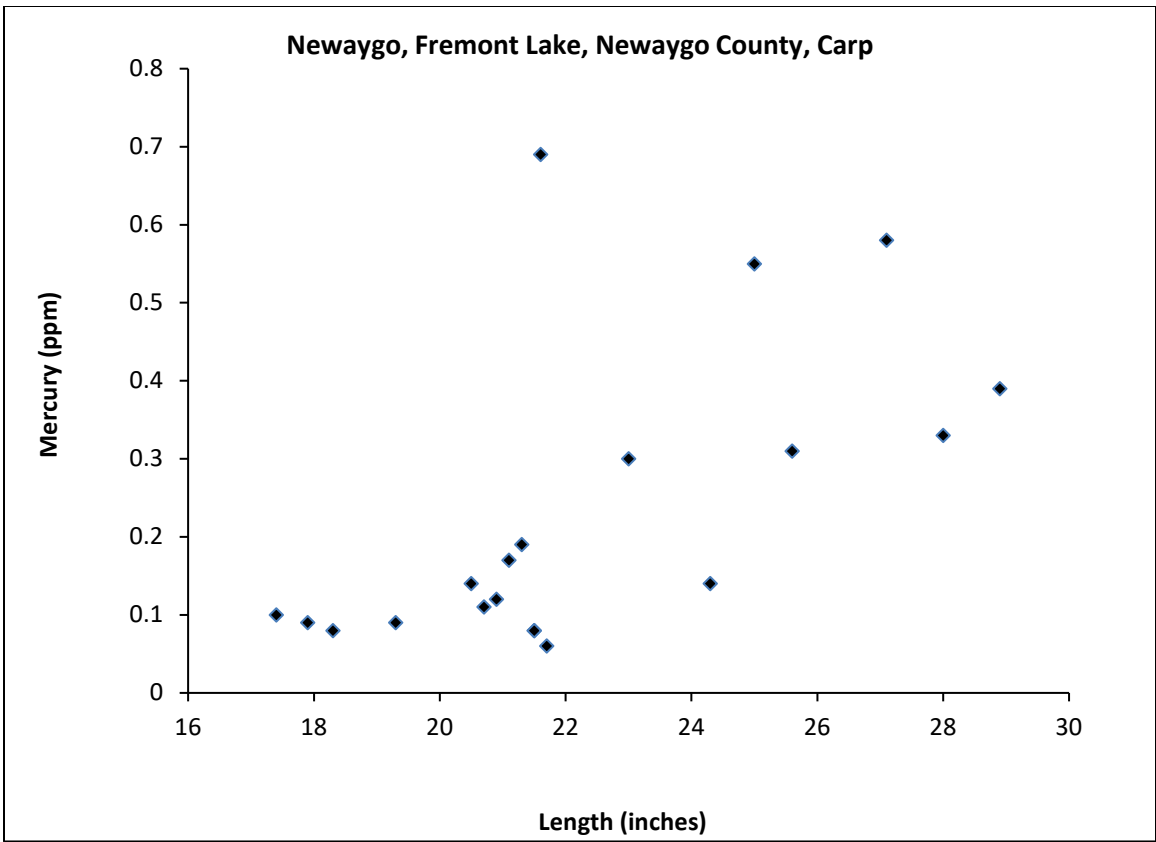
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1990	2005	20	17.4	na	17.4	28.9
Datasets available: 1990, 2005						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.23	0.06	0.69	0.32	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.376	0.489				

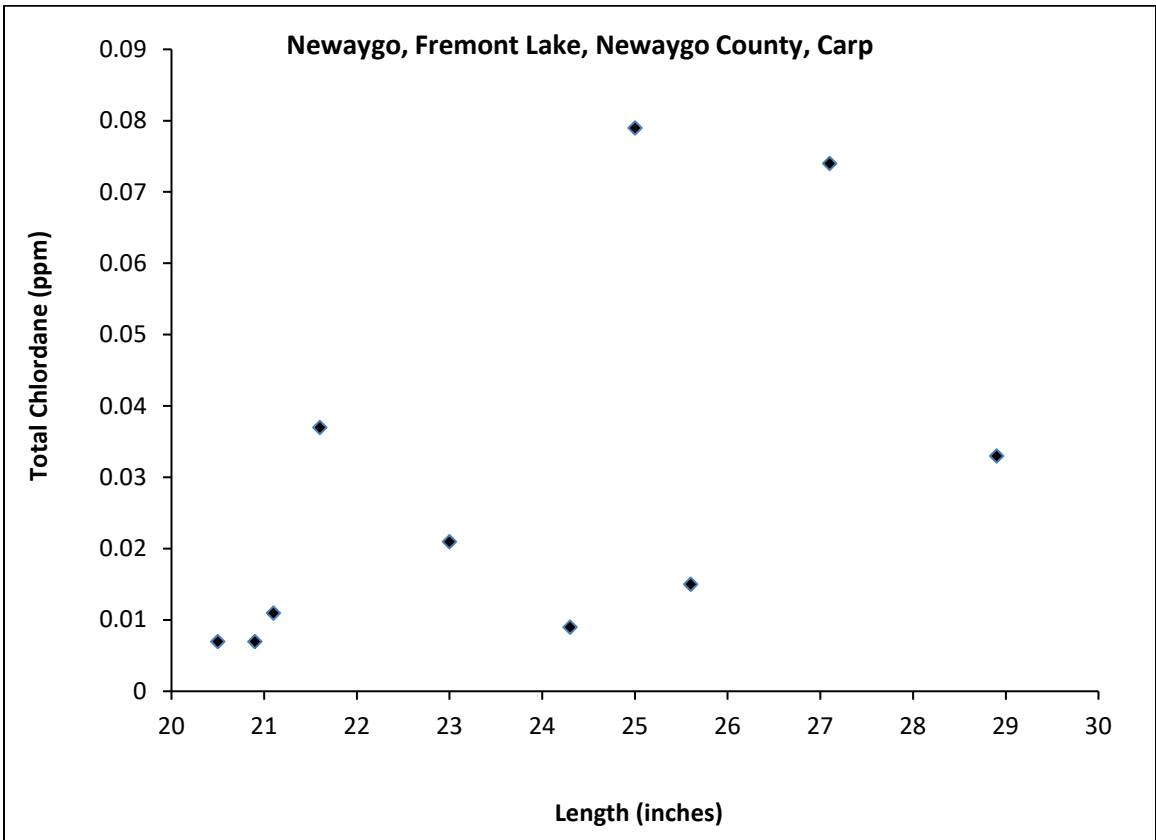
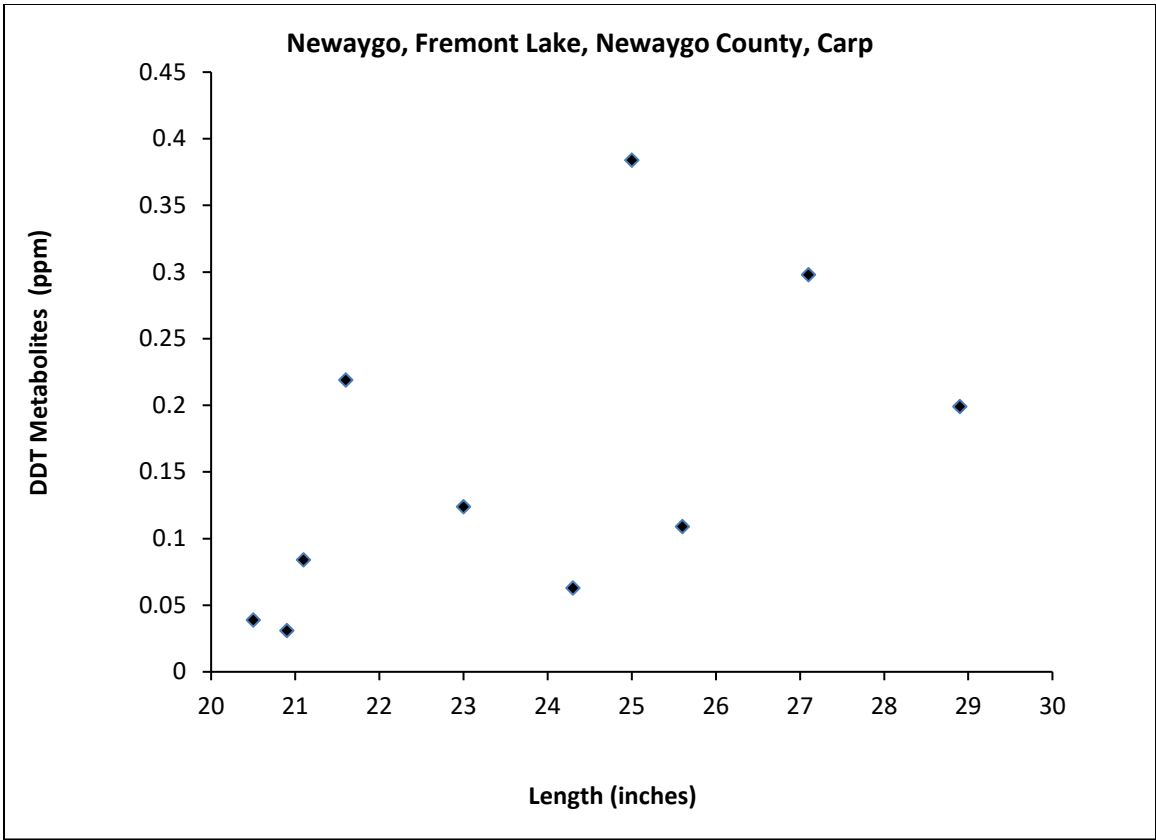
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2005	2005	10	20.5	na	20.5	28.9
Datasets available: 2005						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.108	0.02	0.25	0.16	1
DDT	10	0.155	0.03	0.38	0.24	4
Chlordane	10	0.029	0.007	0.08	0.05	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.357	0.406				
DDT	0.300	0.397				
Chlordane	0.279	0.370				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Women and children should not eat more than 1 meal per week of Fremont Lake carp due to PCBs.

Recommendation: No one should eat more than 1 meal per month of Fremont Lake carp due to PCBs. Mercury and DDT would cause advisories.





Largemouth Bass

Fremont Lake

Newaygo County

Hg Analysis:

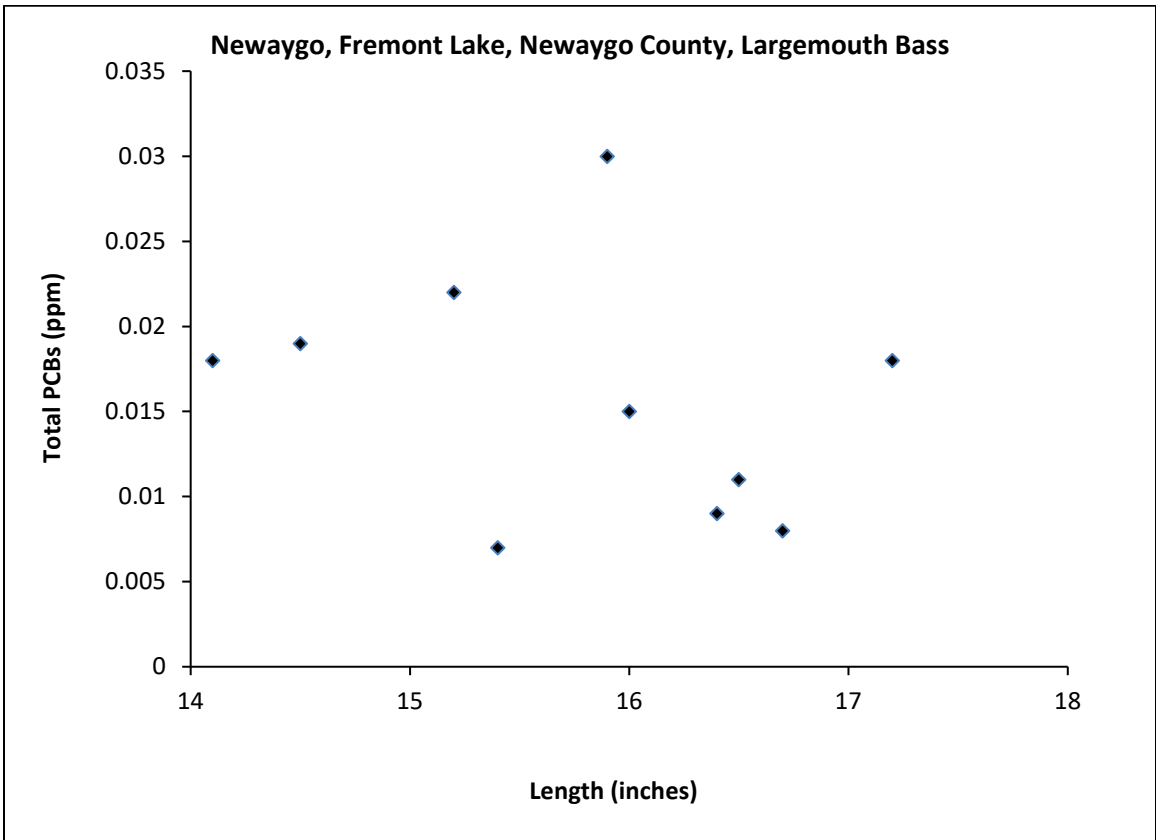
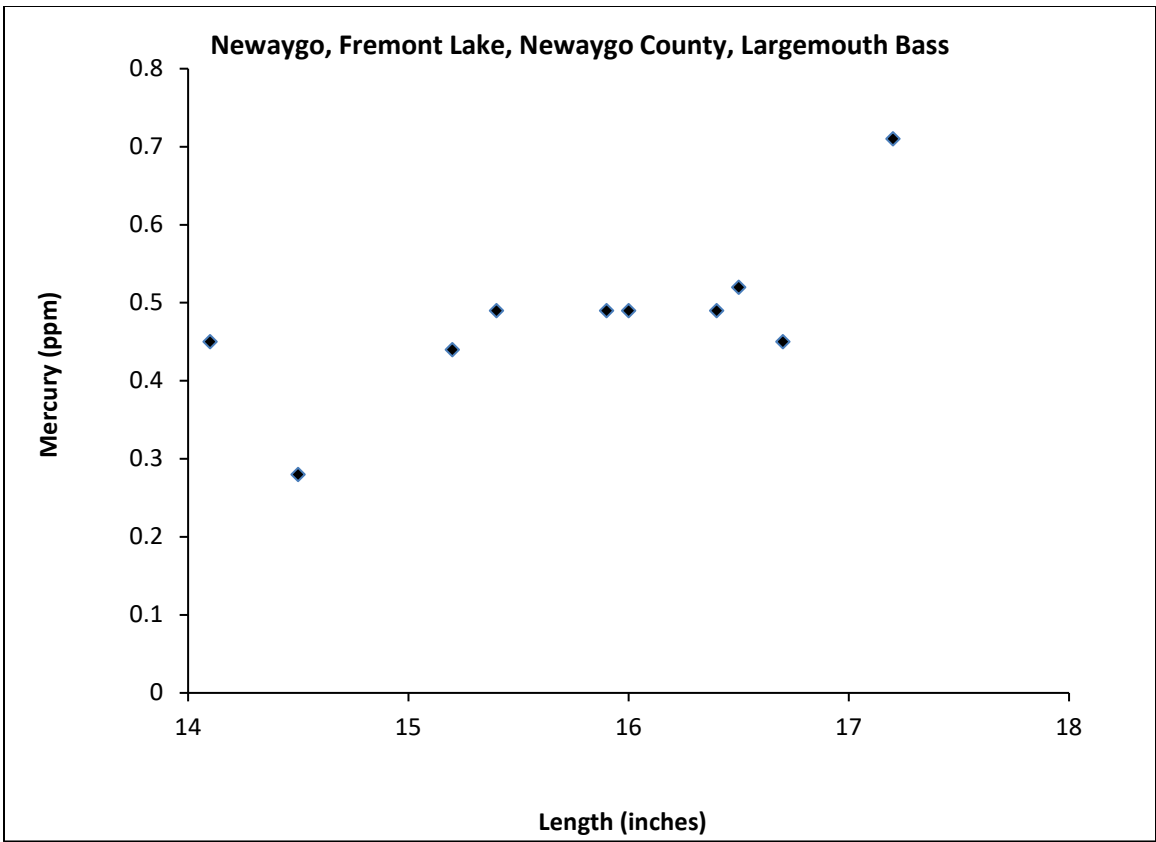
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2005	2005	10	14.1	14	14.1	17.2
Datasets available: 2005						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.48	0.28	0.71	0.56	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.510	0.494				

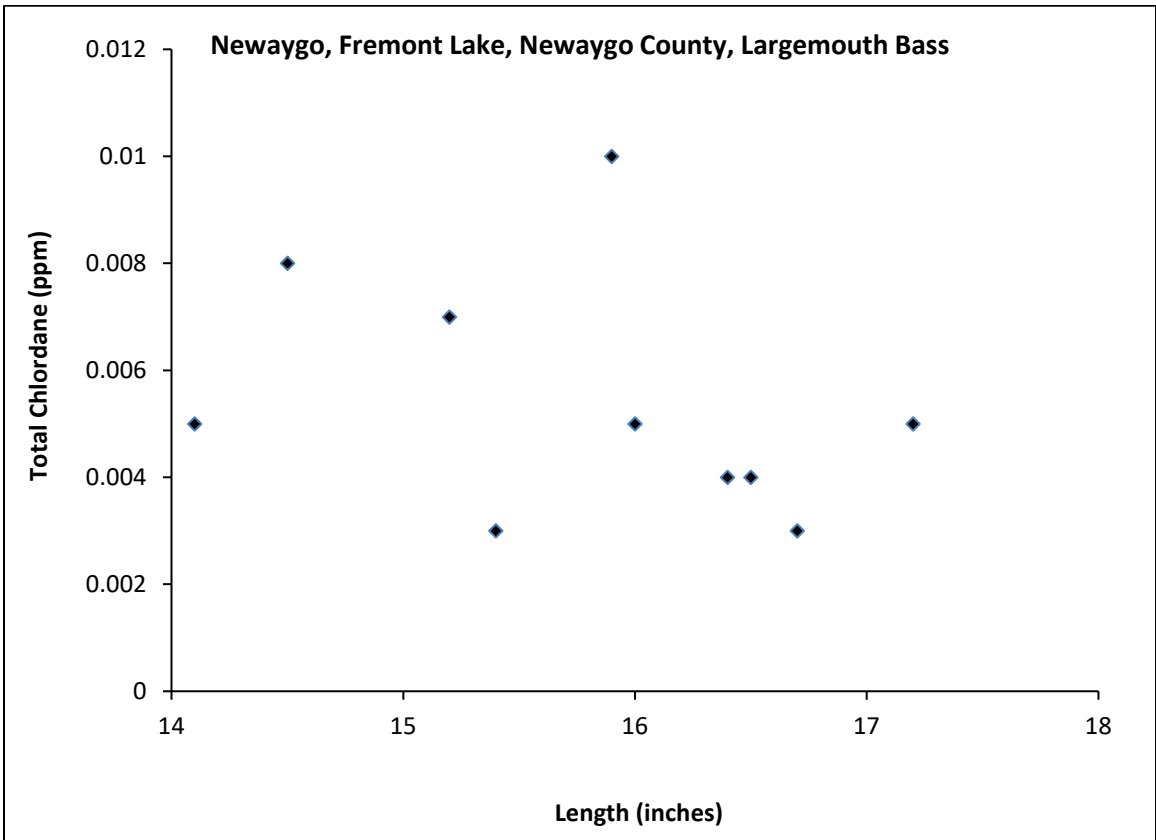
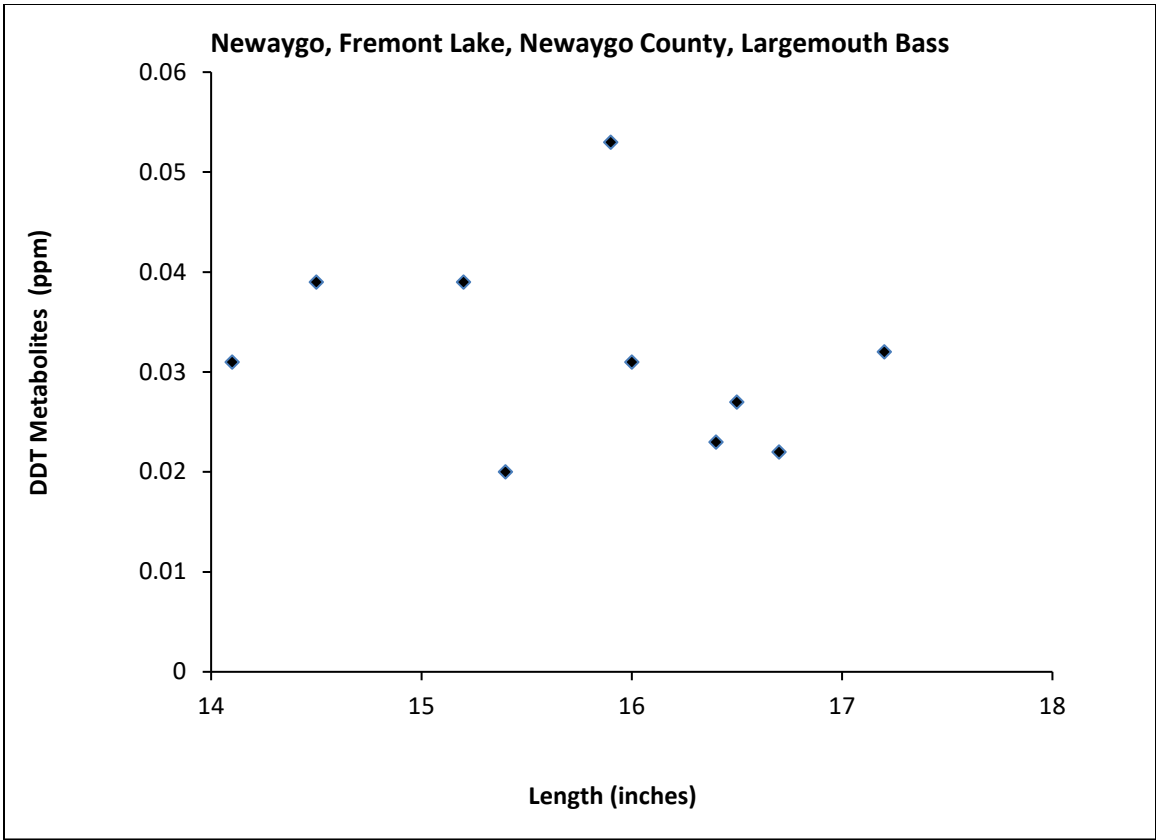
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2005	2005	10	14.1	14	14.1	17.2
Datasets available: 2005						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.02	0.007	0.03	0.02	12
DDT	10	0.03	0.02	0.05	0.04	16
Chlordane	10	0.005	0.003	0.01	0.01	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.081	0.096				
DDT	0.067	0.079				
Chlordane	0.116	0.132				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Fremont Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 1 meal per month of Fremont Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. Statewide length break applied.





Carp

Hess Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	18.5	na	18.5	24.6
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.05	0.02	0.12	0.07	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.534	0.675				

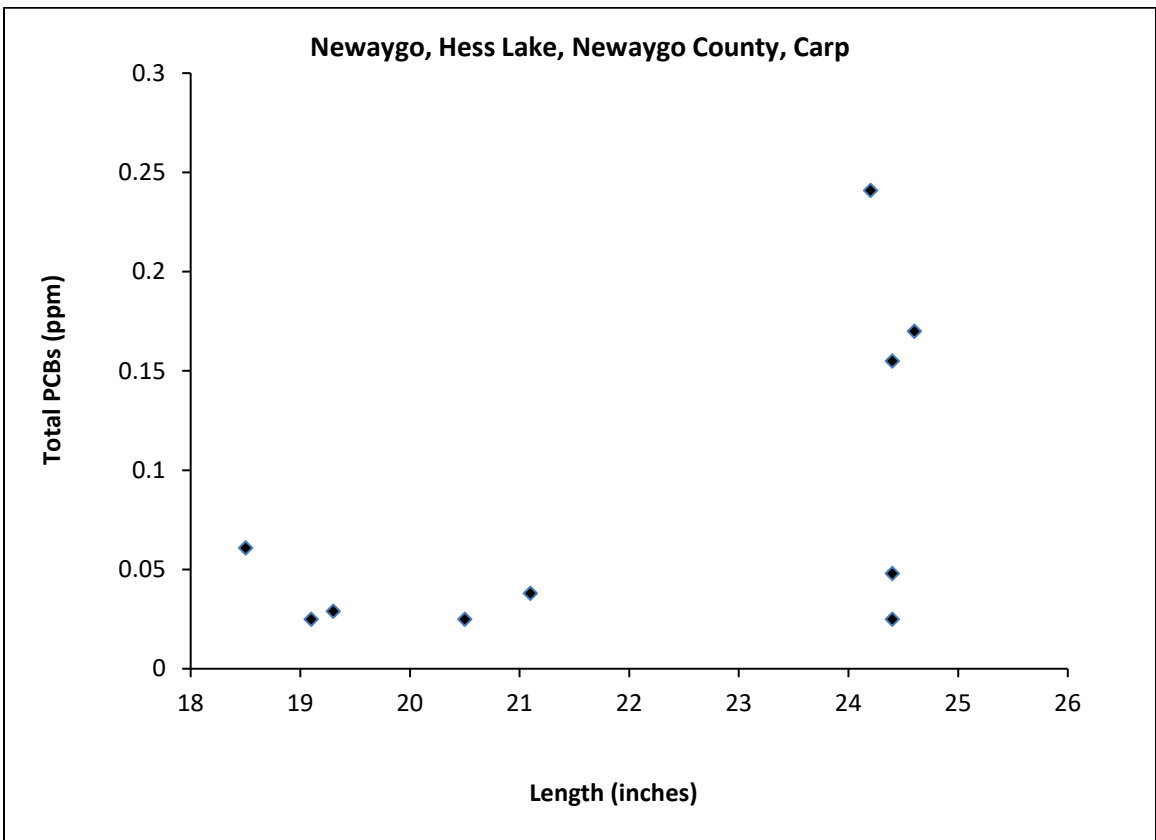
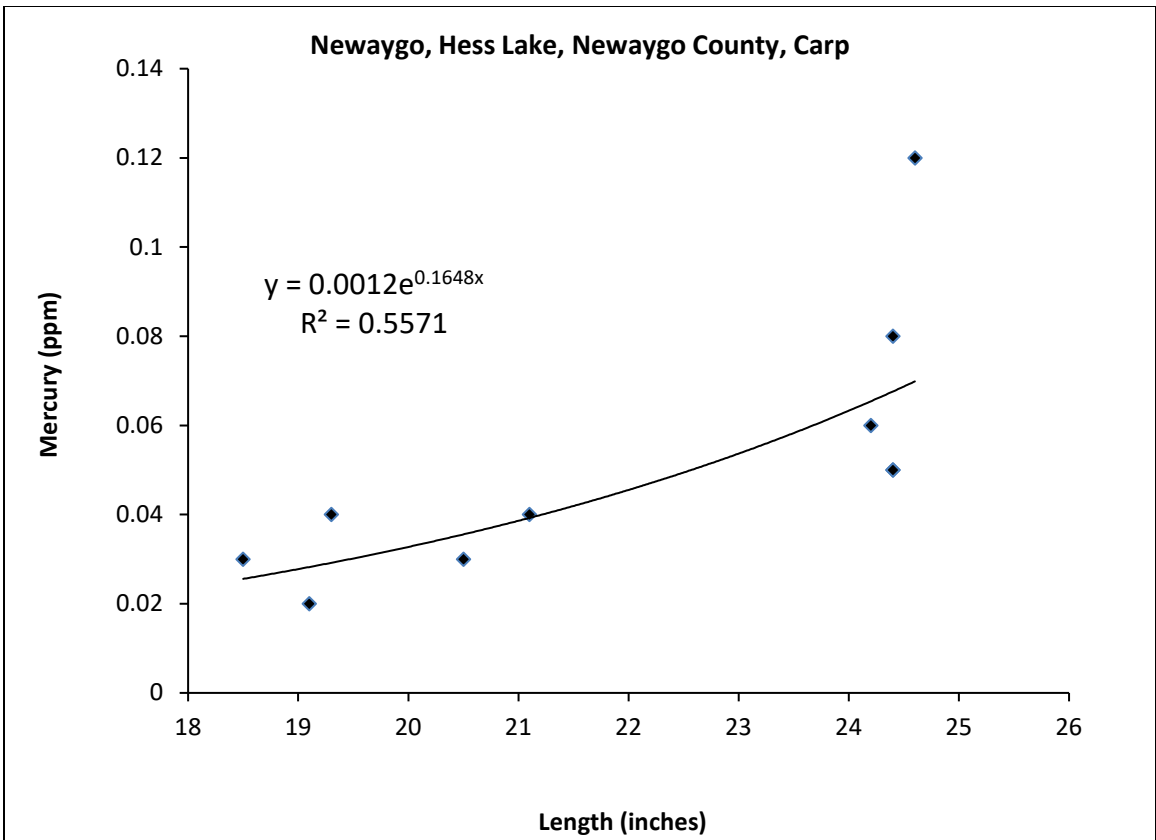
Organics Analysis:

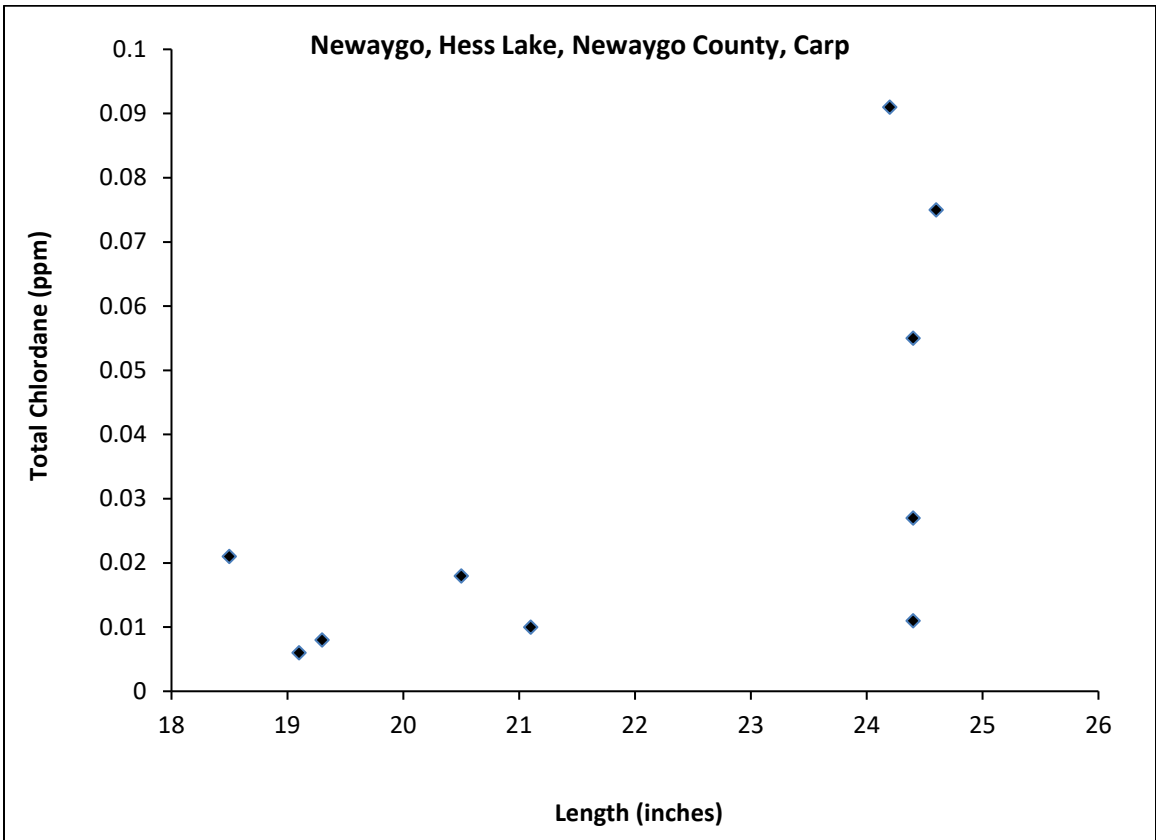
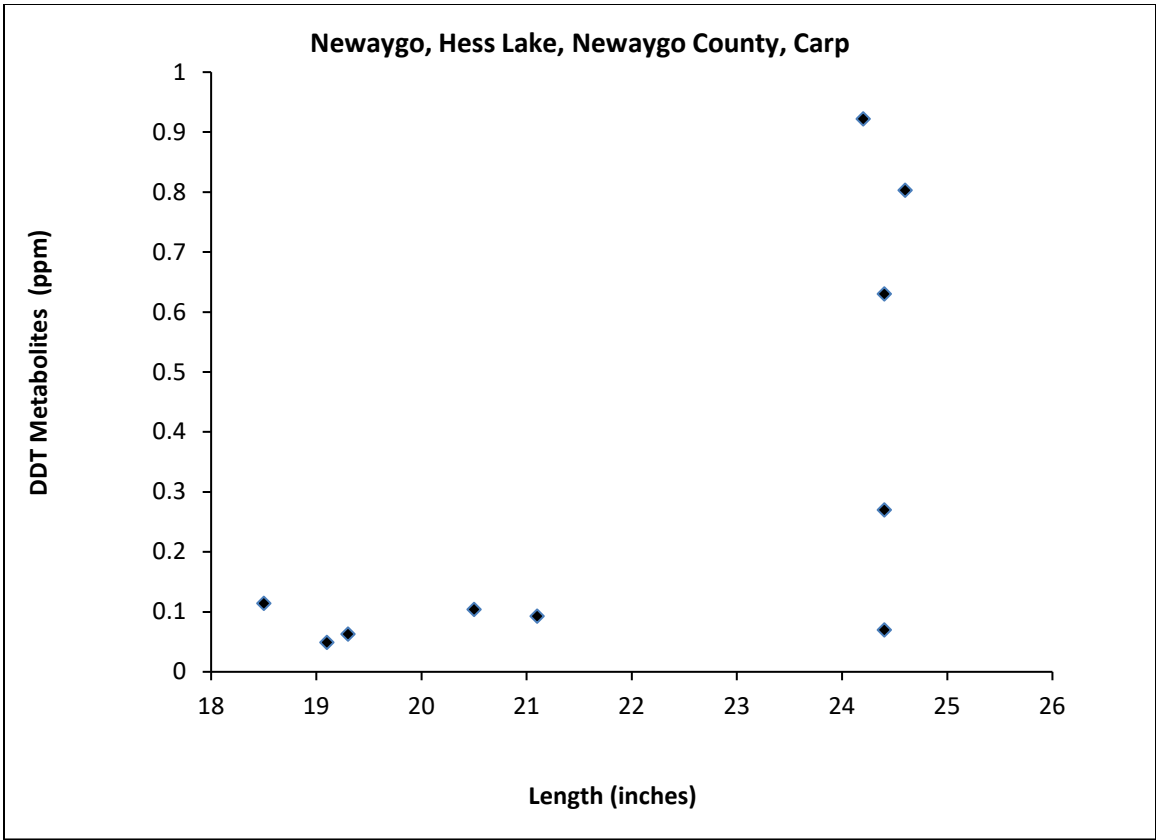
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	18.5	na	18.5	24.6
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.08	0.02	0.24	0.14	1
DDT	10	0.31	0.05	0.92	0.55	2
Chlordane	10	0.03	0.006	0.09	0.05	--
Toxaphene	10	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	0.333	0.323				
DDT	0.459	0.525				
Chlordane	0.411	0.457				
Toxaphene	--	--				
Final meal category based on UCL:						1*

Existing Advisory: Women and children should not eat more than 1 meal per week of Hess Lake carp larger than 22 inches due to PCBs.

Recommendation: No one should eat more than 2 meal per month of Hess Lake carp due to PCBs. DDT and mercury would cause advisories. *Based on the EGLE Fish Contaminant Monitoring Program, PCB and DDT concentrations ≥15 years old are expected to have declined to a concentration that allows a less restrictive meal category.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
16	0.03	16
18	0.04	16
20	0.06	16
22	0.08	12
24	0.11	8
26	0.15	4
28	0.21	4
30	0.29	2
32	0.41	2
<i>Shaded area denotes extrapolated estimates</i>		





Largemouth Bass

Hess Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	13.2	14	13.8	20.1
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.29	0.13	0.64	0.45	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.802	0.912				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1997	1997	10	13.2	14	13.8	20.1
Datasets available: 1997						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	8	0.025*	--	--	--	--
DDT	8	0.06	0.01	0.13	0.09	16
Chlordane	8	0.003	0.003	0.006	0.000	--
Toxaphene	8	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.106	0.238				
Chlordane	0.009	0.005				
Toxaphene	--	--				
Final meal category based on UCL:						2

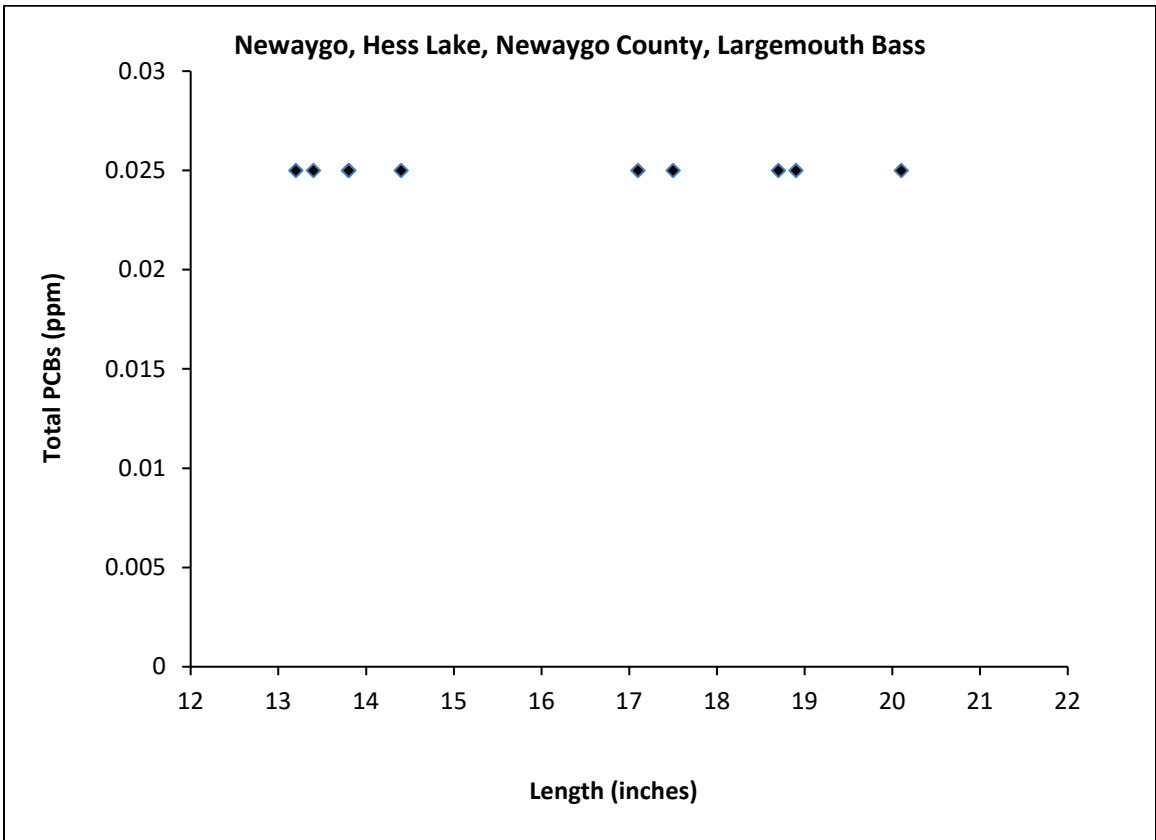
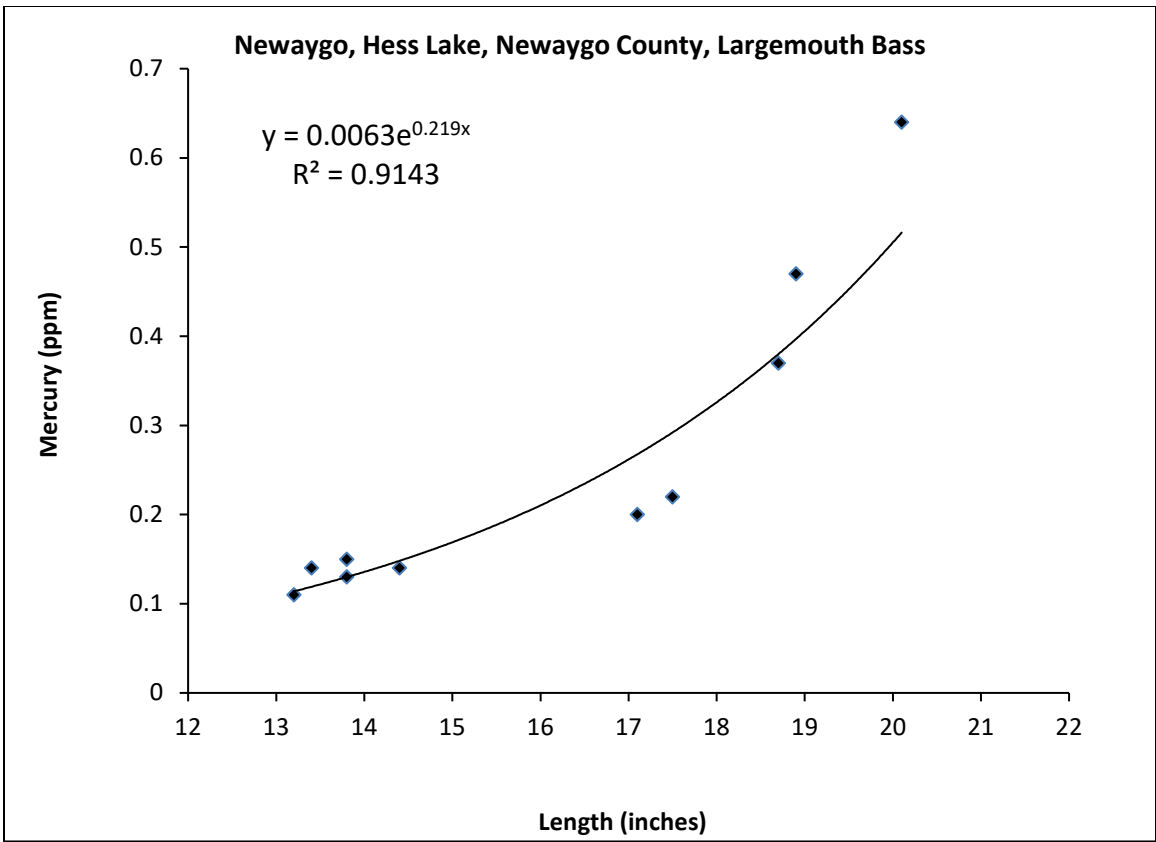
* - below Aroclor detection level of 0.025 ppm

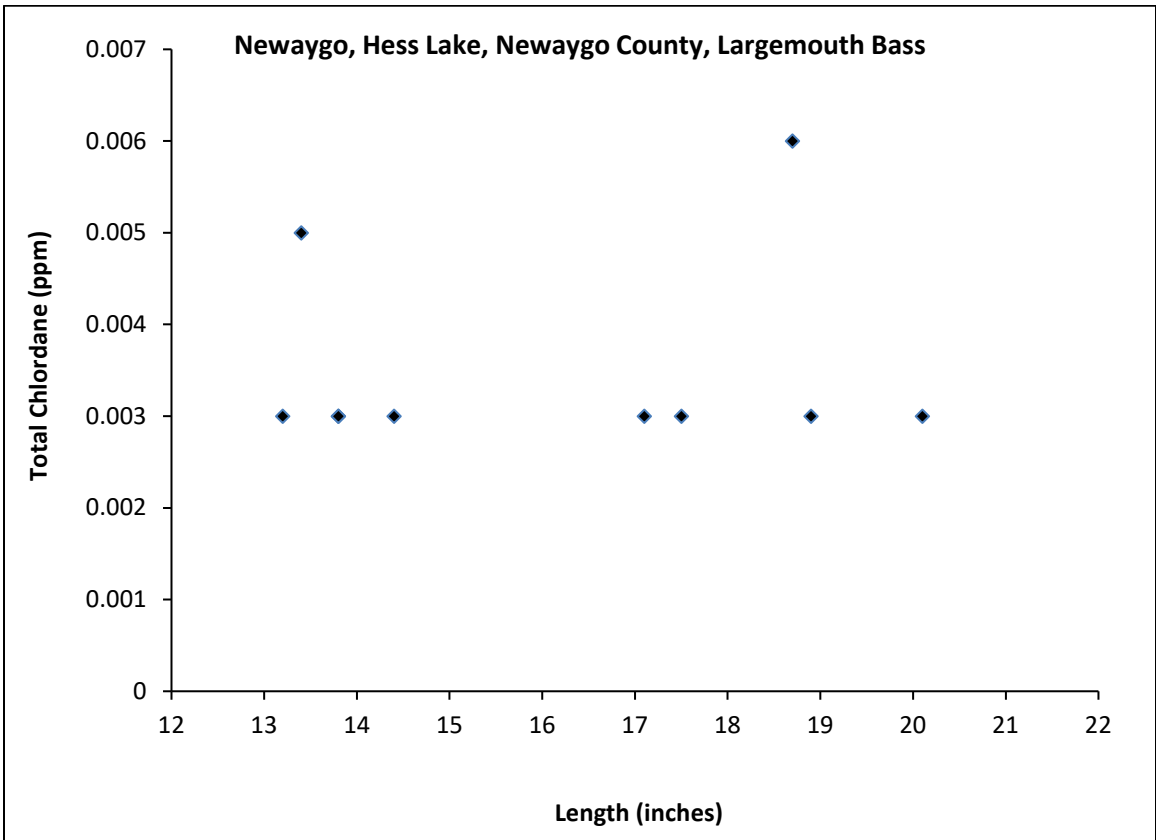
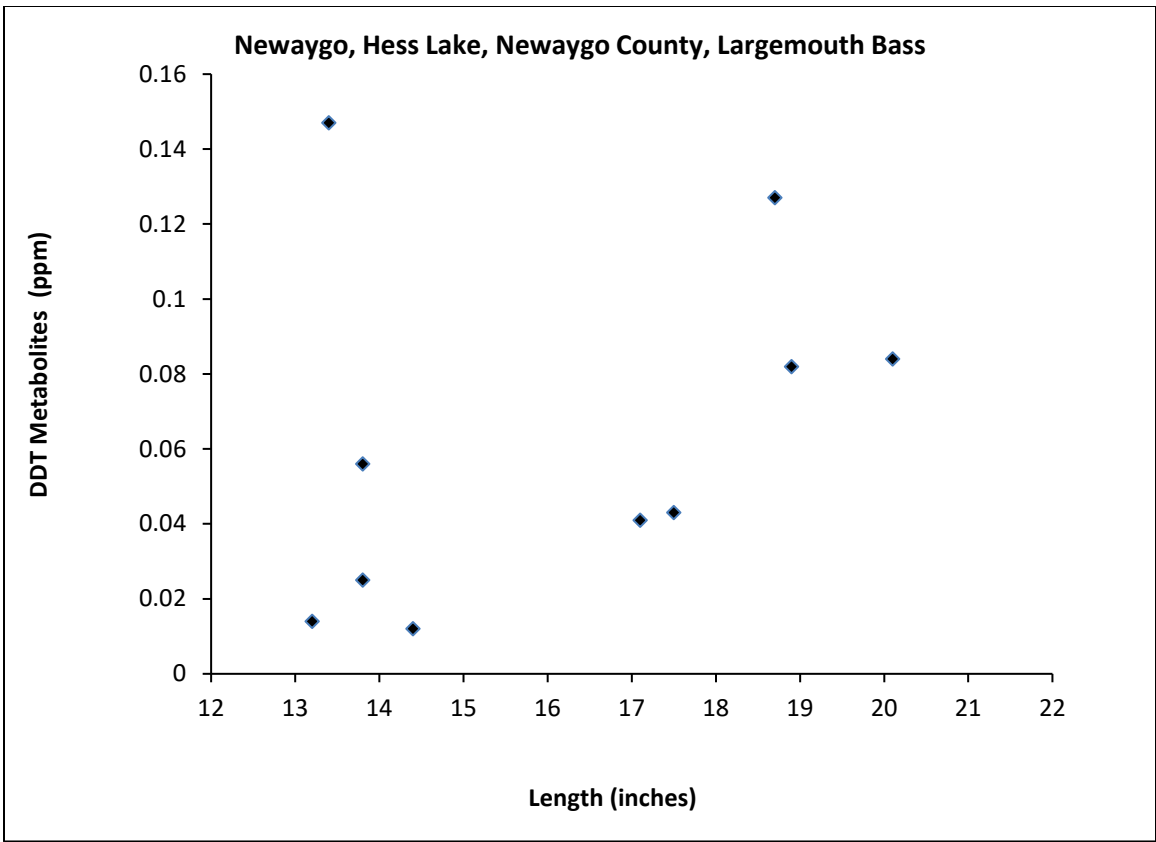
Existing Advisory: Hess Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 4 meals per month of Hess Lake largemouth or smallmouth bass smaller than 18 inches or more than 2 meals per month of those fish between 18 and 20 inches, or more than 1 meal per month of those fish larger than 20 inches due to mercury. *PCBs may cause an advisory, however the detection limits were elevated for this analysis making the dataset insufficient to evaluate PCB concentrations.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.14	4
15	0.17	4
16	0.21	4
17	0.26	4
18	0.32	2
19	0.4	2
20	0.5	2
21	0.63	1
22	0.78	1

Shaded area denotes extrapolated estimates





Northern Pike

Robinson Lake

Newaygo County

Hg Analysis:

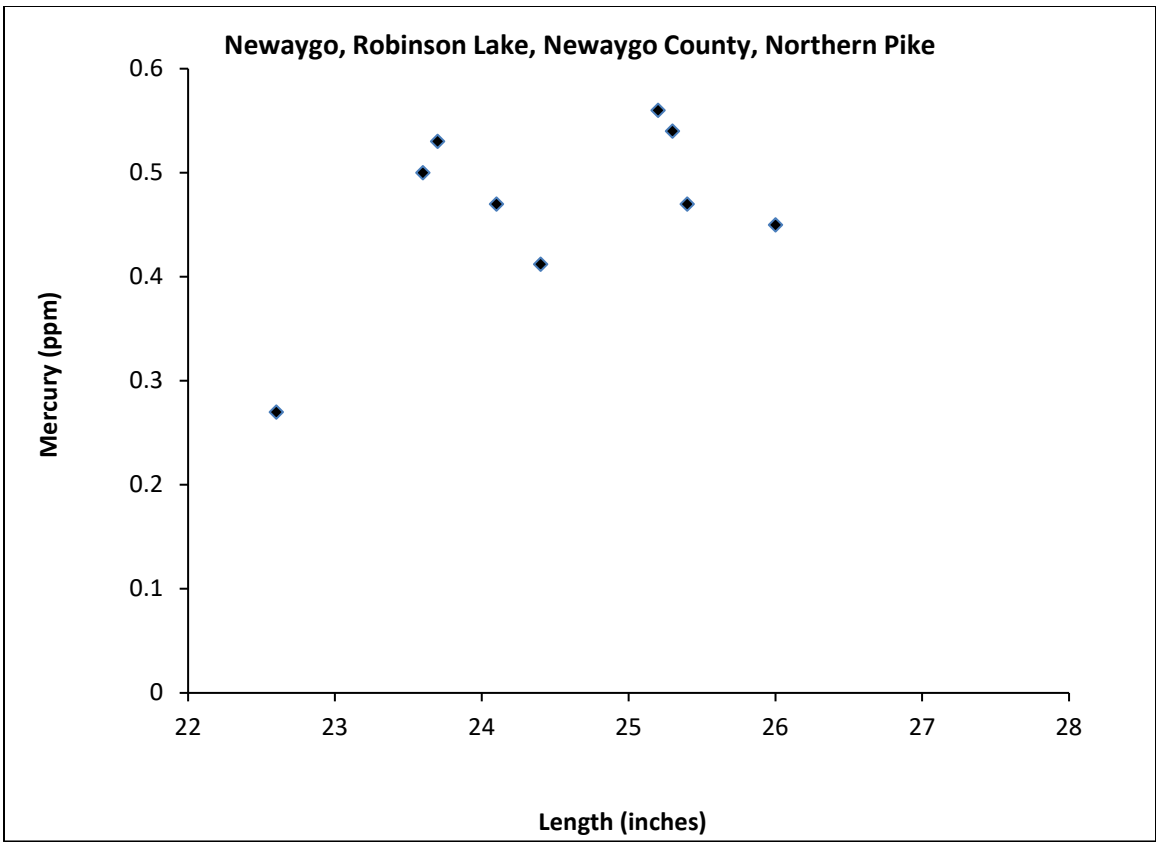
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	9	22.6	24	23.6	26.0
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.49	0.41	0.56	0.53	2
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.277	0.317				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						2

Existing Advisory: Robinson Lake northern pike are covered under the statewide mercury advisory.

Recommendation: No one should eat more than 2 meals per month of Robinson Lake northern pike smaller than 30 inches or more than 1 meal per month of those fish larger than 30 inches due to mercury. Statewide length break was applied.



Black Crappie

Sand Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	6	9.1	na	9.1	11.4
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.11	0.06	0.19	0.17	4
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.860	0.818				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	6	9.1	na	9.1	11.4
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	0.025	--	--	--	--
DDT	6	0.052	0.04	0.07	0.06	16
Chlordane	6	0.003	0.003	0.004	0.004	--
Toxaphene	6	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	0.061	0.075				
Chlordane	0.178	0.178				
Toxaphene	--	--				
Final meal category based on UCL:						4

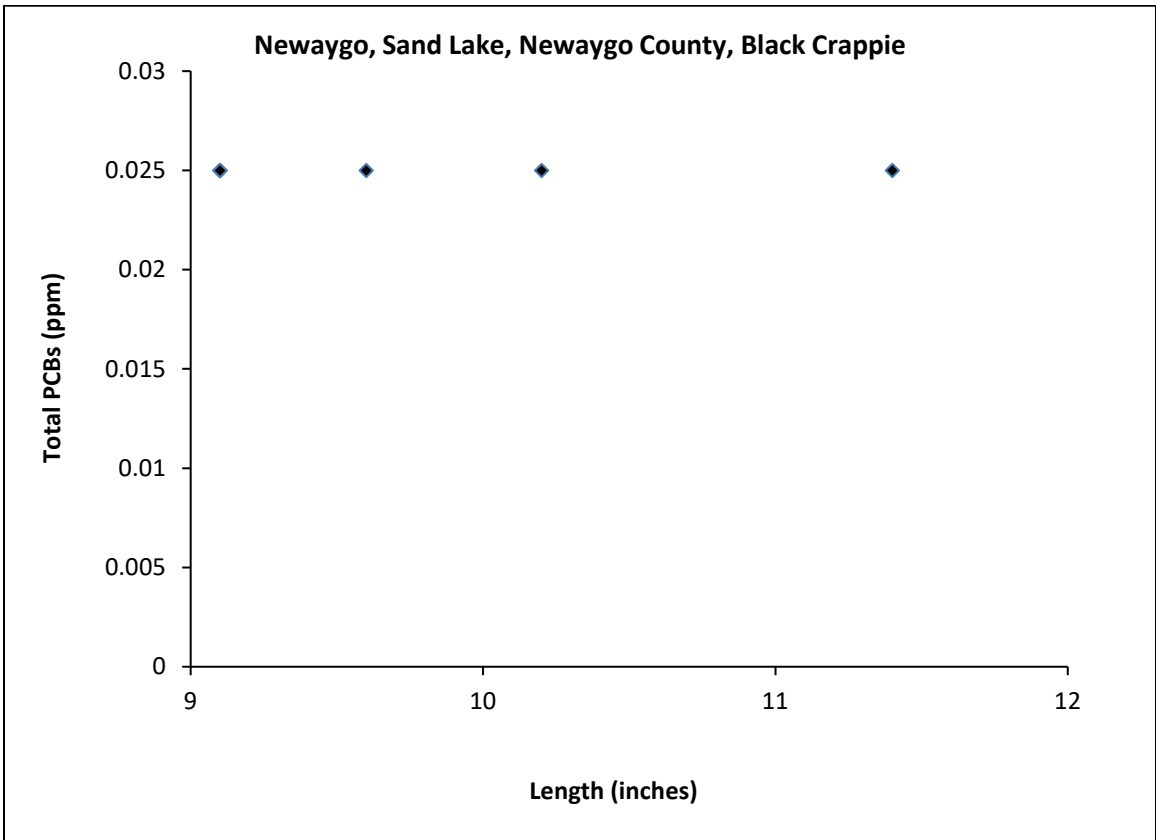
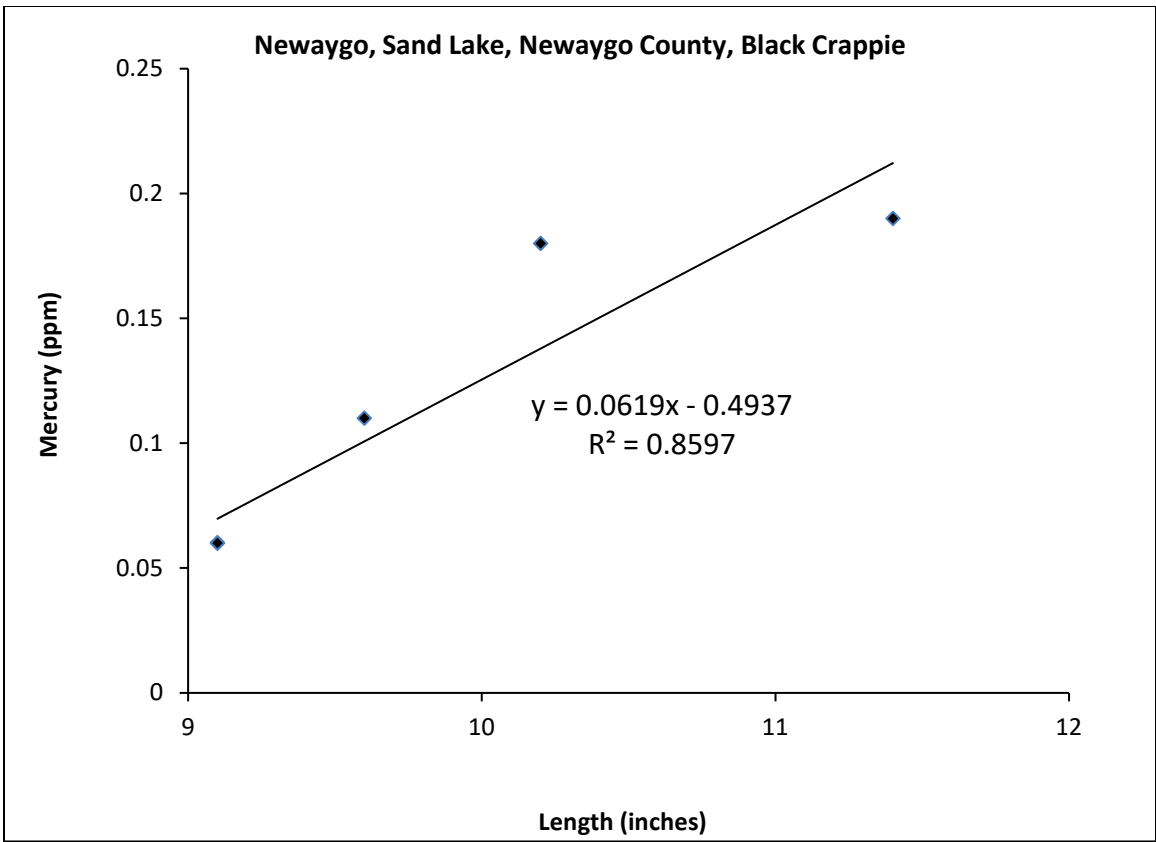
* - below Aroclor detection level of 0.25 ppm

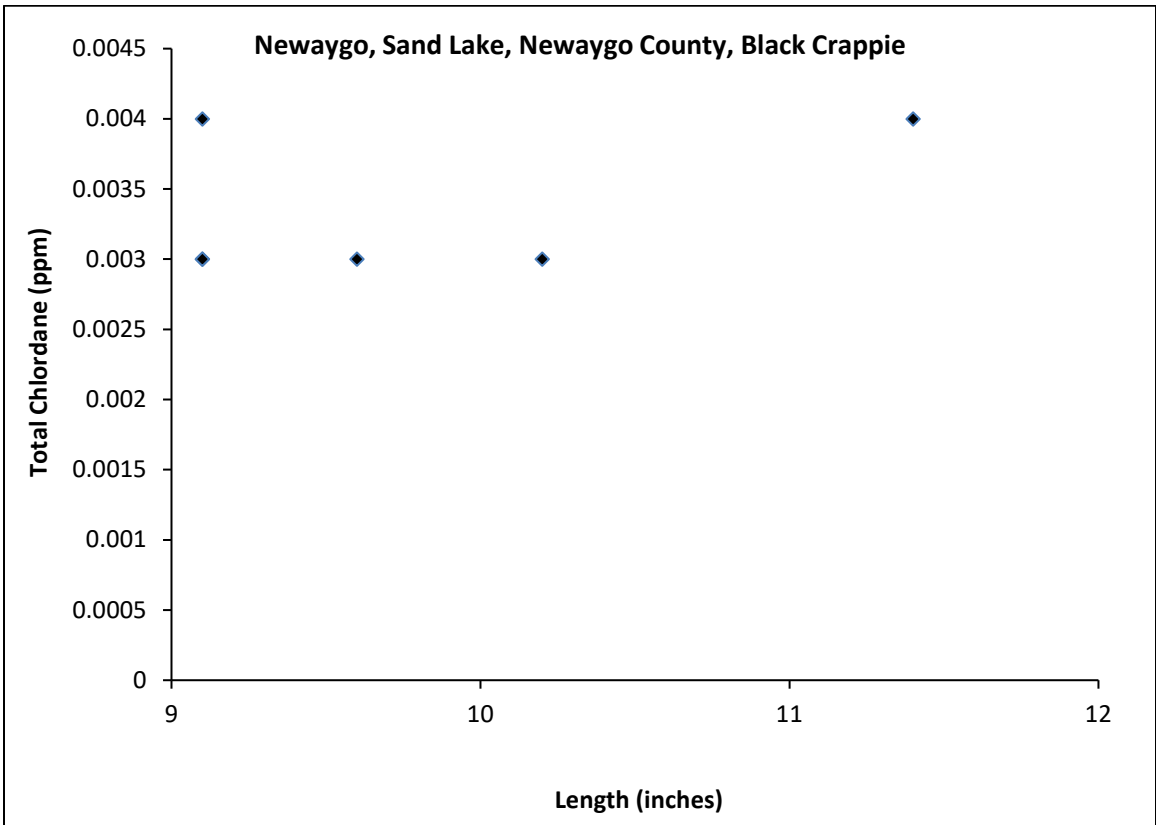
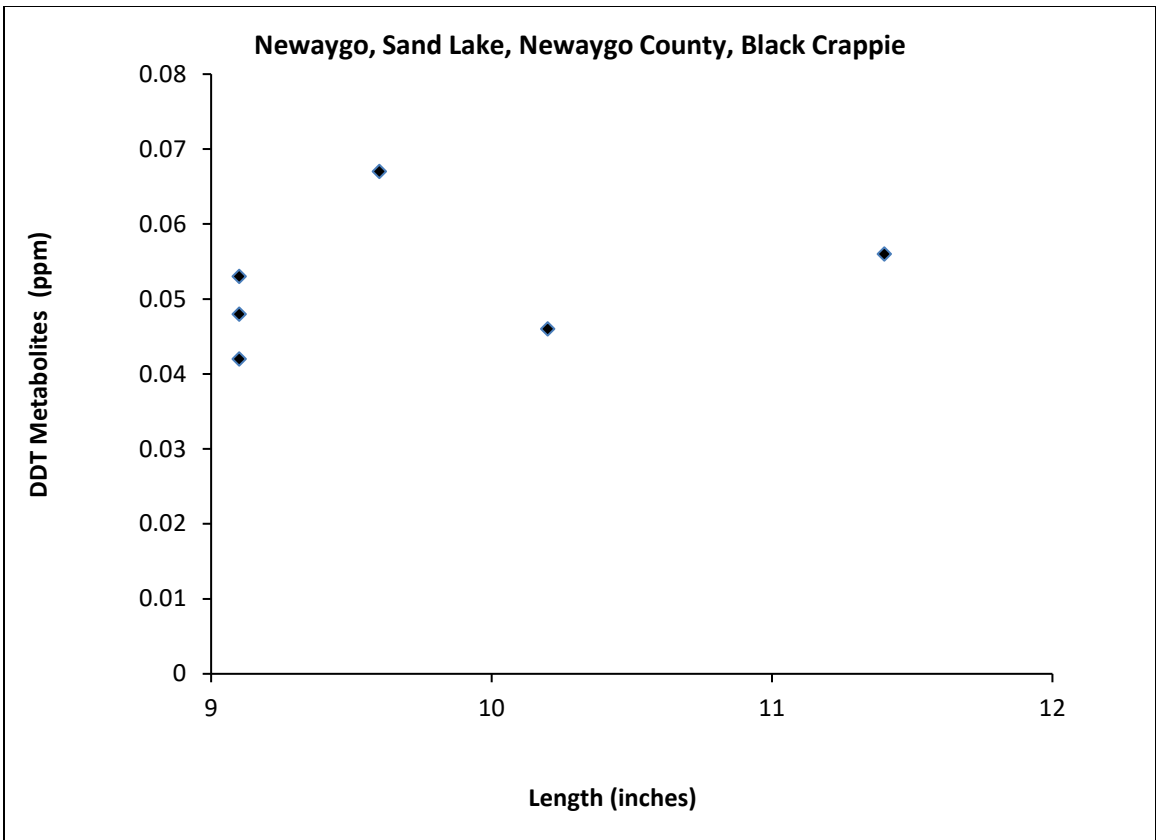
Existing Advisory: Sand Lake crappie are covered under the statewide mercury advisory.

Recommendation: People can eat 16 meals per month of crappie less than 9 inches. No one should eat more than 4 meals per month of Sand Lake crappie larger than 9 inches due to mercury. Dataset is limited by age of the data.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
8	0	16
9	0.06	16
10	0.13	8
11	0.19	4
12	0.25	4
13	0.31	2
14	0.37	2

Shaded area denotes extrapolated estimates





Largemouth Bass

Sand Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of al Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	3	13	14	13.8	13.8
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.25	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	--	--				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1992	1992	3	13	14	13.8	13.8
Datasets available: 1992						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.025*	--	--	--	--
DDT	1	0.08	--	--	--	--
Chlordane	1	0.005	--	--	--	--
Toxaphene	1	ND	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

* - below Aroclor detection level of 0.25 ppm

Existing Advisory: Sand Lake largemouth bass are covered under the statewide mercury advisory.

Recommendation: Dataset is limited due to sample size, age of the data and is not sufficient for setting a consumption guideline. Statewide guidelines apply, which recommend no one should eat more than 2 meals per month of legal size largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.

Northern Pike

Sand Lake

Newaygo County

Hg Analysis:

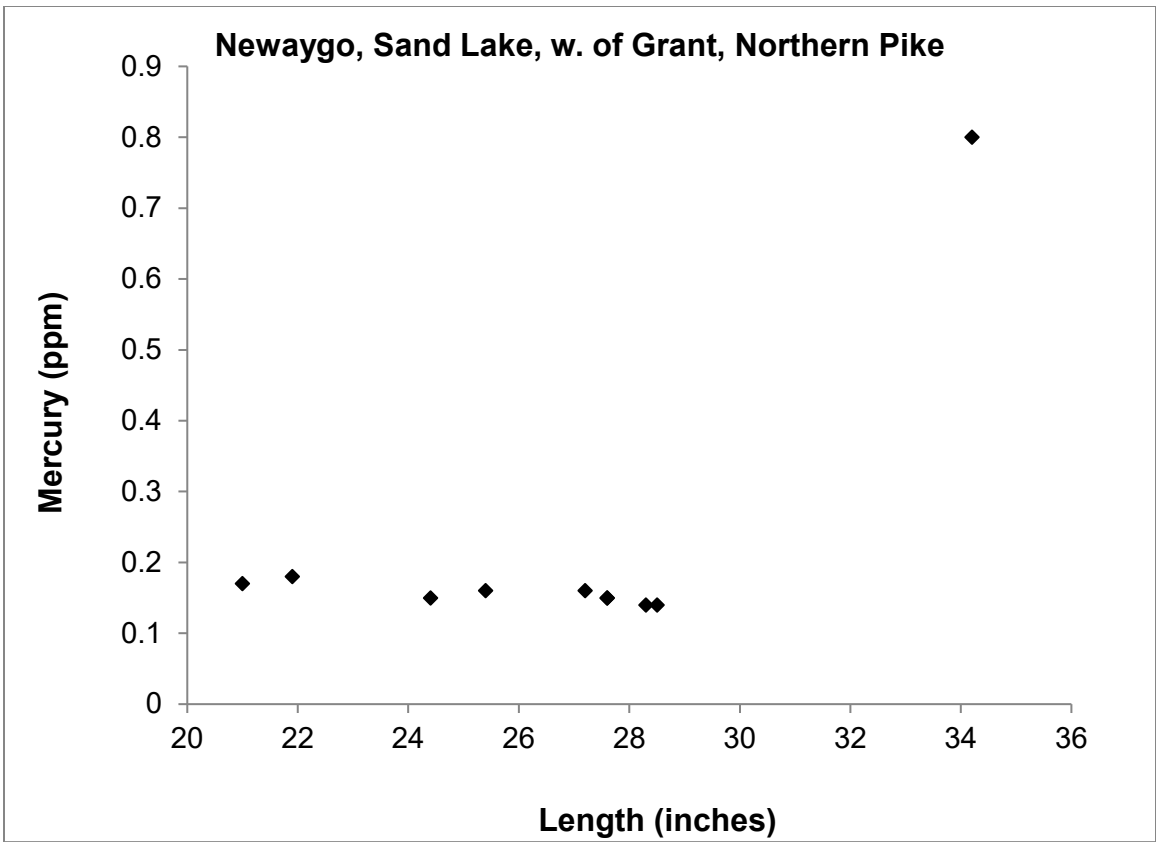
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent				Min	Max			
2014	2014	10	21	24	24.4	34.2			
Datasets available:		2014							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category		
Mercury	8	0.23		0.14	0.80	0.42	2		
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
Mercury	0.454	0.376							

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples				
Earliest	Most Recent				Min	Max			
--	--	0	--	--	--	--			
Datasets available:		--							
Chemical	Sample Size (Legal)	Mean		Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category		
PCB	--	--		--	--	--	--		
DDT	--	--		--	--	--	--		
Chlordane	--	--		--	--	--	--		
Toxaphene	--	--		--	--	--	--		
TEQ*	--	--		--	--	--	--		
Chemical	Linear Regression	Exponential Regression							
	R ²	R ²							
PCB	--	--							
DDT	--	--							
Chlordane	--	--							
Toxaphene	--	--							
TEQ*	--	--							
Final meal category based on UCL:							2		

Existing Advisory: Sand Lake northern pike are covered by the statewide advisory: No one should eat more than 2 meals per month of northern pike smaller than 30 inches or more than 1 meal per month of those fish larger than 30 inches due to mercury.

Recommendation: No one should eat more than 2 meals per month of northern pike smaller than 30 inches or more than 1 meal per month of those fish larger than 30 inches due to mercury. The statewide length break was applied as the size range of the fish was limited.



Largemouth Bass

Sylvan Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	6	14.4	14	14.4	16.8
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.53	0.39	0.74	0.65	1
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.755	0.699				

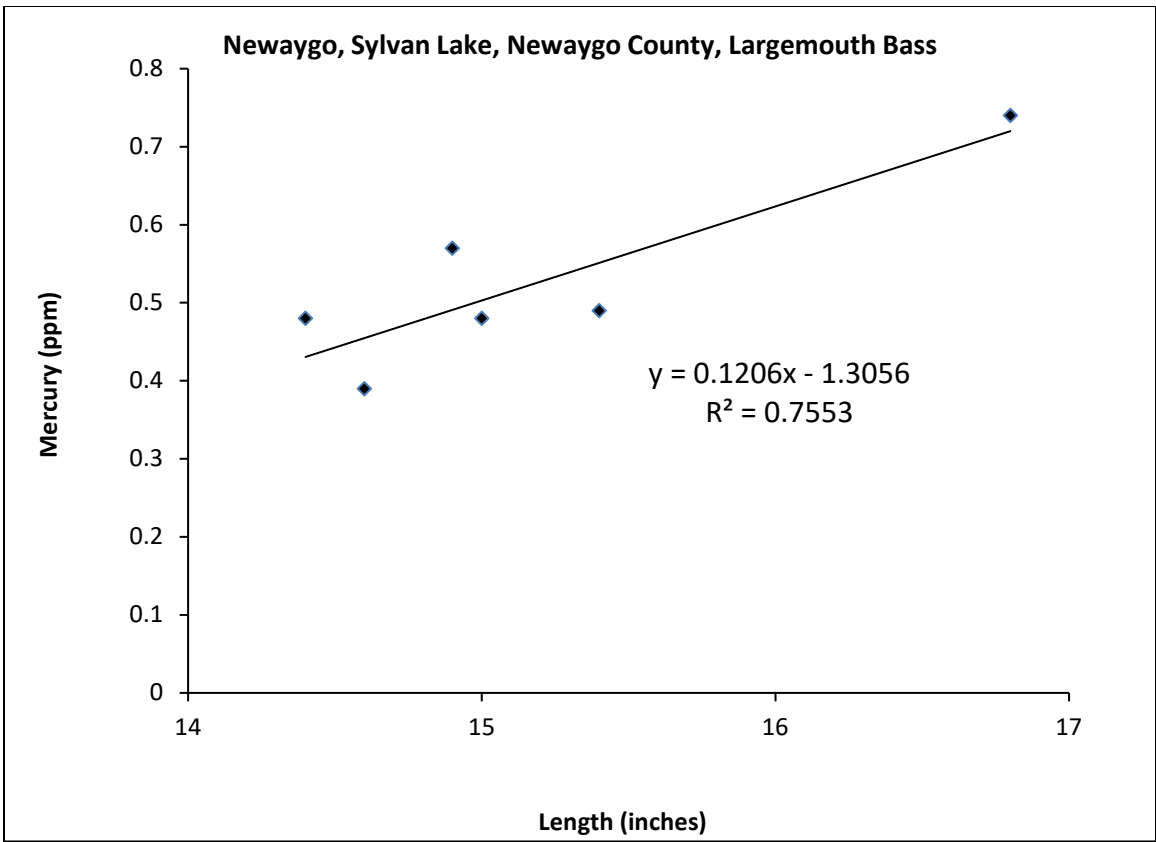
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						1

Existing Advisory: Sylvan Lake largemouth bass are covered by the statewide mercury advisory.

Recommendation: No one should eat more than 1 meal per month of Sylvan Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury Guideline is based on the 95% UCL and the statewide length break was applied. Regression slope was determined largely by a single data point and the length range was small.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.38	2
15	0.5	2
16	0.62	1
17	0.74	1
18	0.87	1
19	0.99	1
20	1.11	0.5
21	1.23	0.5
22	1.35	0.5
<i>Shaded area denotes extrapolated estimates</i>		



Northern Pike

Sylvan Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2004	2004	5	23.2	24	24.2	35.8
Datasets available: 2004						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.70	0.34	1.32	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.953	0.870				

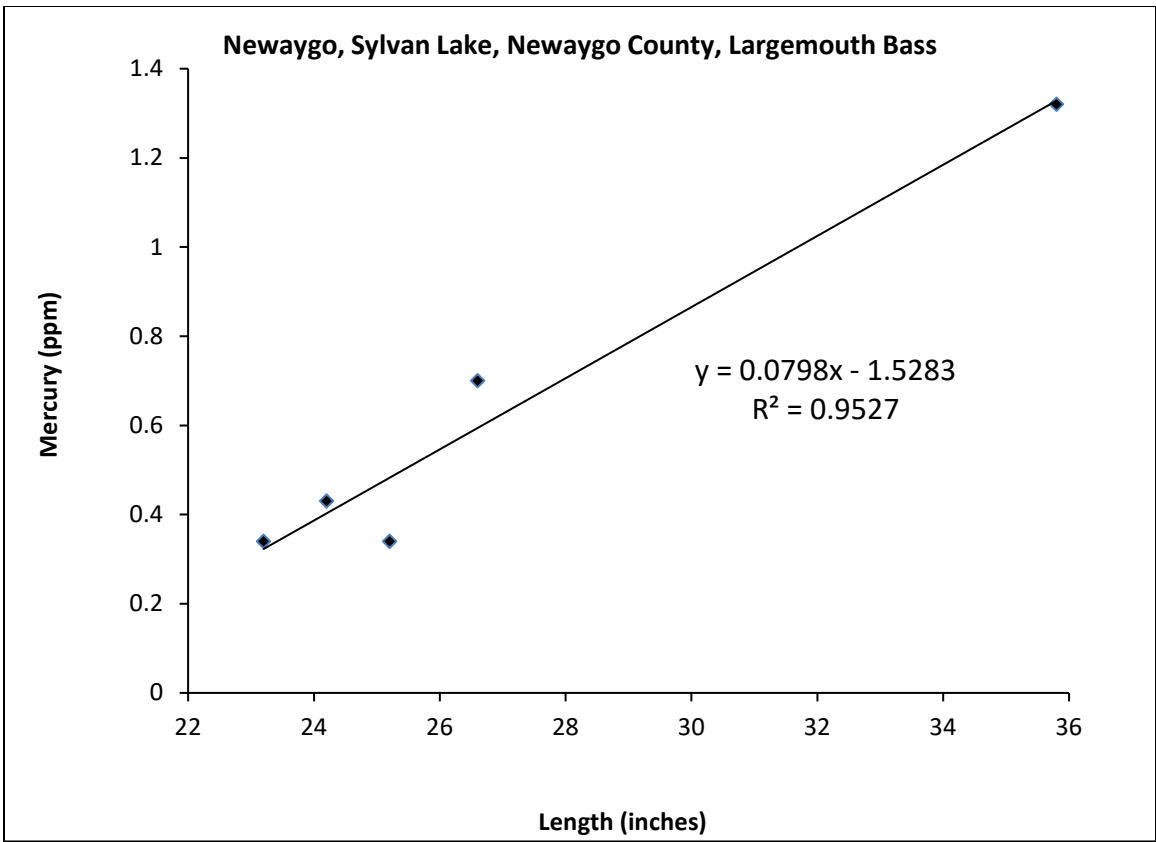
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	0				
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						--

Existing Advisory: Sylvan Lake northern pike are covered by the statewide mercury advisory.

Recommendation: No one should eat more than 6 meals per year of northern pike larger than 30 inches or more than 1 meals per month of northern pike smaller than 30 inches in length. Statewide length break was applied. Slope of the regression line was largely determined by one point.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.39	2
26	0.55	1
28	0.71	1
30	0.87	1
32	1.03	1
34	1.18	0.5
36	1.34	0.5
38	1.5	0.5
<i>Shaded area denotes extrapolated estimates</i>		



Bluegill

Walkup Lake

Newaygo County

Hg Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1999	1999	16	5.7	na	5.7	7.7
Datasets available: 1999						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	16	0.040	0.03	0.07	0.05	16
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
Mercury	0.350	0.352				

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
--	--	--	--	--	--	--
Datasets available: --						
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
Chemical	Linear Regression	Exponential Regression				
	R ²	R ²				
PCB	--	--				
DDT	--	--				
Chlordane	--	--				
Toxaphene	--	--				
Final meal category based on UCL:						16

Existing Advisory: Walkup Lake bluegill are not covered under an advisory.

Recommendation: People can eat 16 meals per month of bluegill or sunfish from Walkup Lake. No other consumption guidelines are needed for Walkup Lake bluegill or sunfish.

