Antrim County

Splake **Bellaire Lake** **Antrim 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	6	17.3	8	17.3	28.7

Datasets available: 1987

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.26	0.20	0.36	0.32	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.501	0.525

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: --

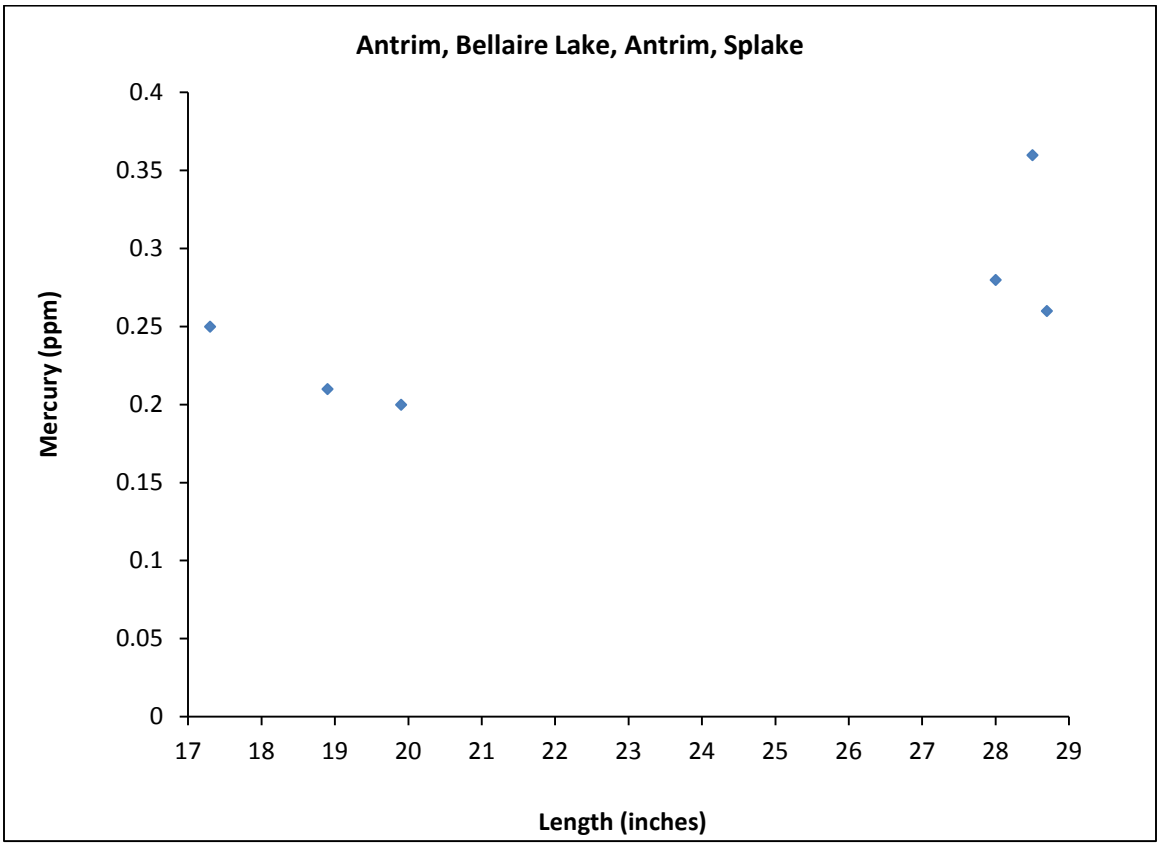
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

Existing Advisory: There are no current consumption advisories for Bellaire Lake splake.

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


Antrim, Bellaire Lake, Antrim, Splake
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
17
18
19
20
21
22
23
24
25
26
27
28
29
Length (inches)

Walleye **Bellaire Lake** **Antrim 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	9.1	15	14.8	23.6

Datasets available: 1987

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.51	0.19	0.70	0.69	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.810	0.885

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	--	--

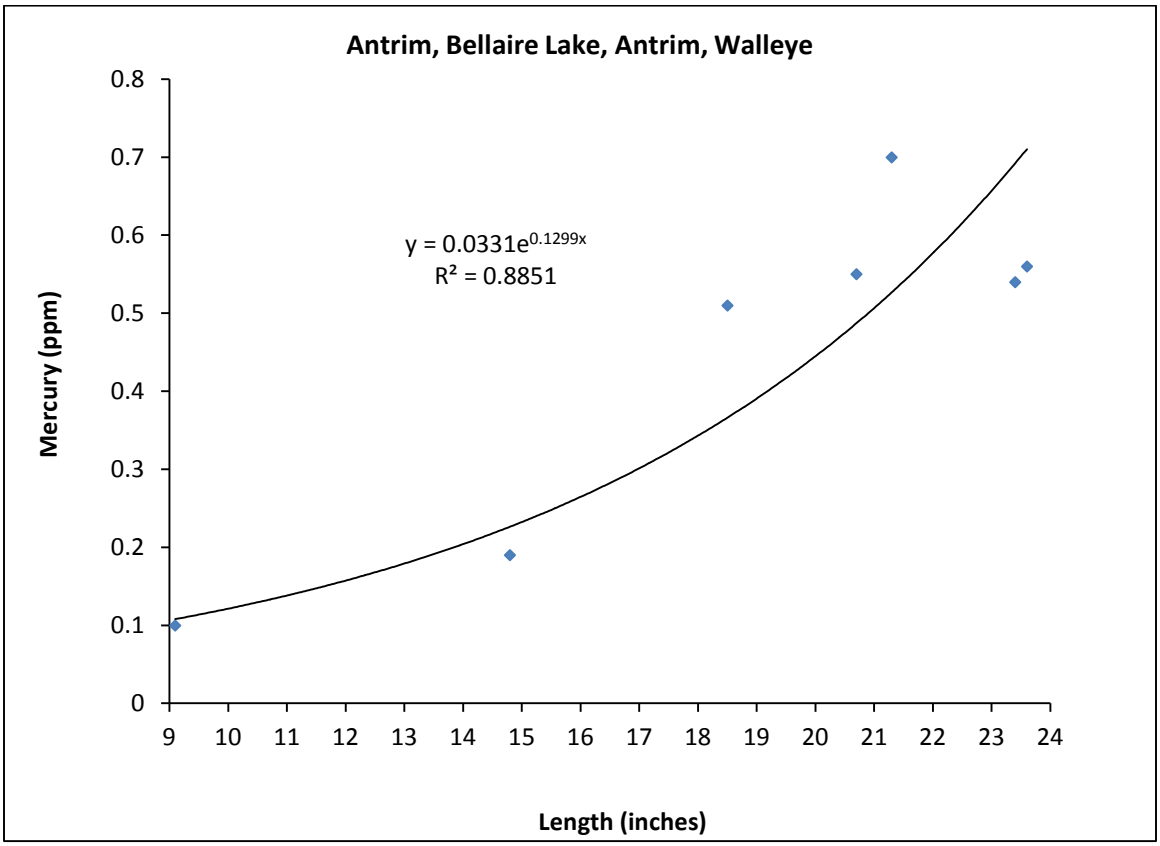
Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 2 meals per month of Bellaire Lake walleye smaller than 22 inches or more than 1 meal per month of those fish larger than 22 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.232	4
16	0.265	4
17	0.301	2
18	0.343	2
19	0.391	2
20	0.445	2
21	0.506	2
22	0.577	1
23	0.657	1

Shaded area denotes extrapolated estimates


Antrim, Bellaire Lake, Antrim, Walleye
y = 0.0331e^0.1299x
R² = 0.8851
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Length (inches)

Brown Trout **Cedar River** **Antrim 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	9.1	8	9.1	11.2

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.18	0.13	0.23	--	--

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	9.1	8	9.1	11.2

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	0.004	0.003	0.005	--	--
Chlordane	2*	ND	--	--	--	--
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: There are no current consumption advisories for Cedar River brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

White Sucker **Cedar River** **Antrim 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	1	15.7	na	15.7	15.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.20	--	--	--	--

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	1	15.7	na	15.7	15.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	ND	--	--	--	--
DDT	1	ND	--	--	--	--
Chlordane	1	ND	--	--	--	--
Toxaphene	1	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 Cedar River white sucker.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Cedar River sucker: No one should eat more than 8 meals per month of sucker from inland waters.

Brown Bullhead **Ellsworth Lake** **Antrim 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
1994	1994	2	13.4	na	13.4	13.4

Datasets available: 1994

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.20	0.11	0.29	--	--

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
1994	1994	2	13.4	na	13.4	13.4

Datasets available: 1994

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	ND	--	--	--	--
DDT	2	0.004	0.003	0.004	--	--
Chlordane	2	ND	--	--	--	--
Toxaphene	2	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 Ellsworth Lake brown bullhead.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

Largemouth Bass **Ellsworth Lake** **Antrim 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	1994	9	12	14	14.6	18.5

Datasets available: 1986, 1994

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.33	0.27	0.38	0.37	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.029	0.039

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1994	1994	7	13.4	14	13.9	18.5

Datasets available: 1994

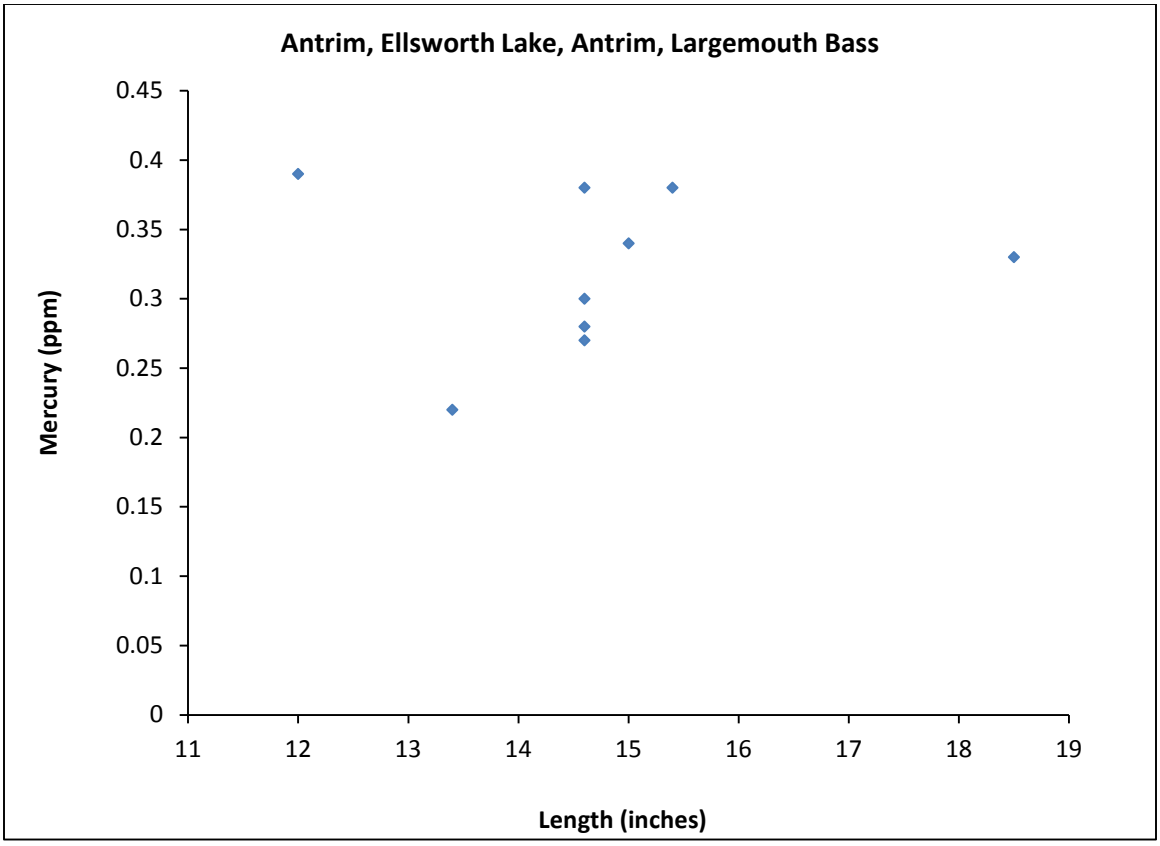
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	ND	--	--	--	--
DDT	7	0.003	0.003	0.004	0.004	16
Chlordane	7	ND	--	--	--	--
Toxaphene	7	ND	--	--	--	--

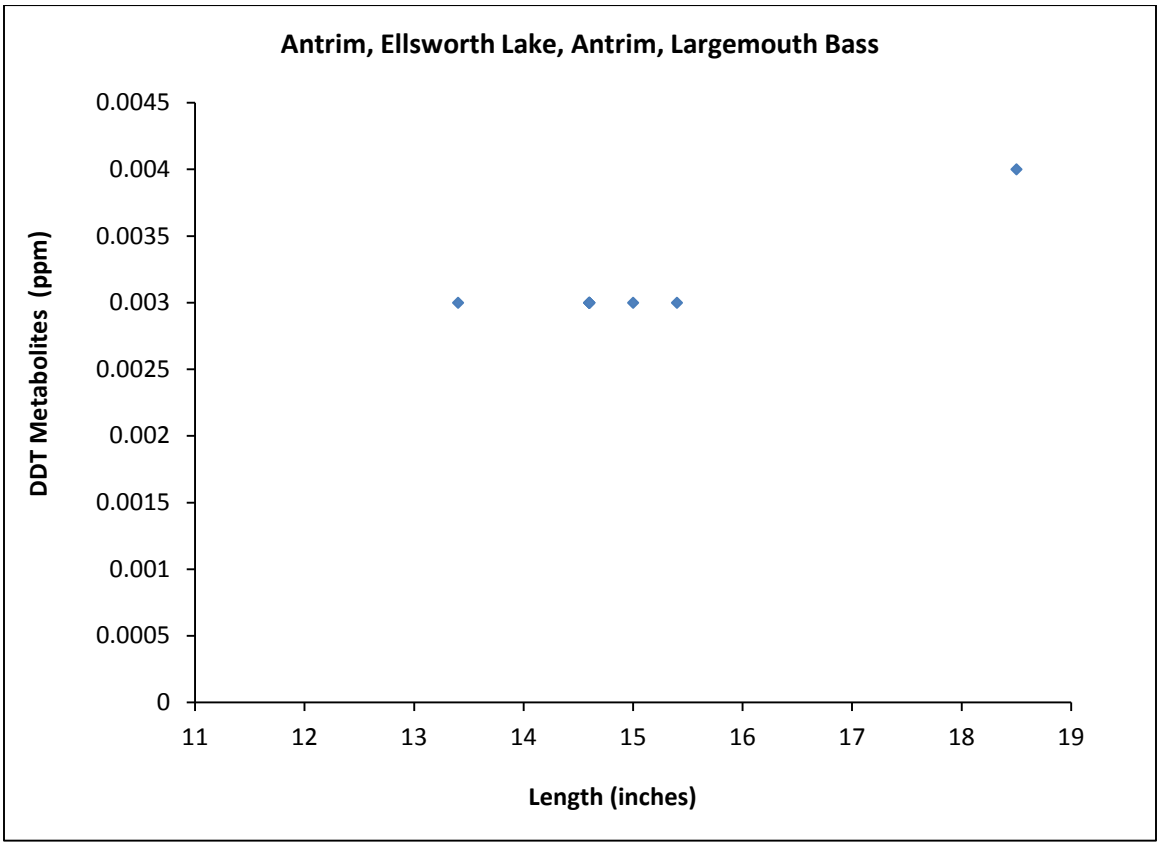
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.856	0.856
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

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


Antrim, Ellsworth Lake, Antrim, Largemouth Bass
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11
12
13
14
15
16
17
18
19
Length (inches)


Antrim, Ellsworth Lake, Antrim, Largemouth Bass
DDT Metabolites (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
11
12
13
14
15
16
17
18
19
Length (inches)

Northern Pike **Ellsworth Lake** **Antrim 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
1986	1986	8	12.6	24	12.6	22.6

Datasets available: 1986

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.38	0.15	0.72	0.53	2*

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.556	0.699

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1986	1986	5	16.3	24	16.3	22.6

Datasets available: 1986

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.04	0.025	0.05	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.776*	0.780*
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

*negative slope

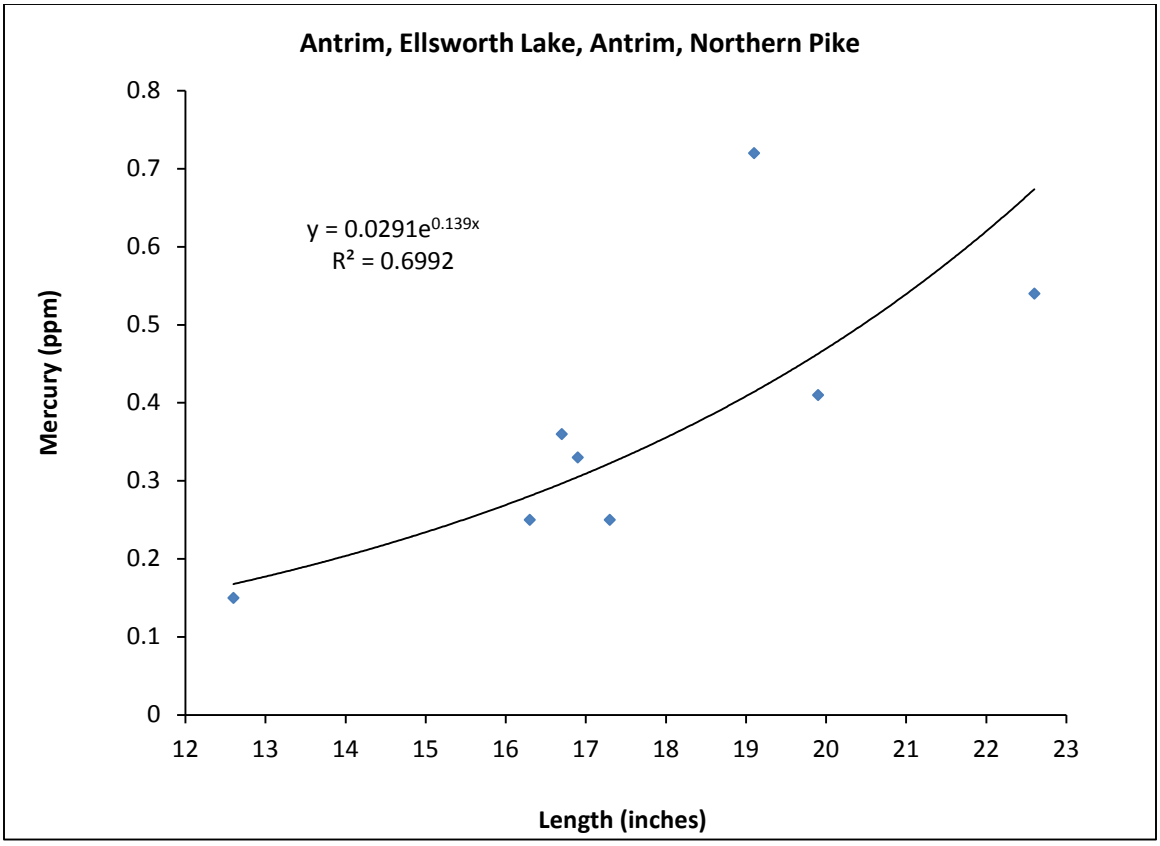
Final meal category based on UCL: 2*

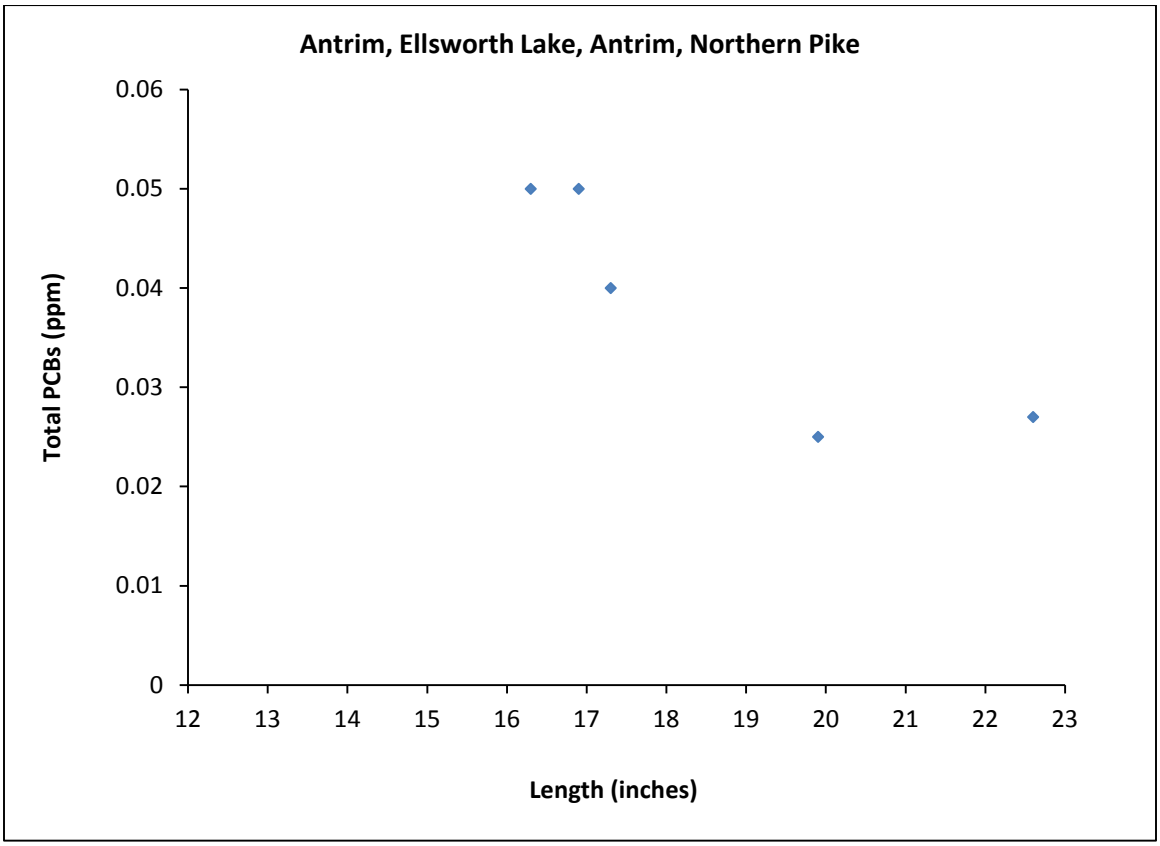
Existing Advisory: Ellsworth Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Ellsworth Lake northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches. Regression estimates were not used beyond the length range of the sampled fish. The regression based meal category at 22 inches exceeds 1 meal per month. Statewide length range was applied as the length range was limited. *The UCL was not used because it is based on sublegal samples.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.818	1
25	0.940	1
26	1.080	1
27	1.241	0.5
28	1.426	0.5
29	1.639	0.5
30	1.883	0.5
31	2.164	0.5
32	2.487	0

Shaded area denotes extrapolated estimates


Antrim, Ellsworth Lake, Antrim, Northern Pike
y = 0.0291e^0.139x
R² = 0.6992
Mercury (ppm)
Length (inches)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
12
13
14
15
16
17
18
19
20
21
22
23


Antrim, Ellsworth Lake, Antrim, Northern Pike
Total PCBs (ppm)
Length (inches)
0
0.01
0.02
0.03
0.04
0.05
0.06
12
13
14
15
16
17
18
19
20
21
22
23

White Sucker **Ellsworth Lake** **Antrim 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	1994	6	15.6	na	15.6	20.5

Datasets available: 1986, 1994

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.09	0.011	0.13	0.13	8

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.003	0.007

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1986	1994	5	18.1	na	18.1	20.5

Datasets available: 1986, 1994

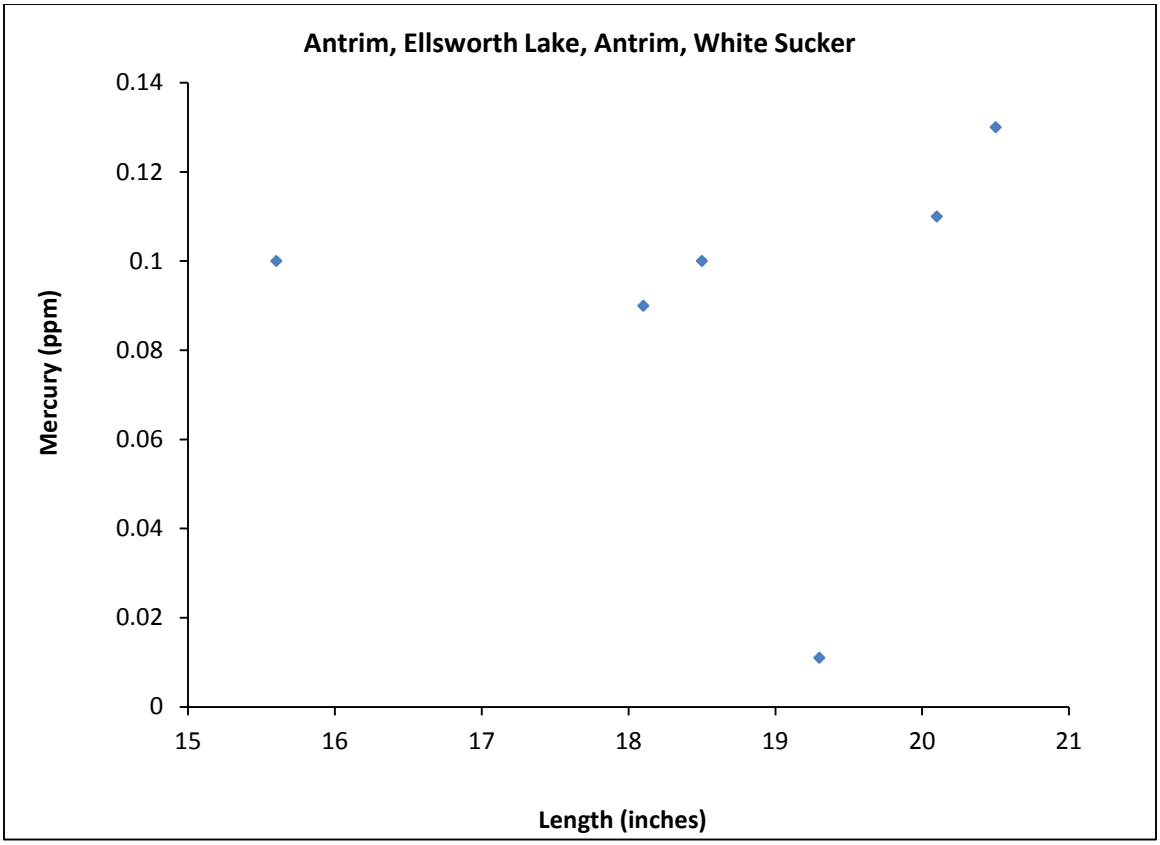
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.005	0.003	0.01	0.01	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--

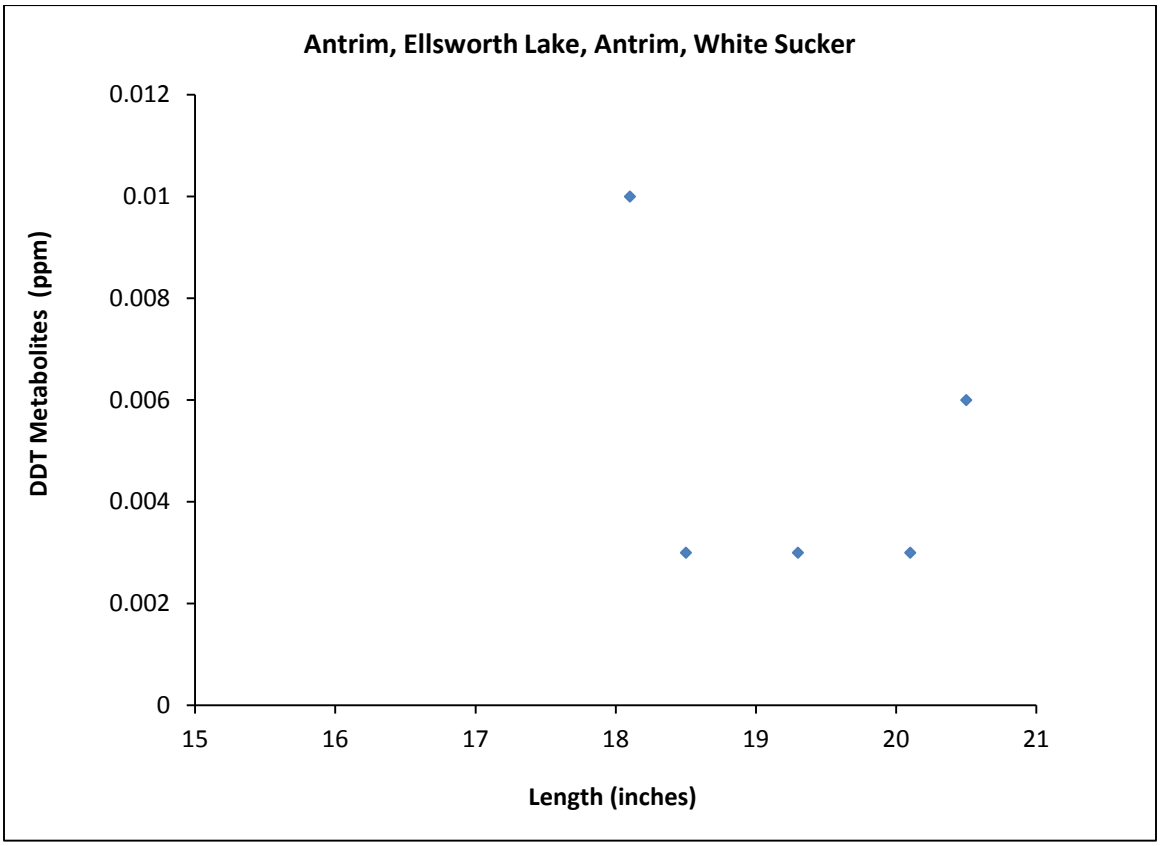
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.146	0.075
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 8

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

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


Antrim, Ellsworth Lake, Antrim, White Sucker
Mercury (ppm)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
15
16
17
18
19
20
21
Length (inches)


Antrim, Ellsworth Lake, Antrim, White Sucker
DDT Metabolites (ppm)
0.012
0.01
0.008
0.006
0.004
0.002
0
15
16
17
18
19
20
21
Length (inches)

Rock Bass **Intermediate Lake** **Antrim 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	9.1	na	9.1	11.2

Datasets available: 1990

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.33	0.18	0.51	0.40	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.633	0.586

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	10	9.1	na	9.1	11.2

Datasets available: 1990

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	ND	--	--	--	--
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

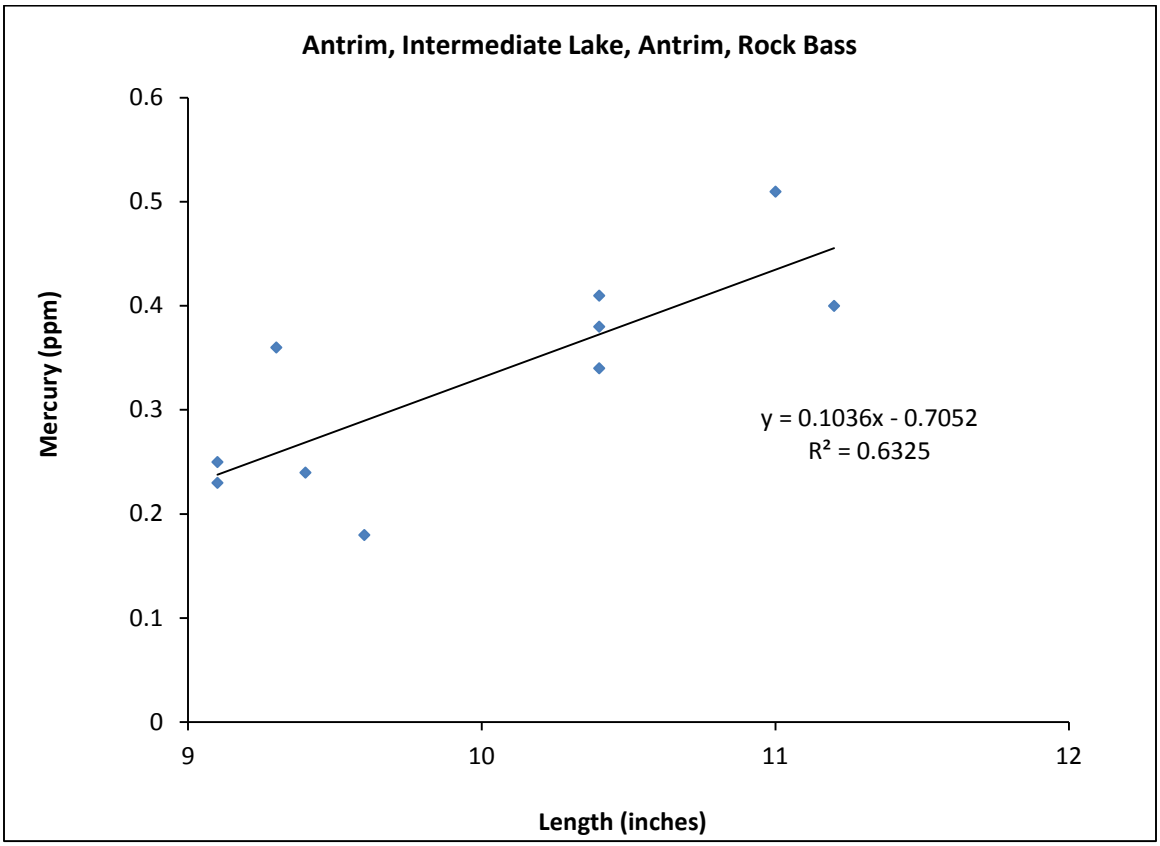
Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 4 meals per month of Intermediate Lake rock bass smaller than 9 inches or more than 2 meals per month of those fish larger than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
7	0.02	16
8	0.12	8
9	0.23	4
10	0.33	2
11	0.43	2
12	0.54	1
13	0.64	1
14	0.74	1

Shaded area denotes extrapolated estimates


Antrim, Intermediate Lake, Antrim, Rock Bass
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
9
10
11
12
Length (inches)
y = 0.1036x - 0.7052
R² = 0.6325

Smallmouth Bass **Intermediate Lake** **Antrim 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	
1990	1990	3	12.2	14	12.2	15.4	
Datasets available:	1990						
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	3	0.29		0.27	0.32	--	--
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	
1990	1990	3	12.2	14	12.2	15.4	
Datasets available:	1990						
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	3	ND		--	--	--	--
DDT	3	0.008		0.004	0.012	--	--
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: Intermediate Lake smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Intermediate Lake largemouth and smallmouth bass: 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.

Walleye **Intermediate Lake** **Antrim 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	14.8	15	14.8	21.5

Datasets available: 1990

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.34	0.22	0.57	0.45	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.700	0.682

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	10	14.8	15	14.8	21.5

Datasets available: 1990

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	0.007	0.003	0.01	0.01	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.074	0.077
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of Intermediate Lake walleye smaller than 20 inches or more than 1 meal per month of those fish larger than 20 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.223	4
16	0.283	2
17	0.342	2
18	0.402	2
19	0.462	2
20	0.522	2
21	0.582	1
22	0.642	1
23	0.702	1

Shaded area denotes extrapolated estimates

Brown Trout **Torch Lake** **Antrim 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	1993	10	15.7	15	15.7	26.4

Datasets available: 1993

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.26	0.10	0.46	0.32	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.714	0.618

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	10	15.7	15	15.7	26.4

Datasets available: 1993

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.19	0.05	0.39	0.25	0.5*
DDT	10	0.36	0.12	0.82	0.50	2*
Chlordane	10	0.08	0.008	0.15	0.11	--
Toxaphene	10	0.26	0.05	0.40	0.33	1*

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.675	0.562
DDT	0.688	0.652
Chlordane	0.680	0.468
Toxaphene	0.453	0.385

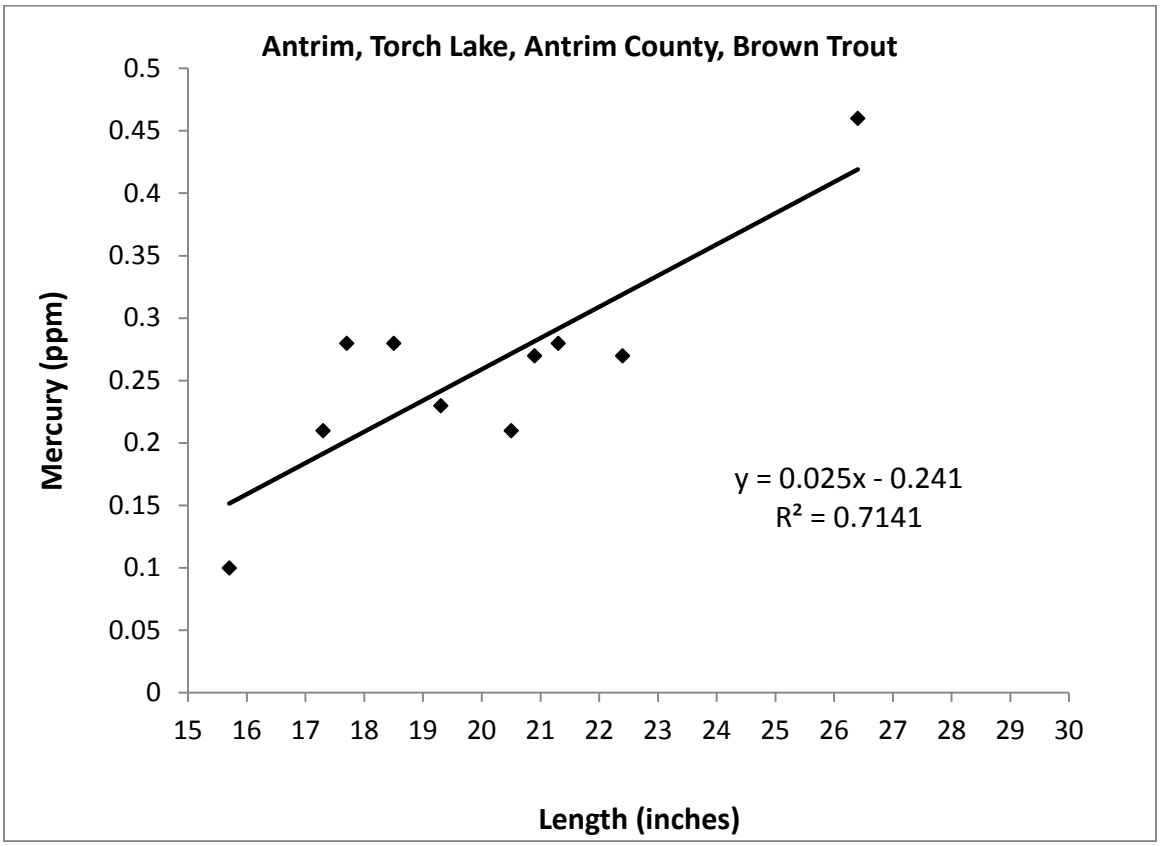
Final meal category based on UCL: 0.5*

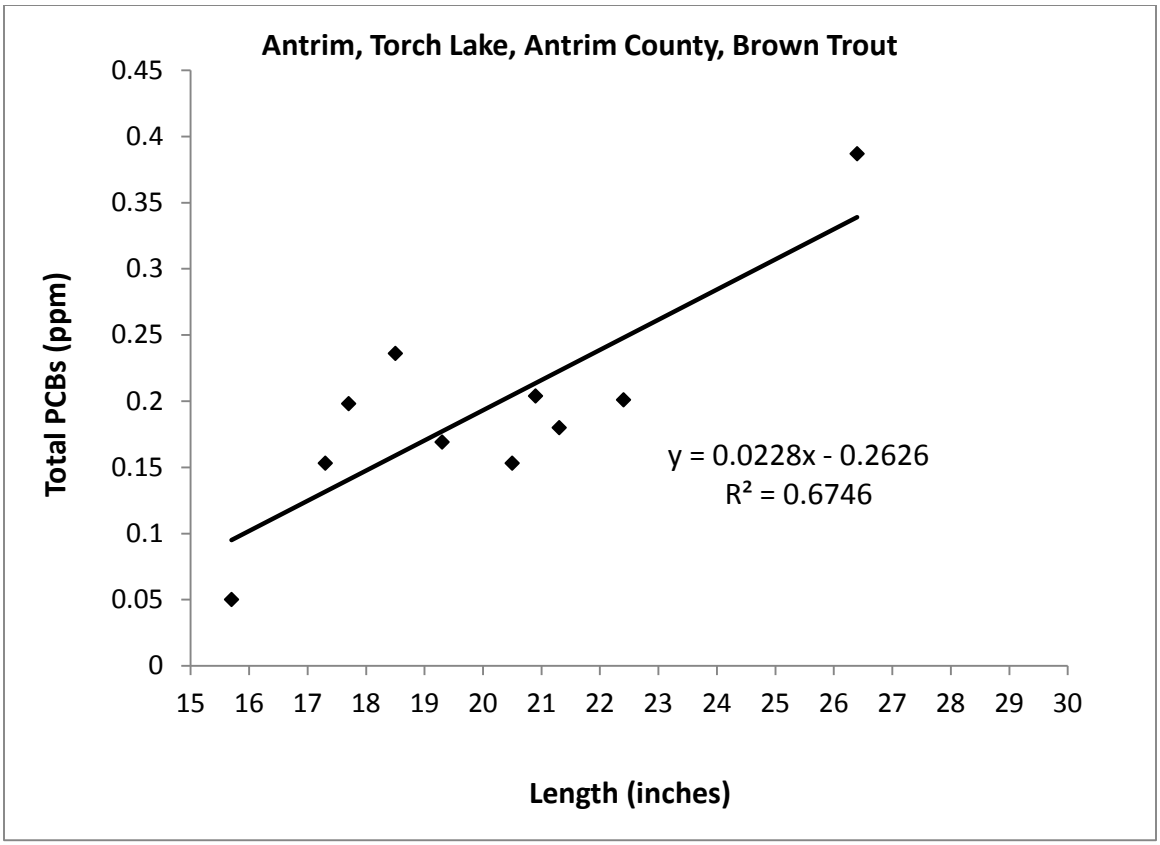
Existing Advisory: Women and children should not eat more than 1 meal per week of Torch Lake brown trout smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to PCBs.

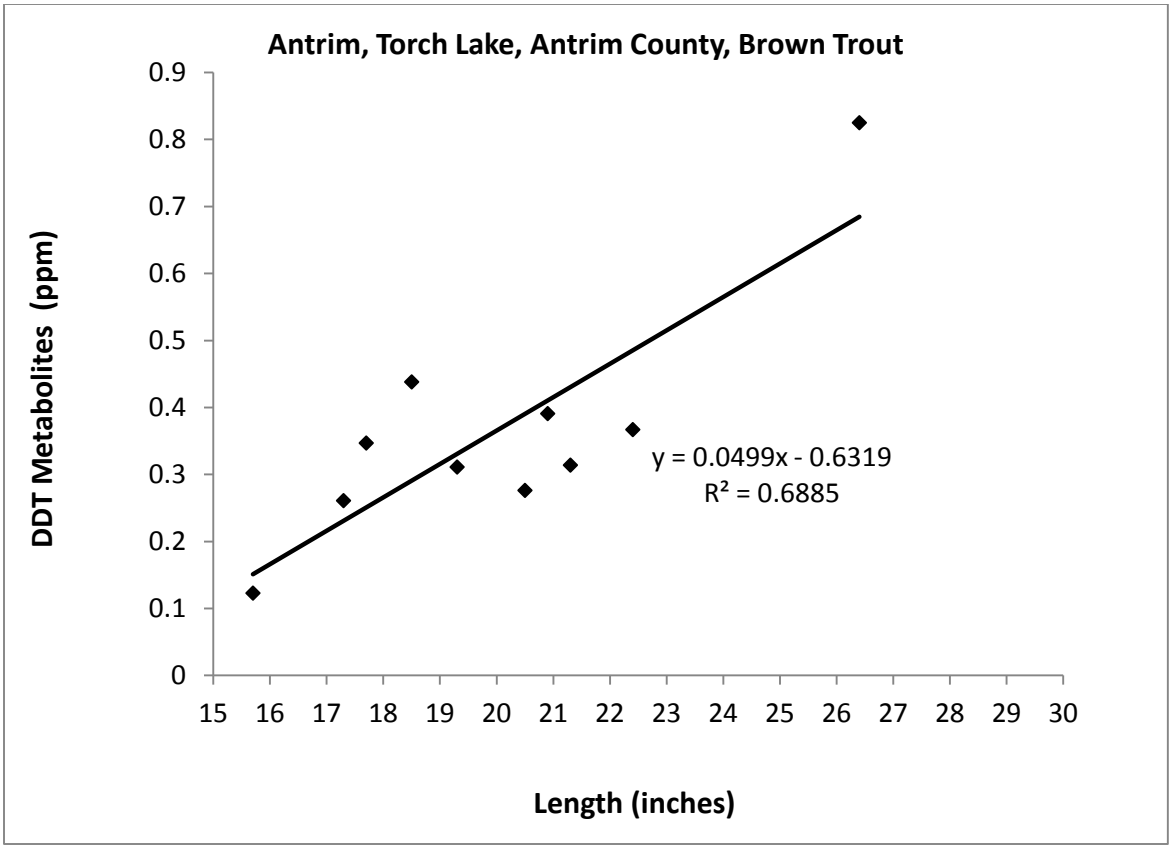
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category	PCB Regression Equation Estimate (ppm	Meal Category
14	0.11	8	0.06	2*
16	0.16	4	0.10	2*
18	0.21	4	0.15	1*
20	0.26	4	0.19	1*
22	0.31	2	0.24	0.5*
24	0.36	2	0.28	0.5*
26	0.41	2	0.33	0.5*
28	0.46	2	0.38	0.5
30	0.51	2	0.42	0.5

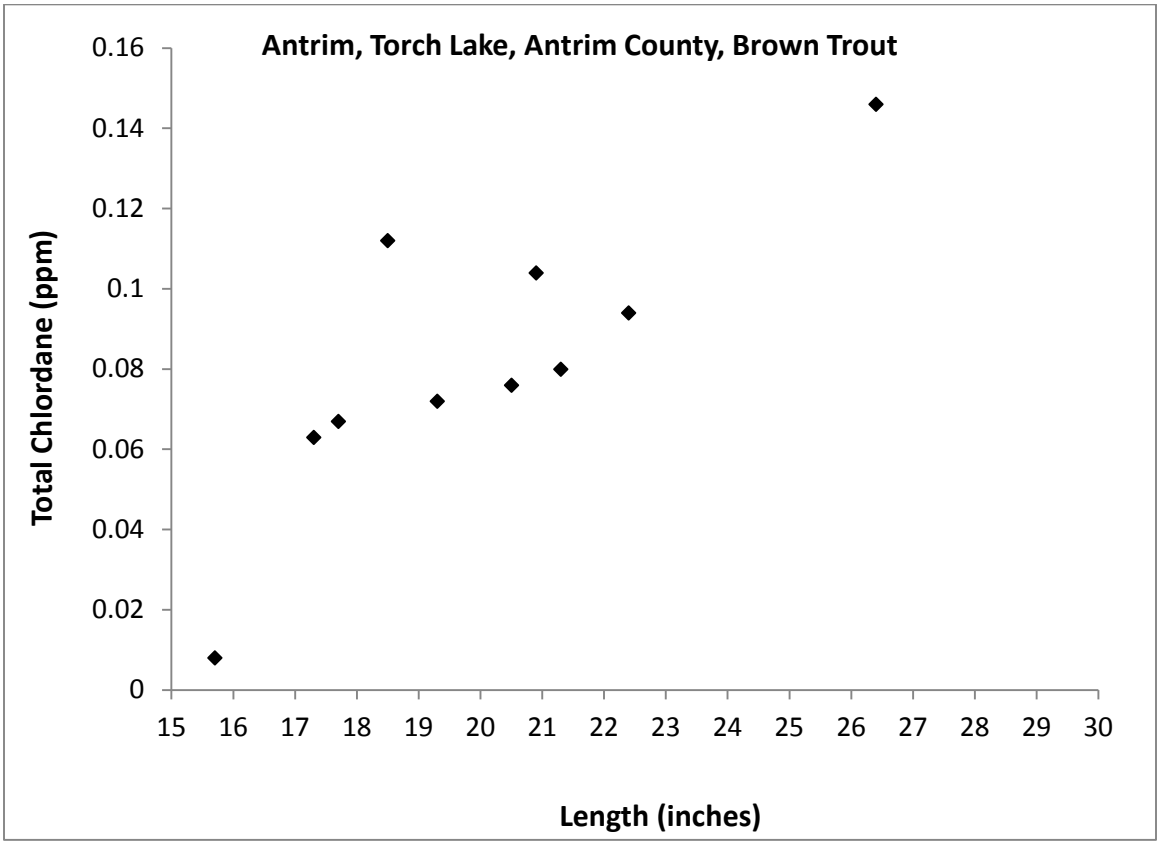
Shaded area denotes extrapolated estimates

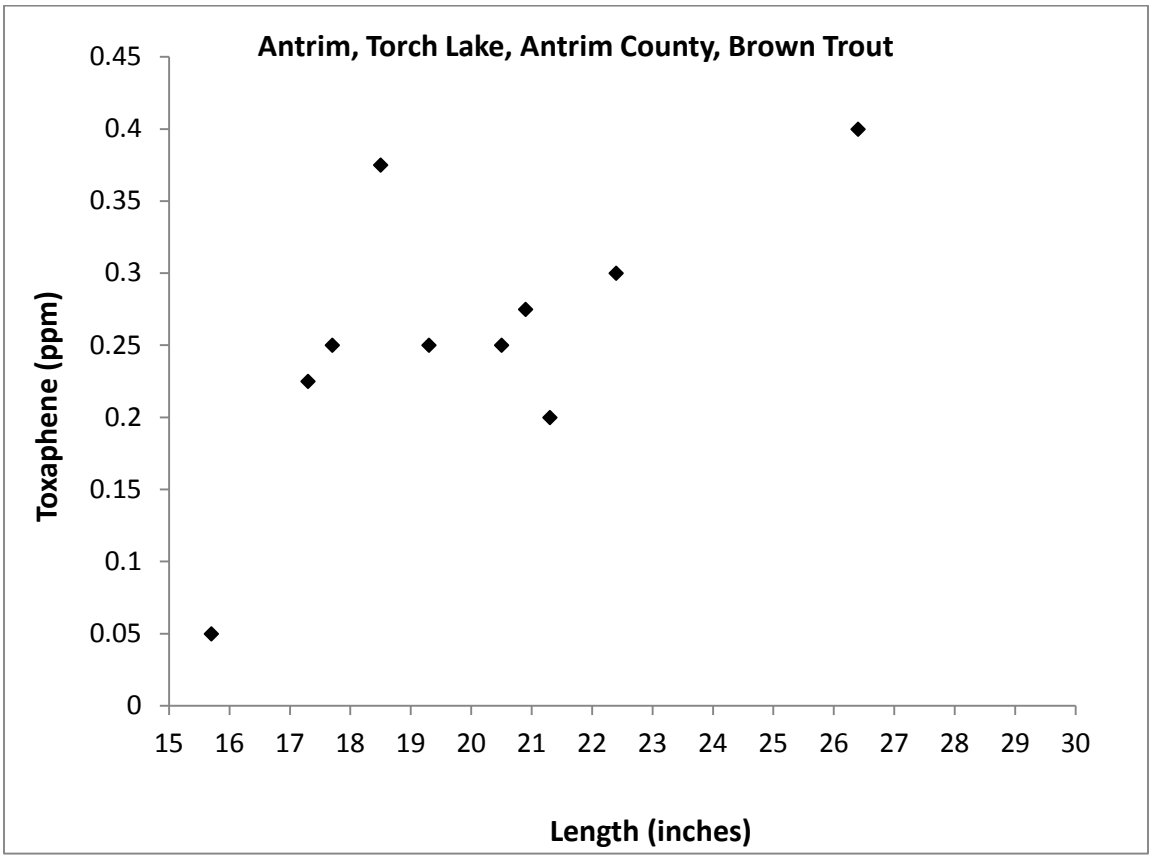
Recommendation: No one should eat more than 2 meals per month of Torch Lake brown trout smaller than 20 inches due to PCBs and toxaphene or more than 1 meal per month of those fish larger than 20 inches due to PCBs. Mercury and DDT would cause advisories. *Based on the MDEQ Fish Contaminant Monitoring Program, PCB, DDT, and Toxaphene concentrations ≥15 years old are expected to have declined to a concentration that allows a less restrictive meal category.


Antrim, Torch Lake, Antrim County, Brown Trout
Mercury (ppm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)
y = 0.025x - 0.241
R² = 0.7141


Antrim, Torch Lake, Antrim County, Brown Trout
Total PCBs (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)
y = 0.0228x - 0.2626
R² = 0.6746


Antrim, Torch Lake, Antrim County, Brown Trout
DDT Metabolites (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
y = 0.0499x - 0.6319
R² = 0.6885
Length (inches)


Antrim, Torch Lake, Antrim County, Brown Trout
Total Chlordane (ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)


Antrim, Torch Lake, Antrim County, Brown Trout
Toxaphene (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Length (inches)

Lake Trout **Torch Lake** **Antrim 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	2009	31	14.2	15	15.4	29.9

Datasets available: 1991, 1993, 2009

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	31	0.60	0.19	1.44	0.74	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.137	0.266

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2009	2009	11	17.7	15	17.7	28.0

Datasets available: 2009

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	11	0.329	0.06	0.64	0.45	Limited
DDT	11	0.502	0.08	1.10	0.69	2
Chlordane	11	0.080	0.01	0.16	0.11	--
Toxaphene	11	ND	--	--	--	--
TEQ*	11	42.7 ppt	8.3 ppt	75.6 ppt	51.8 ppt	Limited

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.536	0.678
DDT	0.381	0.589
Chlordane	0.429	0.589
Toxaphene	--	--
TEQ*	0.478	0.613

Final meal category based on UCL: Limited

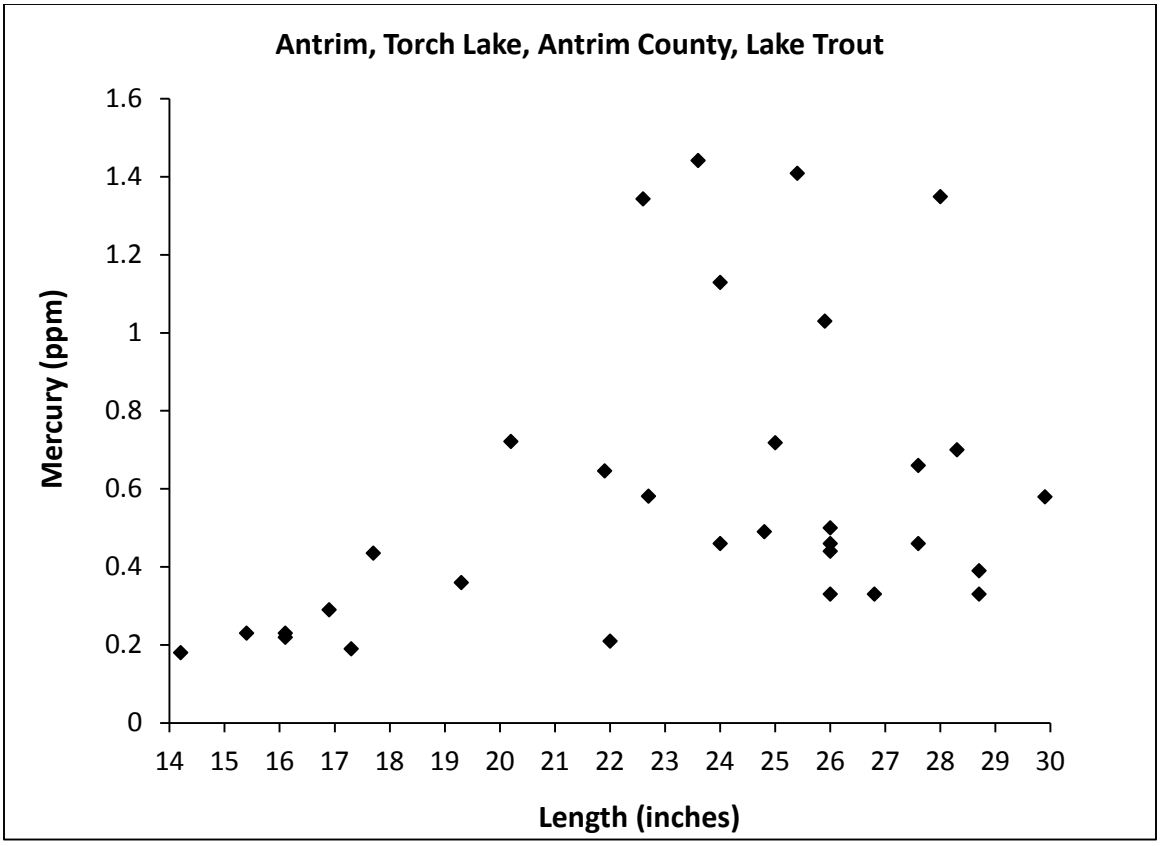
* - 2005 WHO TEFs; dl-PCBs included

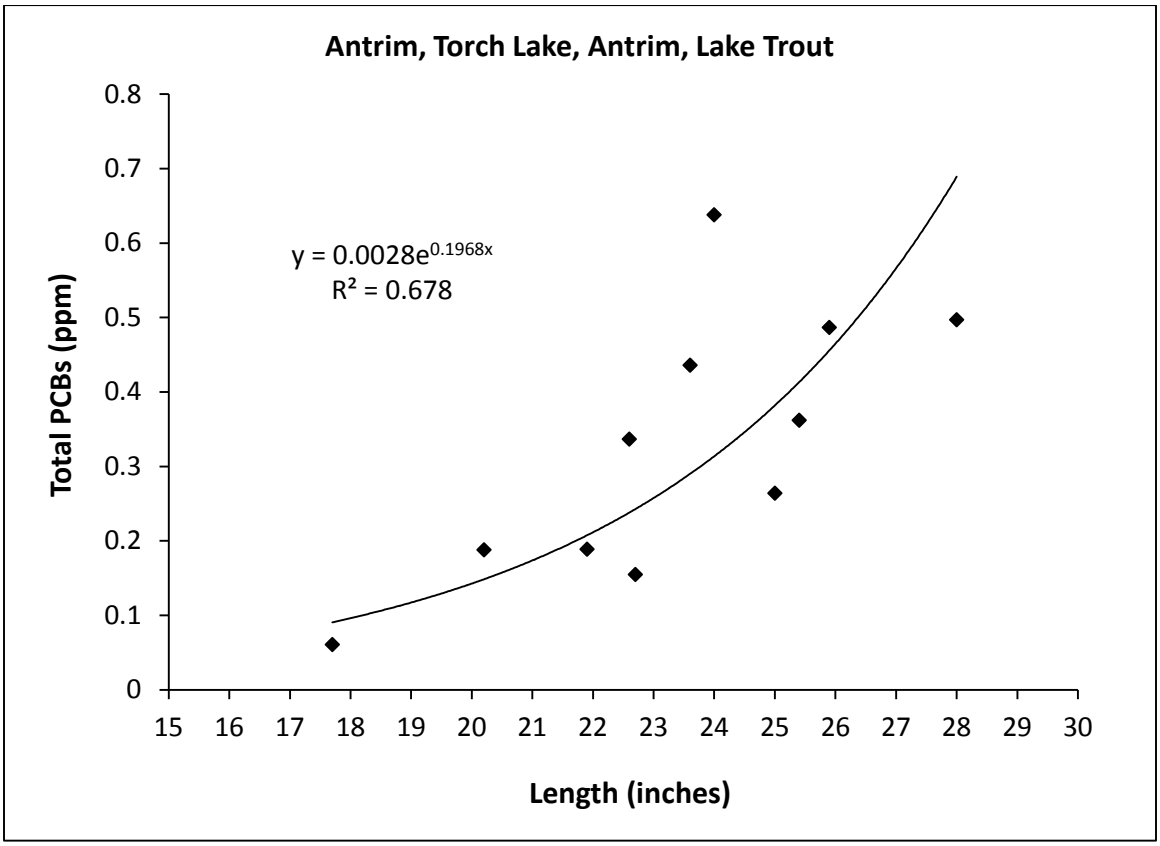
Existing Advisory: No one should eat Torch Lake lake trout due to mercury, dioxin and PCBs.

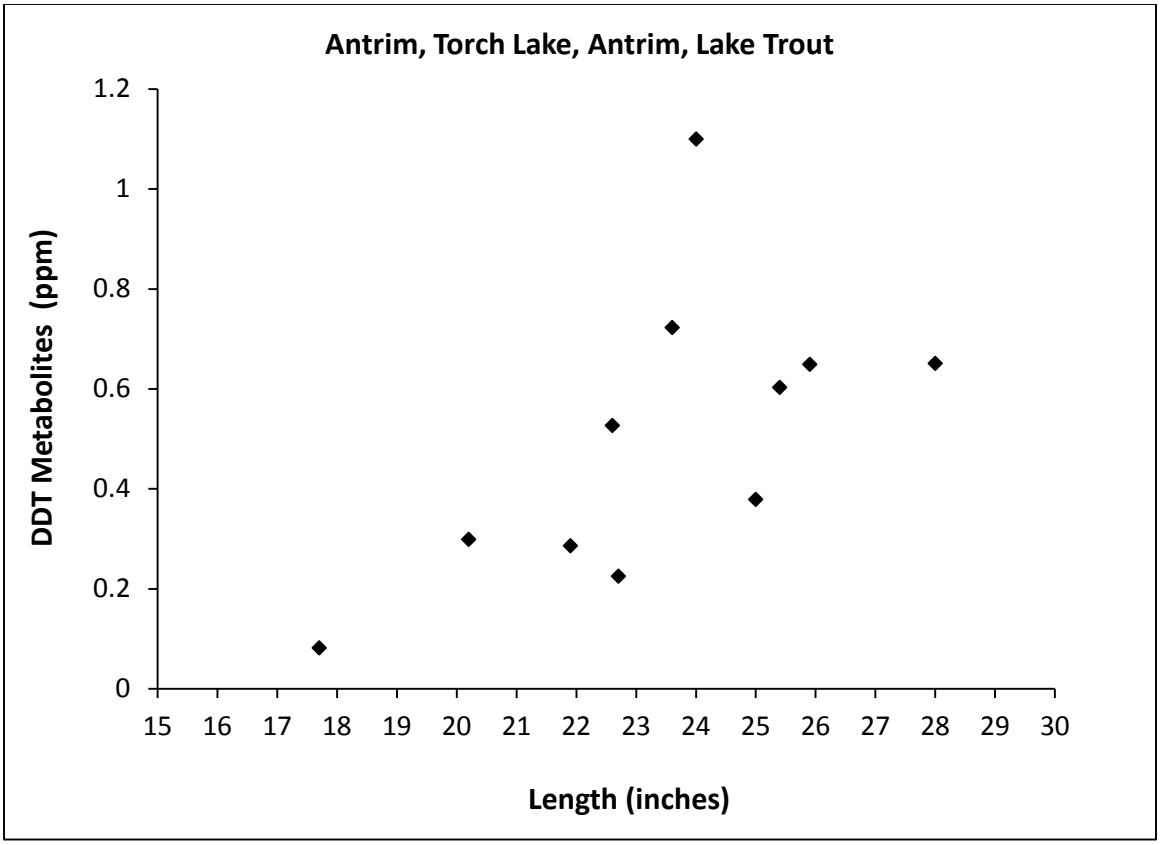
Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of Torch Lake lake trout smaller than 28 inches to 1 or 2 meals per year and should not eat any of those fish larger than 28 inches due to dioxins. PCBs, mercury, and DDT would cause advisories.

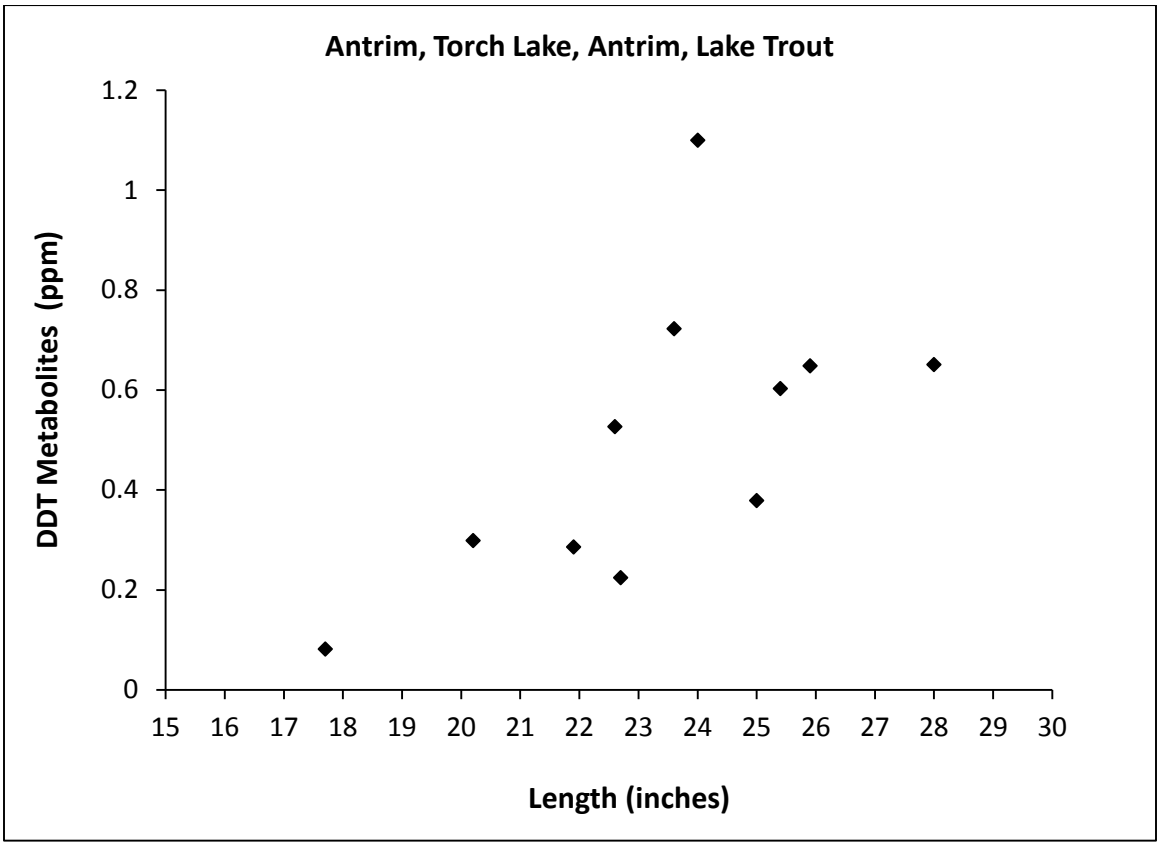
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category	TEQ Regression Equation Estimate (ppm)	Meal Category
15	0.05	2	7.8	Limited
16	0.07	2	9.4	Limited
18	0.10	2	13.5	Limited
20	0.14	1	19.5	Limited
22	0.21	0.5	28.2	Limited
24	0.32	0.5	40.7	Limited
26	0.47	Limited	58.7	Limited
28	0.69	Limited	84.8	Limited
30	1.03	Limited	122.4	0

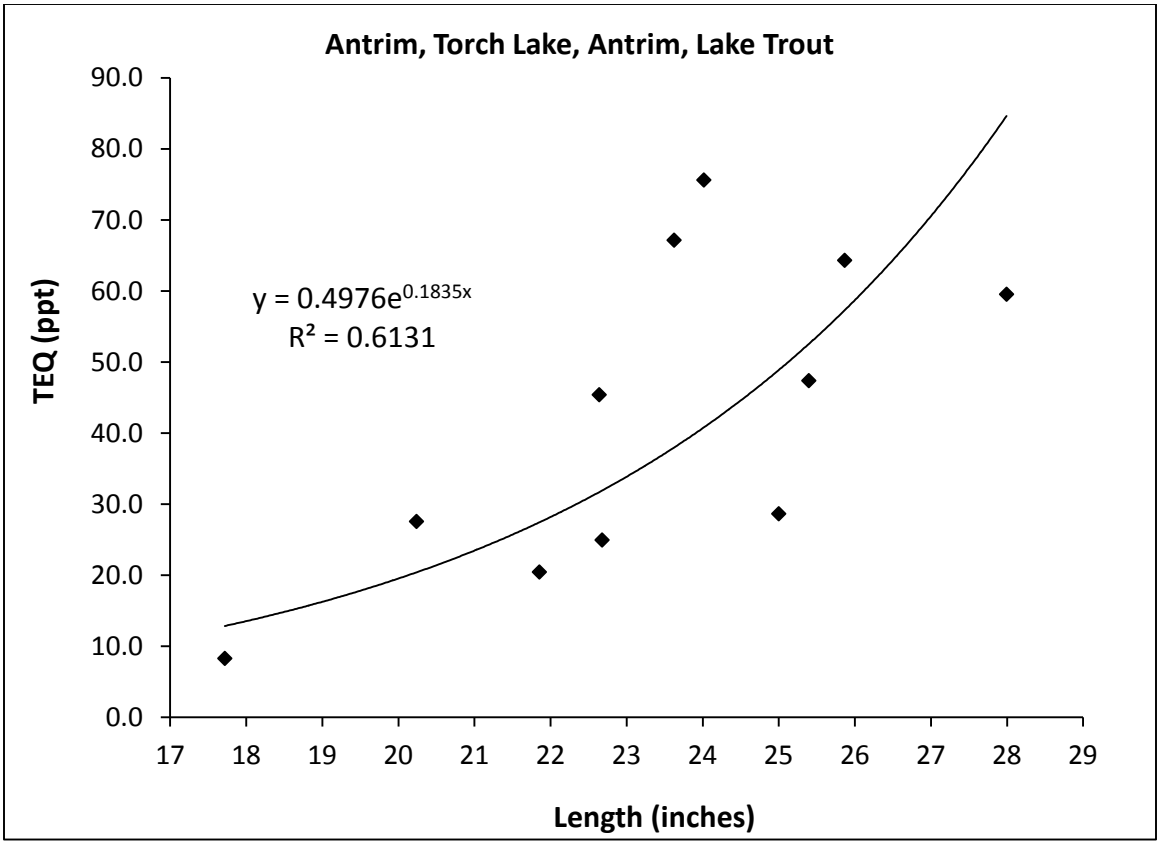
Shaded area denotes extrapolated estimates


Antrim, Torch Lake, Antrim County, Lake Trout
Mercury (ppm)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)


Antrim, Torch Lake, Antrim, Lake Trout
Total PCBs (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
y = 0.0028e^0.1968x
R² = 0.678
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)


Antrim, Torch Lake, Antrim, Lake Trout
DDT Metabolites (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)


Antrim, Torch Lake, Antrim, Lake Trout
DDT Metabolites (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Length (inches)


Antrim, Torch Lake, Antrim, Lake Trout
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
TEQ (ppt)
y = 0.4976e^0.1835x
R² = 0.6131
17
18
19
20
21
22
23
24
25
26
27
28
29
Length (inches)

Lake Whitefish **Torch Lake** **Antrim 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
1994	2001	20	12.8	na	12.8	21.1

Datasets available: 1994, 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.11	0.08	0.18	0.12	8

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.095	0.083

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	14.2	na	14.2	21.1

Datasets available: 1994, 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.10	0.02	0.34	0.17	1
DDT	10	0.22	0.03	0.56	0.35	4
Chlordane	10	0.03	0.004	0.08	0.05	--
Toxaphene	10	ND	--	--	--	--
TEQ*	10	5.7 ppt	0.9 ppt	17.3 ppt	6.9 ppt	1

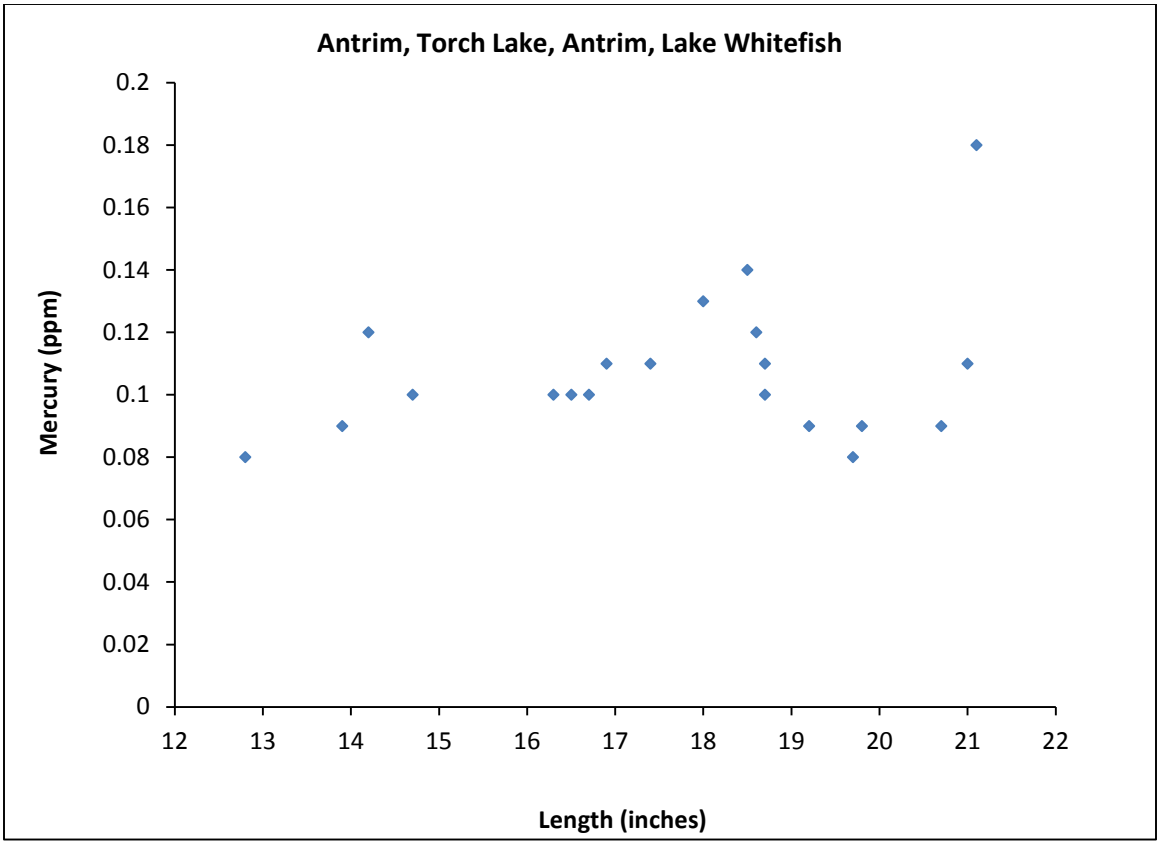
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.507	0.418
DDT	0.444	0.312
Chlordane	0.470	0.341
Toxaphene	--	--
TEQ*	0.306	0.352

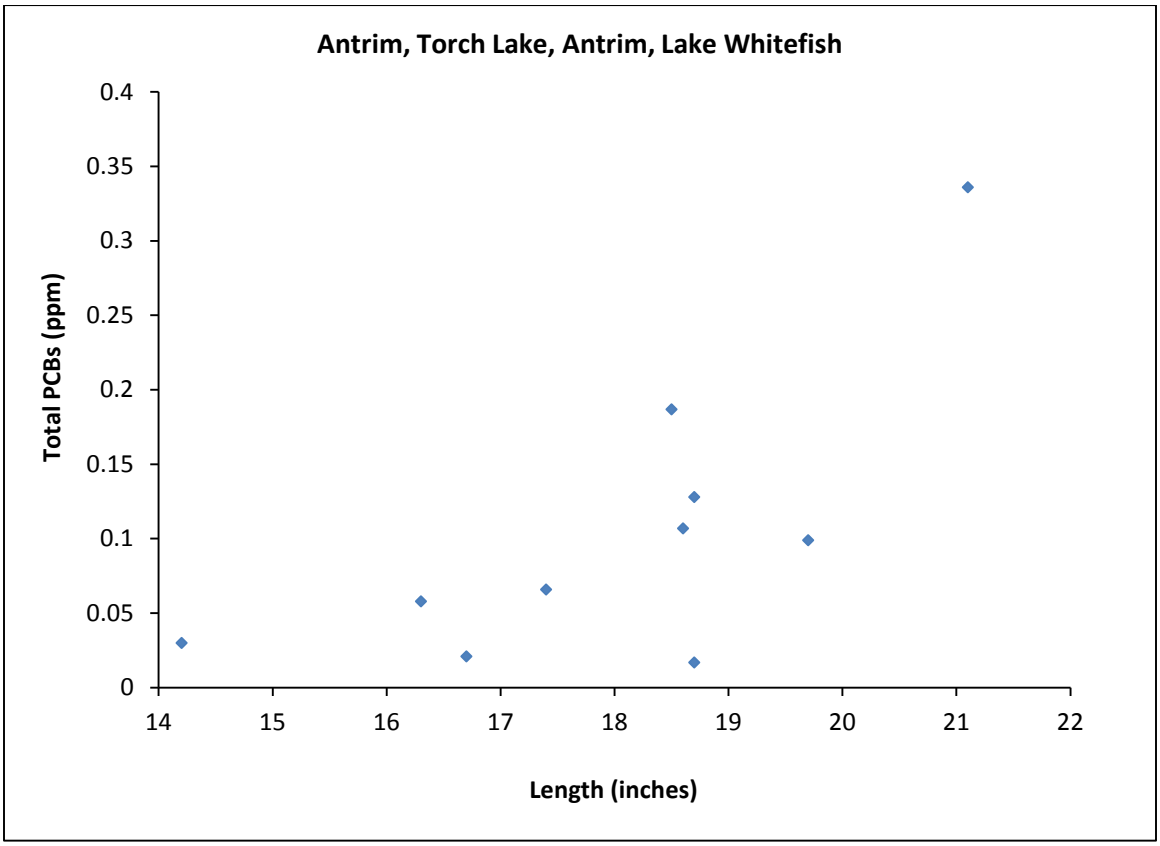
Final meal category based on UCL: 1

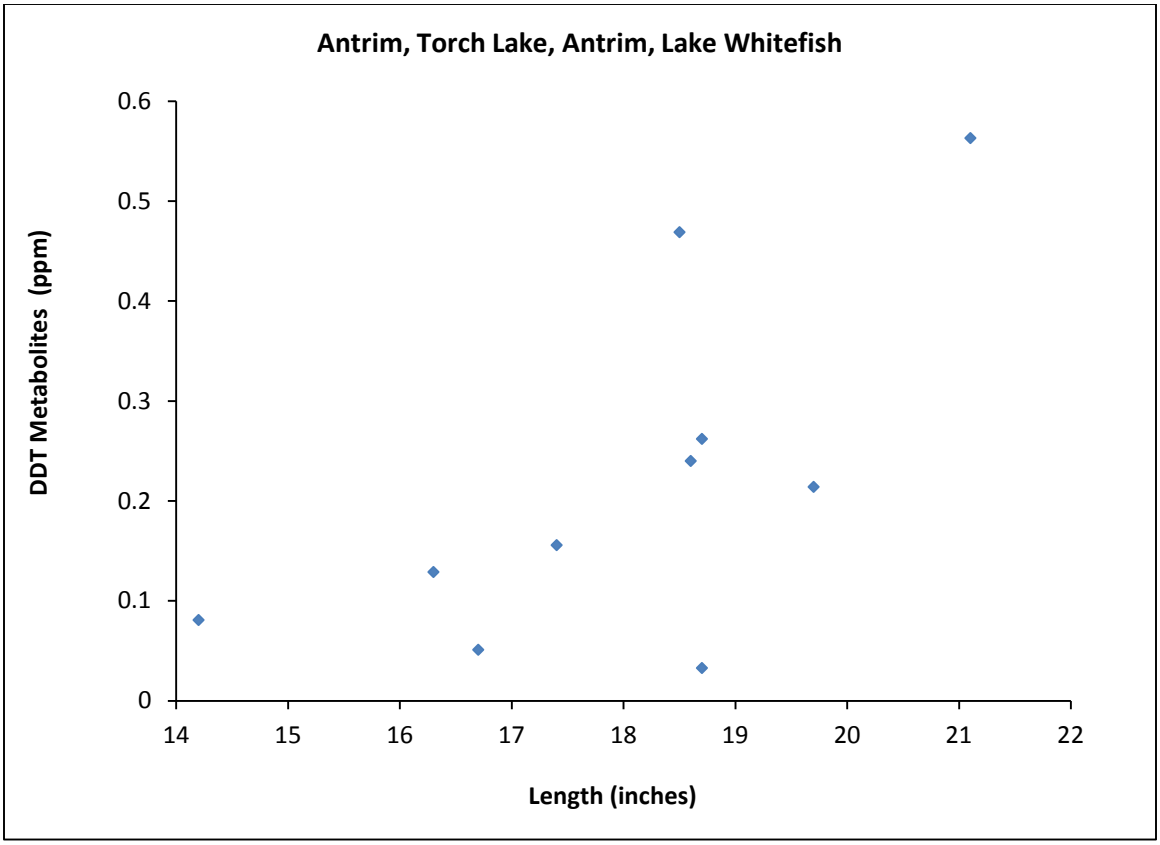
* - 2005 WHO TEFs; dl-PCBs not included

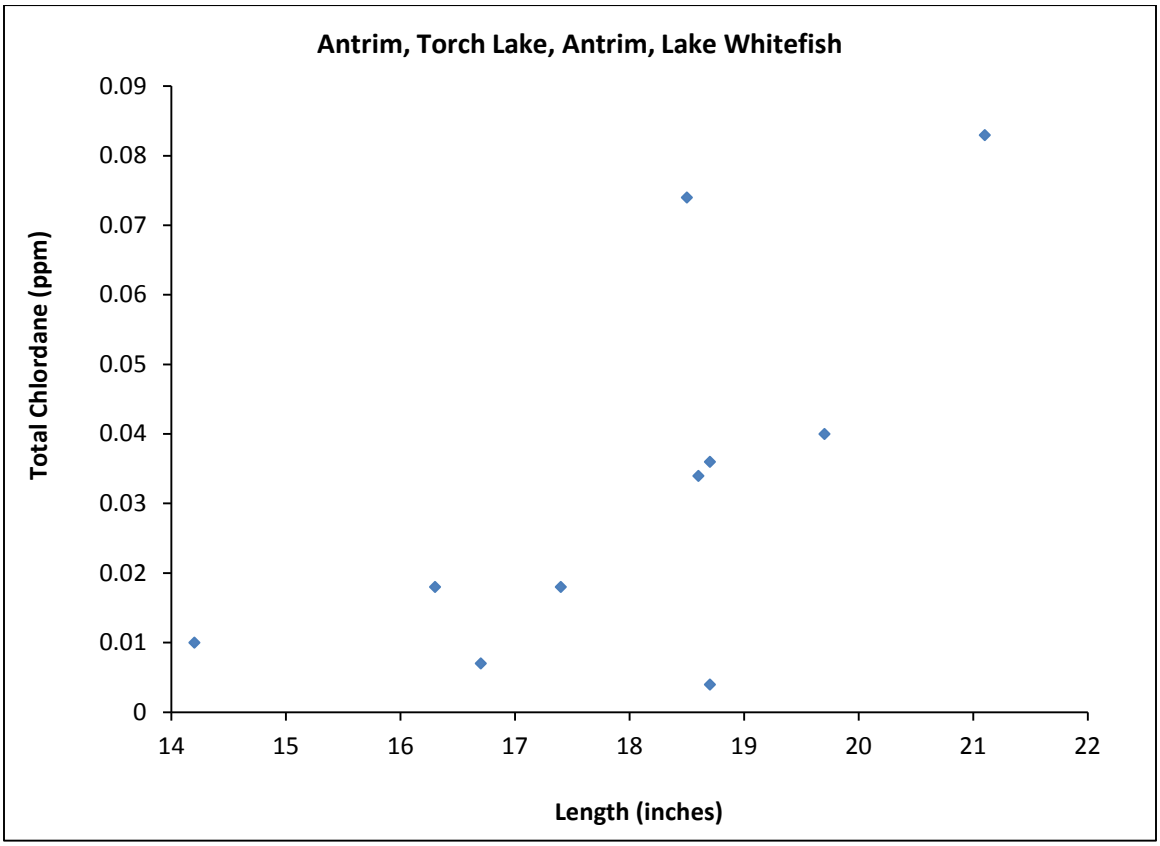
Existing Advisory: Women and children should not eat more than one meal per week of Torch Lake lake whitefish smaller than 18 inches and should not eat any of those fish larger than 18 inches due to PCBs and dioxins.

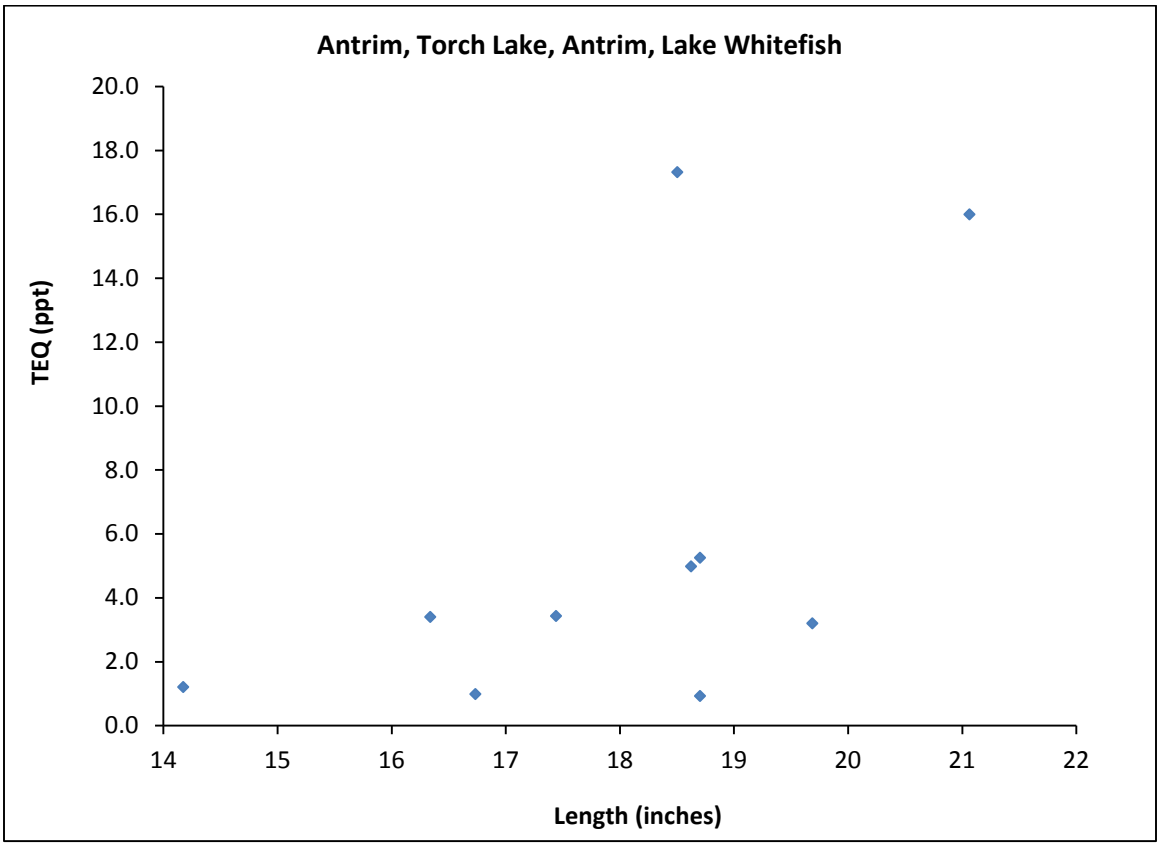
Recommendation: No one should eat more than 1 meal per month of Torch Lake lake whitefish due to PCBs and dioxins. Mercury and DDT would cause advisories.


Antrim, Torch Lake, Antrim, Lake Whitefish
Mercury (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
12
13
14
15
16
17
18
19
20
21
22
Length (inches)


Antrim, Torch Lake, Antrim, Lake Whitefish
Total PCBs (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
20
21
22
Length (inches)


Antrim, Torch Lake, Antrim, Lake Whitefish
DDT Metabolites (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
14
15
16
17
18
19
20
21
22
Length (inches)


Antrim, Torch Lake, Antrim, Lake Whitefish
Total Chlordane (ppm)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
14
15
16
17
18
19
20
21
22
Length (inches)


Antrim, Torch Lake, Antrim, Lake Whitefish
TEQ (ppt)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
14
15
16
17
18
19
20
21
22
Length (inches)

Smallmouth Bass **Torch Lake** **Antrim 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	11.8	14	17.3	19.7

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.49	0.32	0.62	0.65	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.479	0.566

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	11.8	14	17.3	19.7

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.049	0.035	0.074	0.070	2
DDT	5	0.069	0.038	0.097	0.100	16
Chlordane	5	0.011	0.006	0.022	0.020	--
Toxaphene	5	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.675	0.807
DDT	0.754	0.868
Chlordane	0.451	0.613
Toxaphene	--	--

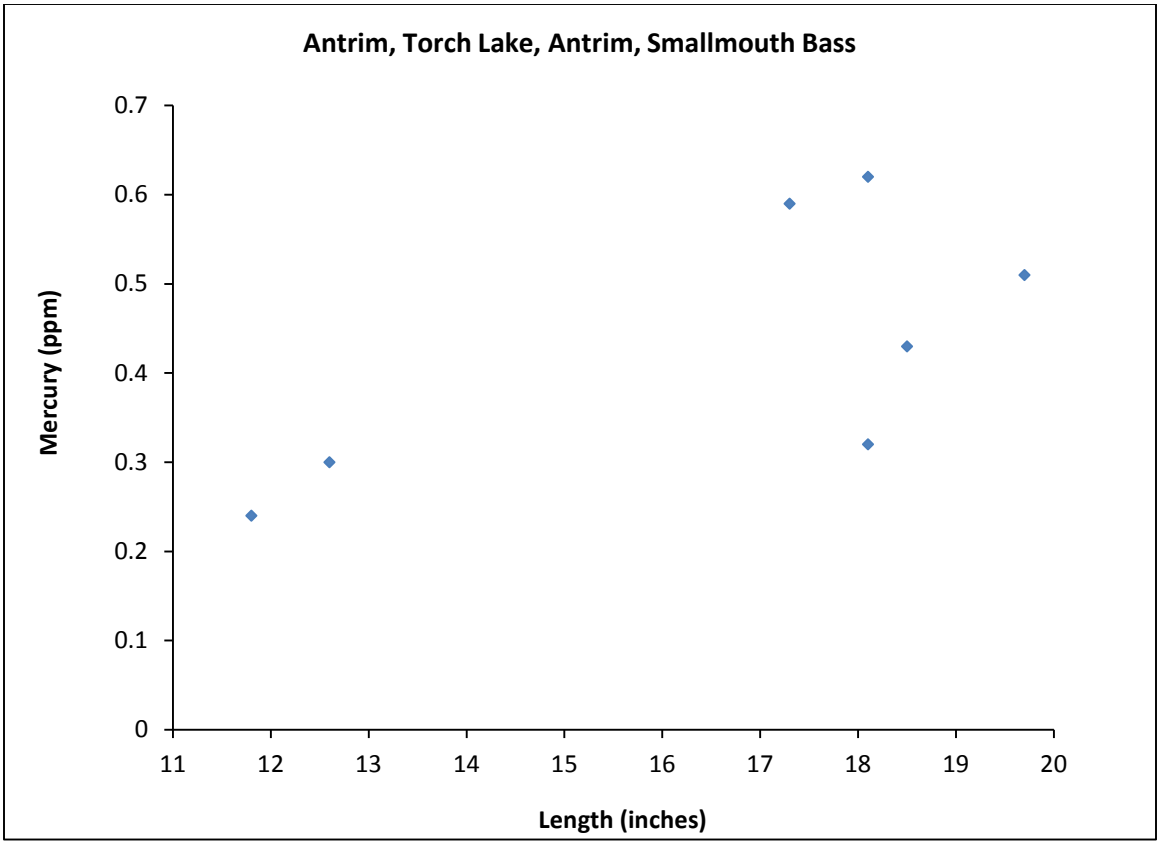
Final meal category based on UCL: 1

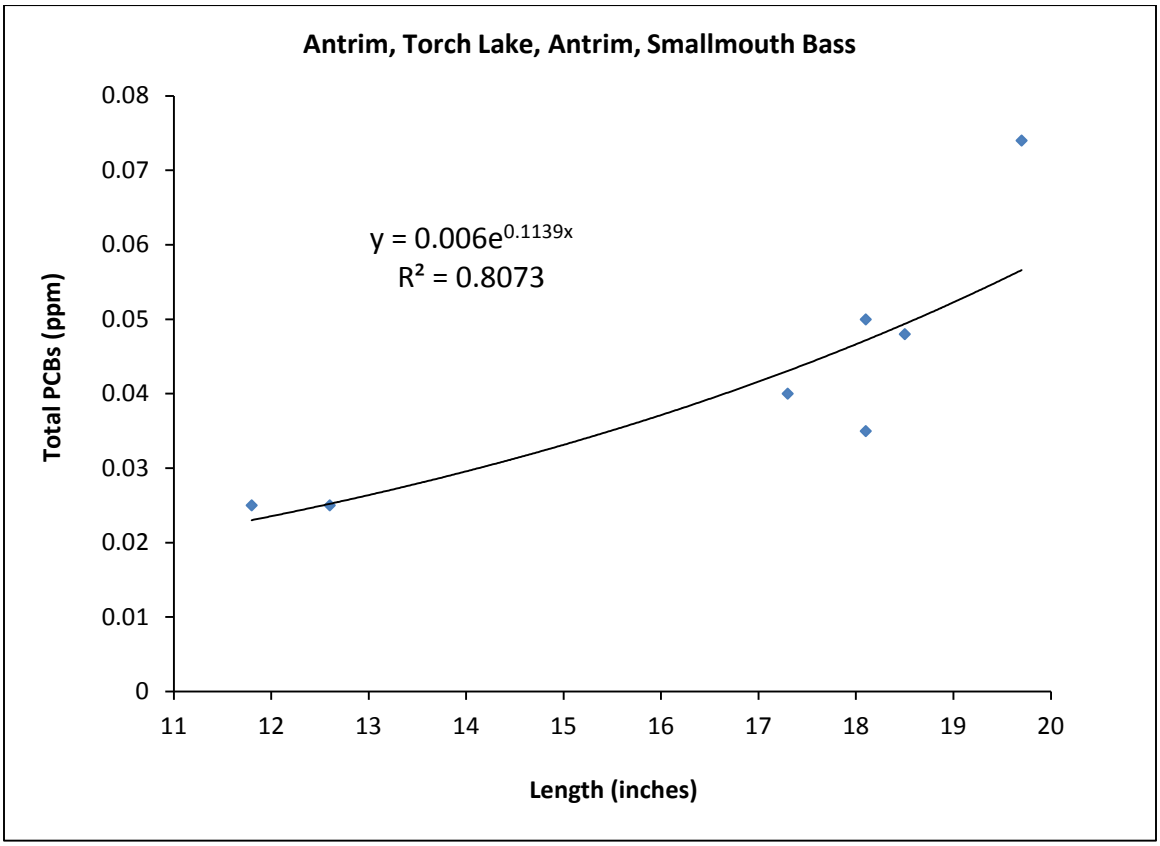
Existing Advisory: Women and children should not eat more than one meal per month of Torch Lake smallmouth bass due to mercury and PCBs.

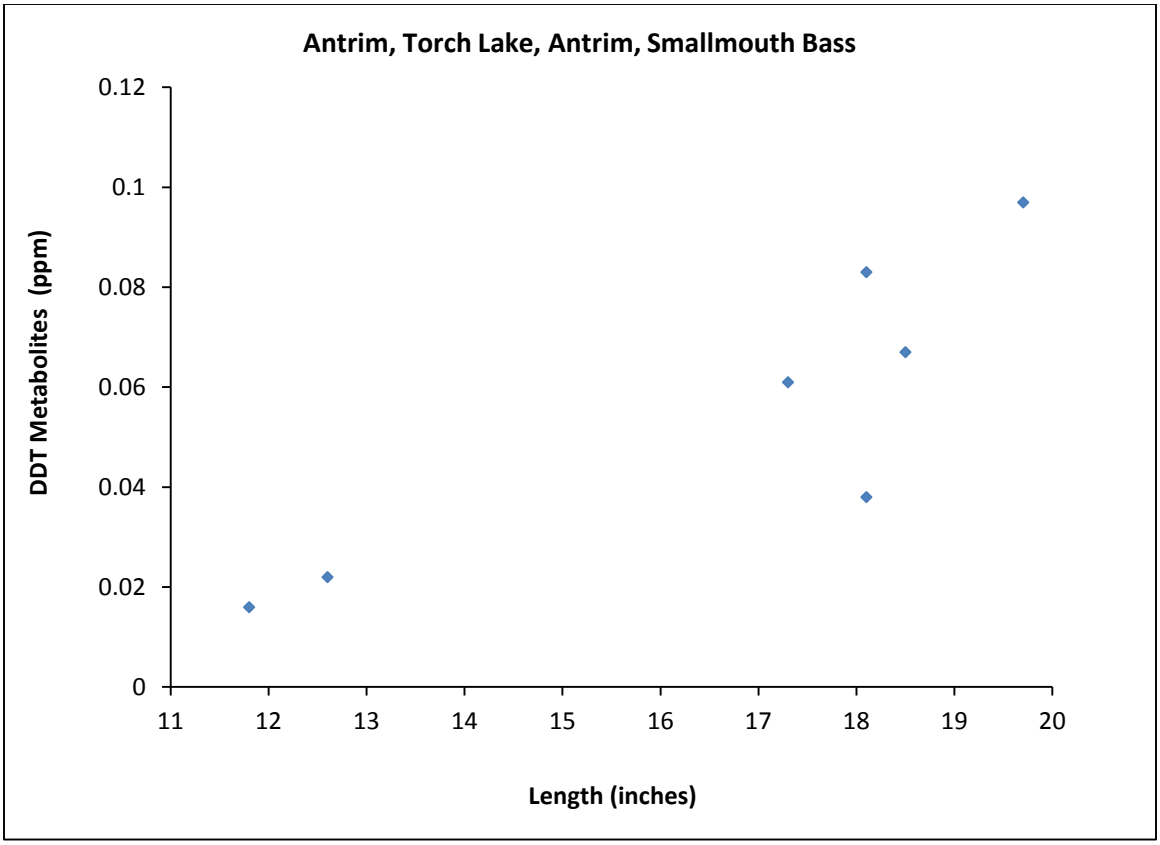
Recommendation: No one should eat more than 1 meal per month of Torch Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. PCBs would cause an advisory. Statewide length break was applied as the size of the fish was limited.

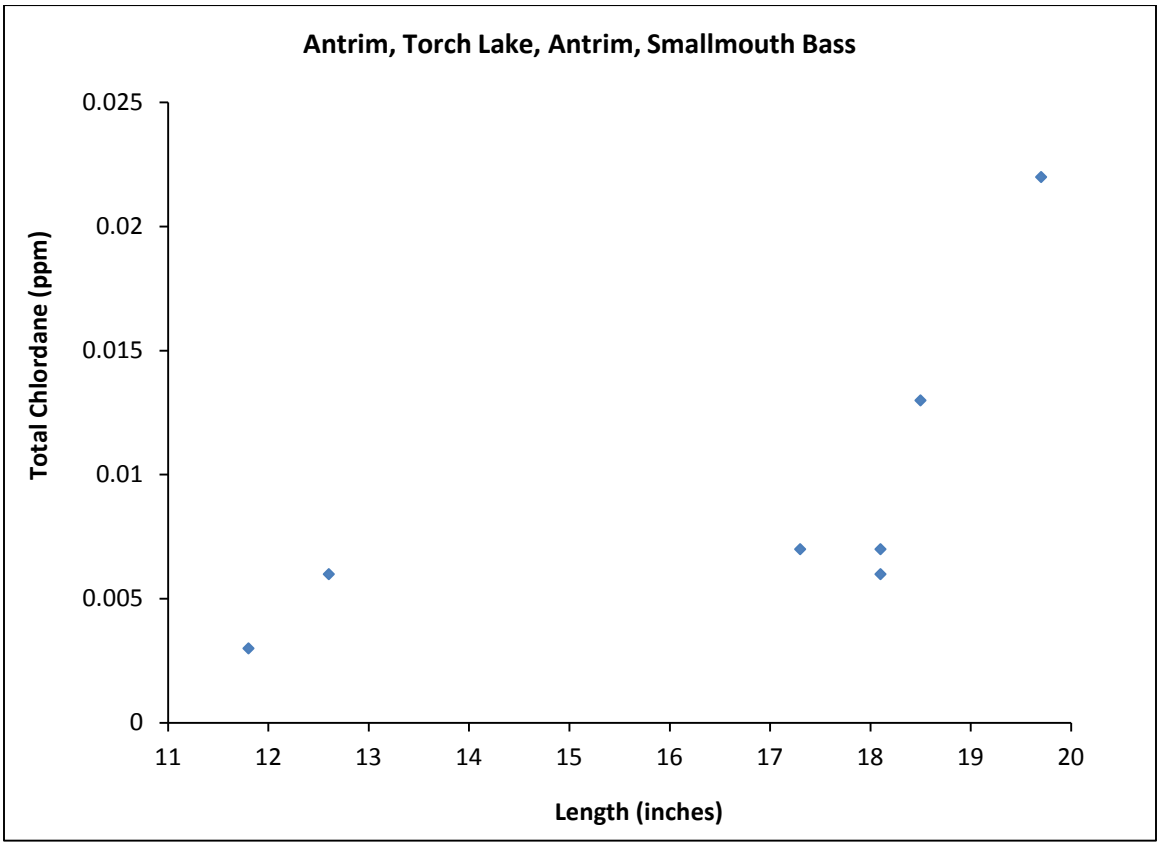
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
14	0.03	8
15	0.03	8
16	0.04	4
17	0.04	4
18	0.05	4
19	0.05	2
20	0.06	2
21	0.07	2
22	0.07	2

Shaded area denotes extrapolated estimates


Antrim, Torch Lake, Antrim, Smallmouth Bass
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
11
12
13
14
15
16
17
18
19
20
Length (inches)


Antrim, Torch Lake, Antrim, Smallmouth Bass
Total PCBs (ppm)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
y = 0.006e^0.1139x
R² = 0.8073
11
12
13
14
15
16
17
18
19
20
Length (inches)


Antrim, Torch Lake, Antrim, Smallmouth Bass
DDT Metabolites (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
11
12
13
14
15
16
17
18
19
20
Length (inches)


Antrim, Torch Lake, Antrim, Smallmouth Bass
Total Chlordane (ppm)
0.025
0.02
0.015
0.01
0.005
0
11
12
13
14
15
16
17
18
19
20
Length (inches)

Yellow Perch **Torch Lake** **Antrim 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	6	10.4	na	10.4	12.2

Datasets available: 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.39	0.31	0.46	0.45	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.843	0.860

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	6	10.4	na	10.4	12.2

Datasets available: 2001

Chemical	Sample Size (Legal)	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	0.005	0.003	0.008	0.007	16
Chlordane	6	ND	--	--	--	--
Toxaphene	6	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.633	0.633
DDT	0.146	0.112
Chlordane	--	--
Toxaphene	--	--

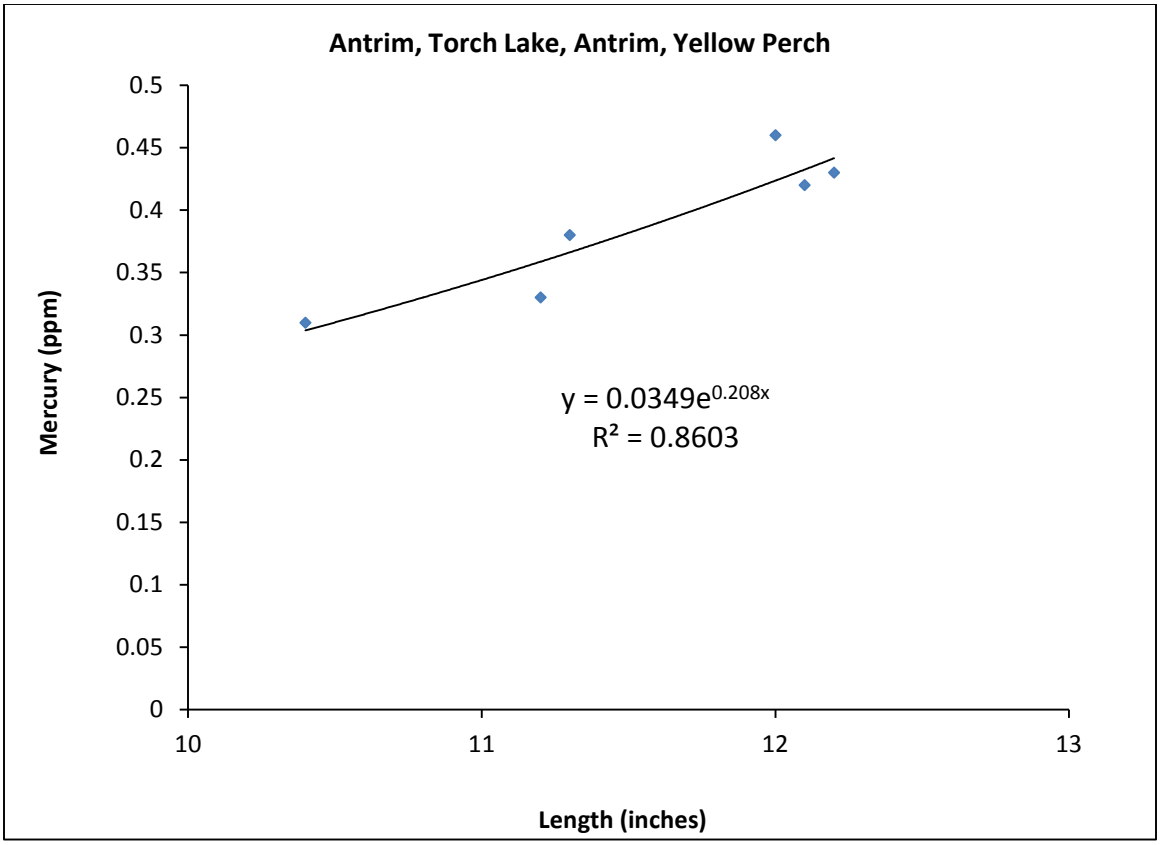
Final meal category based on UCL: 2

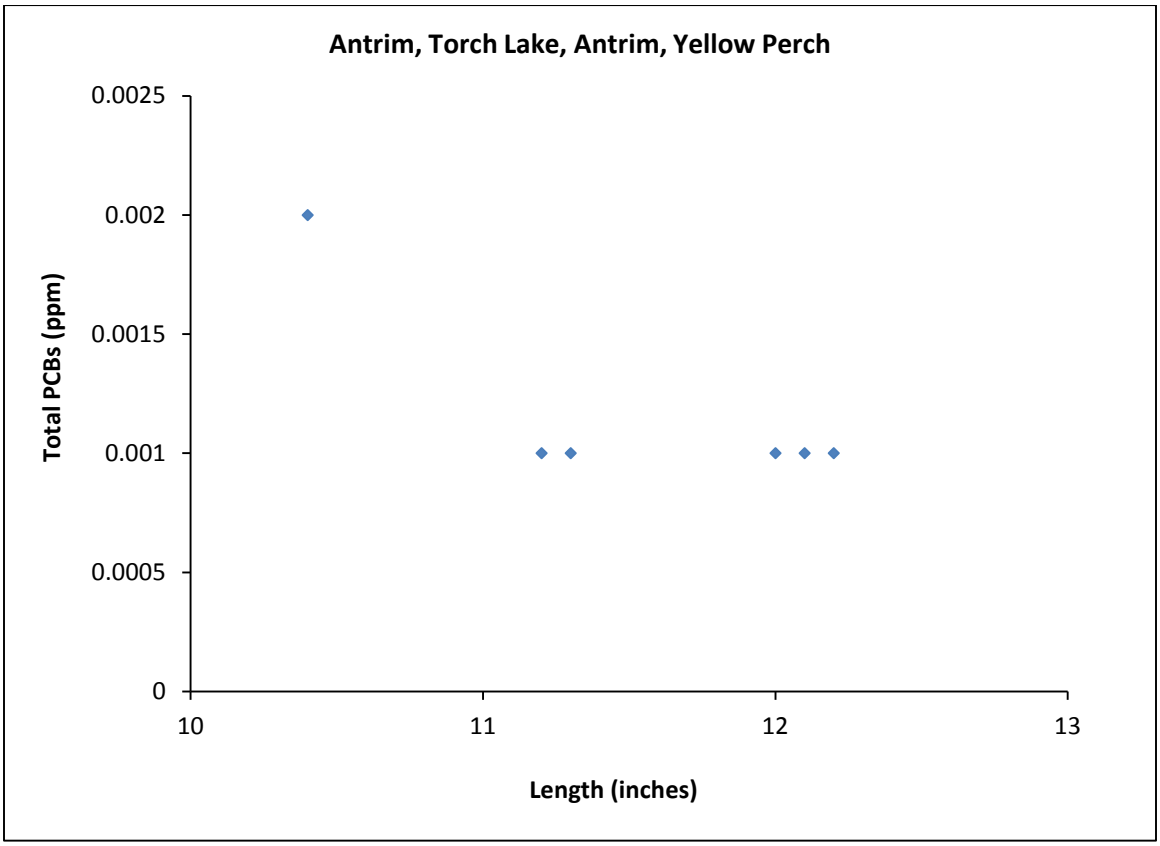
Existing Advisory: Women and children should not eat more than one meal per month of Torch Lake yellow perch larger than 12 inches due to mercury.

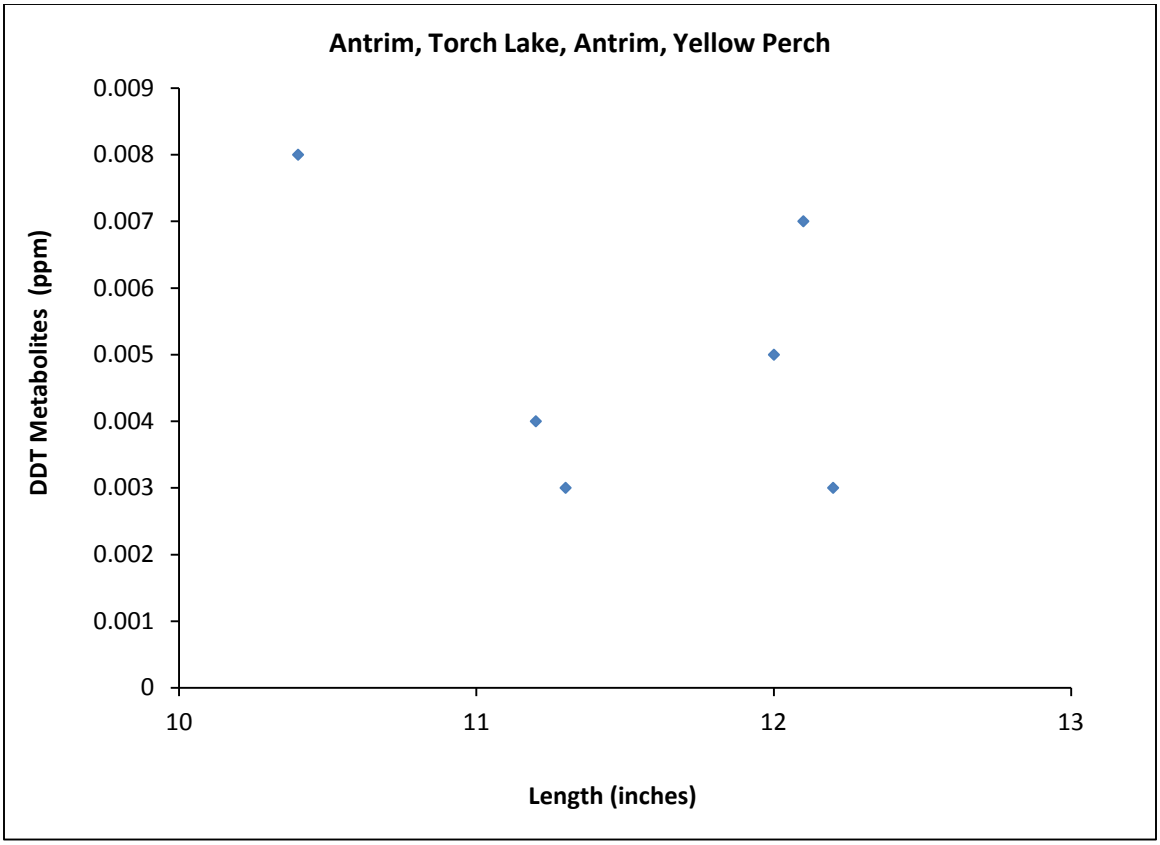
Recommendation: No one should eat more than 4 meals per month of Torch Lake yellow perch smaller than 9 inches or more than 2 meals per month of those fish larger than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	0.122	8
7	0.150	4
8	0.184	4
9	0.227	4
10	0.279	2
11	0.344	2
12	0.423	2
13	0.521	2
14	0.642	1

Shaded area denotes extrapolated estimates


Antrim, Torch Lake, Antrim, Yellow Perch
Mercury (ppm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
11
12
13
Length (inches)
y = 0.0349e^0.208x
R² = 0.8603


Antrim, Torch Lake, Antrim, Yellow Perch
Total PCBs (ppm)
0.0025
0.002
0.0015
0.001
0.0005
0
10
11
12
13
Length (inches)


Antrim, Torch Lake, Antrim, Yellow Perch
DDT Metabolites (ppm)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
10
11
12
13
Length (inches)

Benzie County

Brown Trout **Platte River** **Benzie 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	9.3	10	9.8	15.2

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.14	--	--	--	--

	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	9.3	10	9.3	15.2

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	0.009	--	--	--	--
Chlordane	2*	ND	--	--	--	--
Toxaphene	2*	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 8 fish analyzed as 2 composite samples comprised of fillets of 4 fish each

Existing Advisory: There are no current consumption advisories for Platte River brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

White Sucker **Platte River** **Benzie 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	7	9.8	10	9.8	12.8

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.06	--	--	--	--

	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	7	9.8	10	9.8	12.8

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	ND	--	--	--	--
Chlordane	2*	ND	--	--	--	--
Toxaphene	2*	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 7 fish analyzed as 2 composite samples

Existing Advisory: There are no current consumption advisories for Platte River white sucker.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice applies to Platte River sucker: No one should eat more than 8 meals per month of sucker from inland waters.

Brown Trout **Crystal Lake** **Benzie 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	4	15.4	15	15.4	20.9

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.275	0.160	0.340	--	--

	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	4	15.4	15	15.4	20.9

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	0.19	0.16	0.21	--	--
DDT	4	0.46	0.41	0.57	--	--
Chlordane	4	0.06	0.05	0.07	--	--
Toxaphene	4	ND	--	--	--	--

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 more than one meal per week of Crystal Lake brown trout smaller than 18 inches or more than one meal per month of those fish larger than 18 due to PCBs.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

Lake Trout **Crystal Lake** **Benzie 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	2014	45	14.2	15	16.1	32

Datasets available: 1989, 1997, 2000, 2014

Chemical	Sample Size (Legal)	Mean	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	44	0.28	0.12	0.96	0.33	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.452	0.495

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	2014	25	14.2	15	16.1	32

Datasets available: 1989, 1997, 2000, 2014

Chemical	Sample Size (Legal)	Mean	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	24	0.14	0.03	0.52	0.19	1
DDT	24	0.23	0.05	0.68	0.30	4
Chlordane	24	0.04	0.006	0.11	0.05	--
Toxaphene	24	--	--	--	--	--
TEQ*	9	11.4 ppt	3.4 ppt	29.0 ppt	17.6 ppt	Limited

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.598	0.714
DDT	0.535	0.560
Chlordane	0.451	0.489
Toxaphene	--	--
TEQ*	0.509	0.779

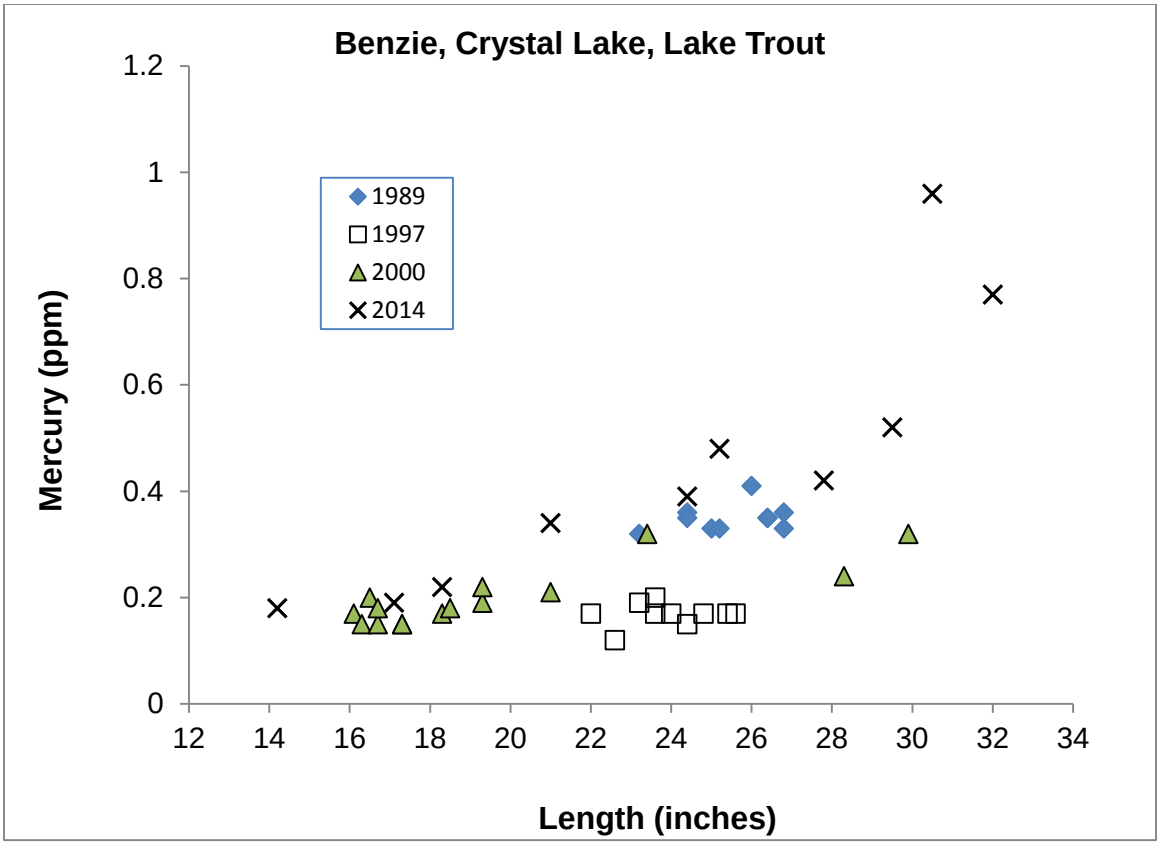
Final meal category based on UCL: Limited

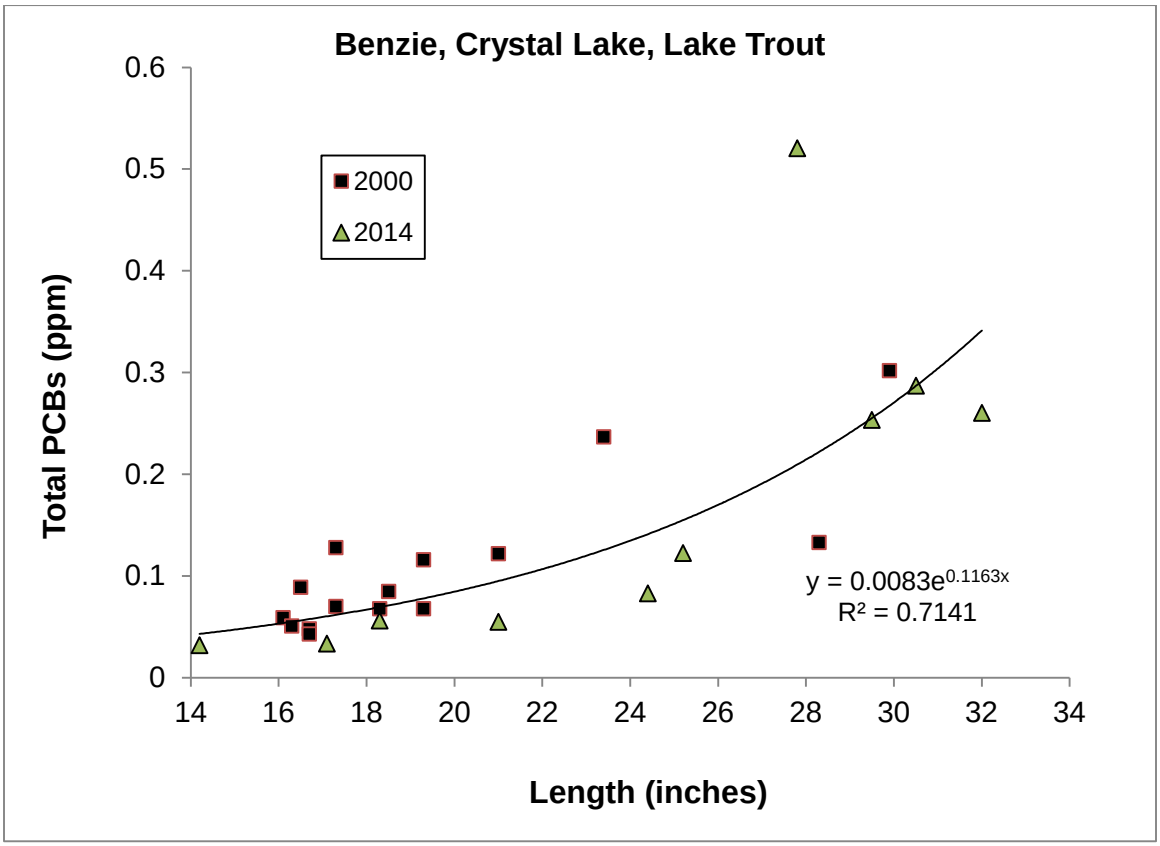
*- WHO 2005 TEFs; dlPCBs included

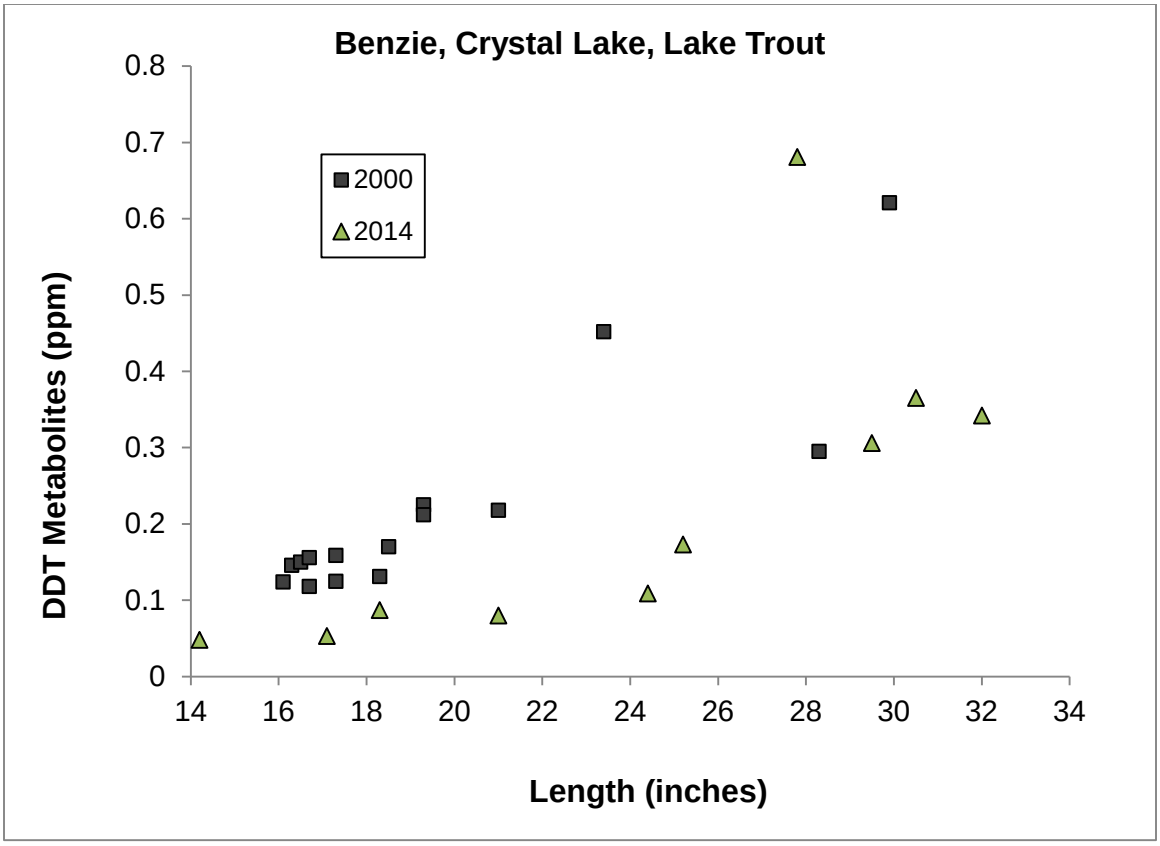
Existing Advisory: No one should eat more than 2 meals per month of Crystal Lake lake trout less than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to PCBs.

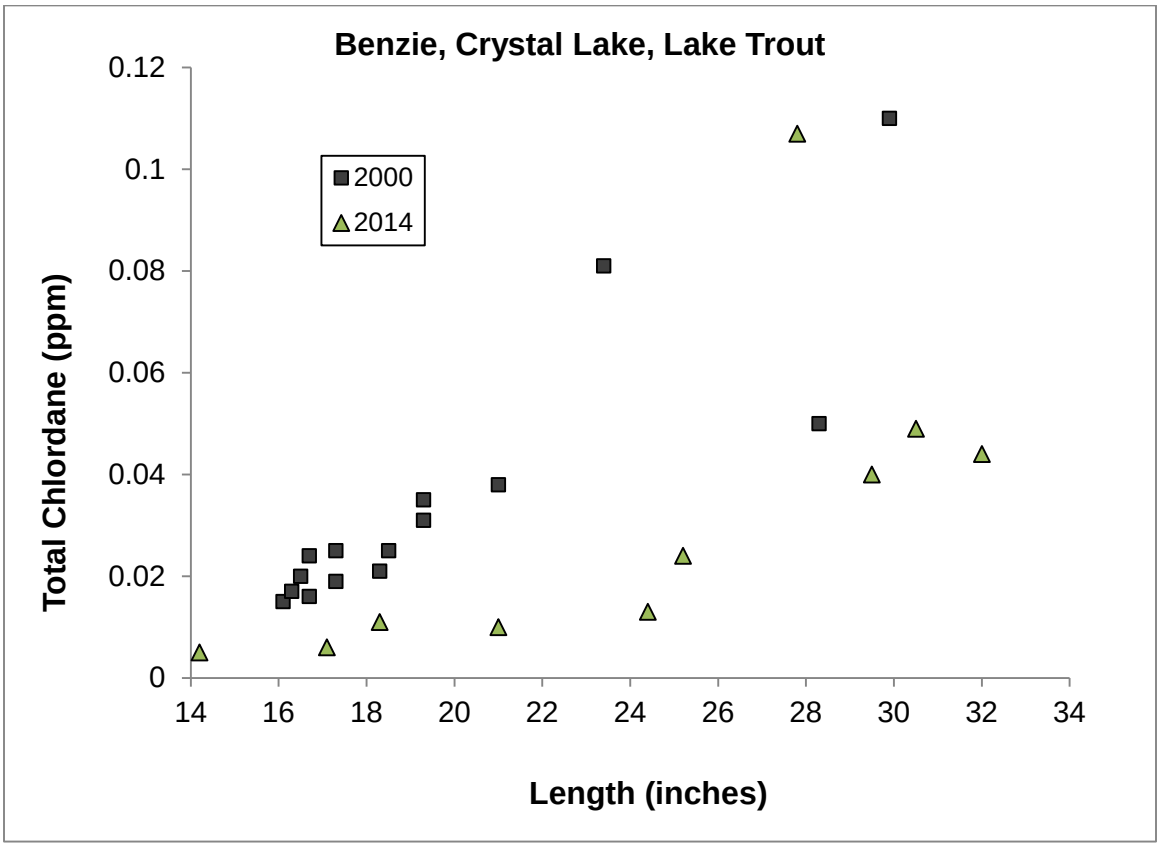
Recommendation: No one should eat more than 1 meal per month of lake trout less than 24 inches and no more than 6 meals per year for fish between 24 and 30 inches. Sensitive populations should not eat fish larger than 30 inches and healthy adults should limit consumption to more than 1 or 2 meals per year due to dioxins.

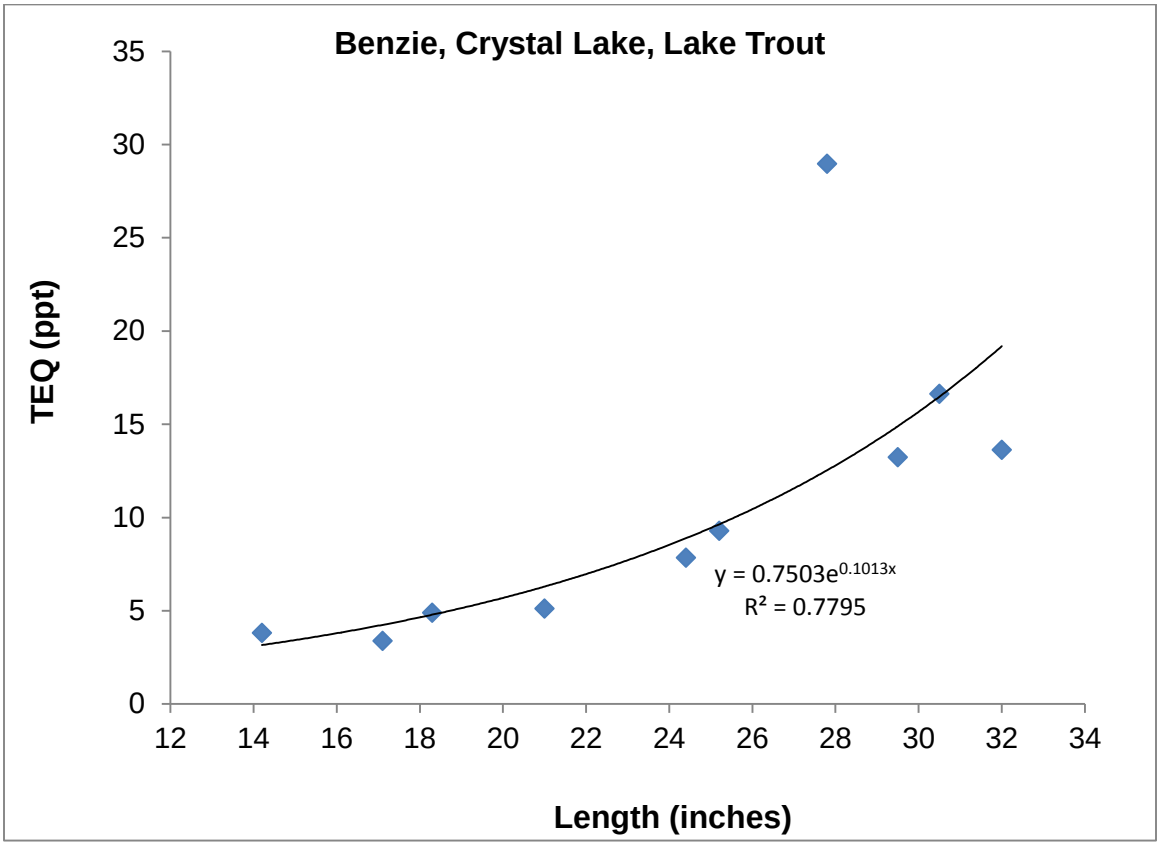
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category	TEQ Regression Equation Estimate (ppt)	Meal Category
14	0.042	4	3.1	2
16	0.053	2	3.8	1
18	0.067	2	4.6	1
20	0.085	2	5.7	1
22	0.107	2	7	1
24	0.135	1	8.5	0.5
26	0.171	1	10.4	0.5
28	0.215	0.5	12.8	0.5
30	0.272	0.5	15.7	Limited
32	0.343	0.5	19.2	Limited


Benzie, Crystal Lake, Lake Trout
Mercury (ppm)
Length (inches)
1989
1997
2000
2014
0
0.2
0.4
0.6
0.8
1
1.2
12
14
16
18
20
22
24
26
28
30
32
34


Benzie, Crystal Lake, Lake Trout
Total PCBs (ppm)
Length (inches)
2000
2014
y = 0.0083e^0.1163x
R² = 0.7141
0
0.1
0.2
0.3
0.4
0.5
0.6
14
16
18
20
22
24
26
28
30
32
34


Benzie, Crystal Lake, Lake Trout
DDT Metabolites (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000
2014
14
16
18
20
22
24
26
28
30
32
34
Length (inches)


Benzie, Crystal Lake, Lake Trout
Total Chlordane (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
2000
2014
14
16
18
20
22
24
26
28
30
32
34
Length (inches)


Benzie, Crystal Lake, Lake Trout
TEQ (ppt)
35
30
25
20
15
10
5
0
12
14
16
18
20
22
24
26
28
30
32
34
Length (inches)
y = 0.7503e^0.1013x
R² = 0.7795

White Sucker **Crystal Lake** **Benzie County**

Hg Analysis:

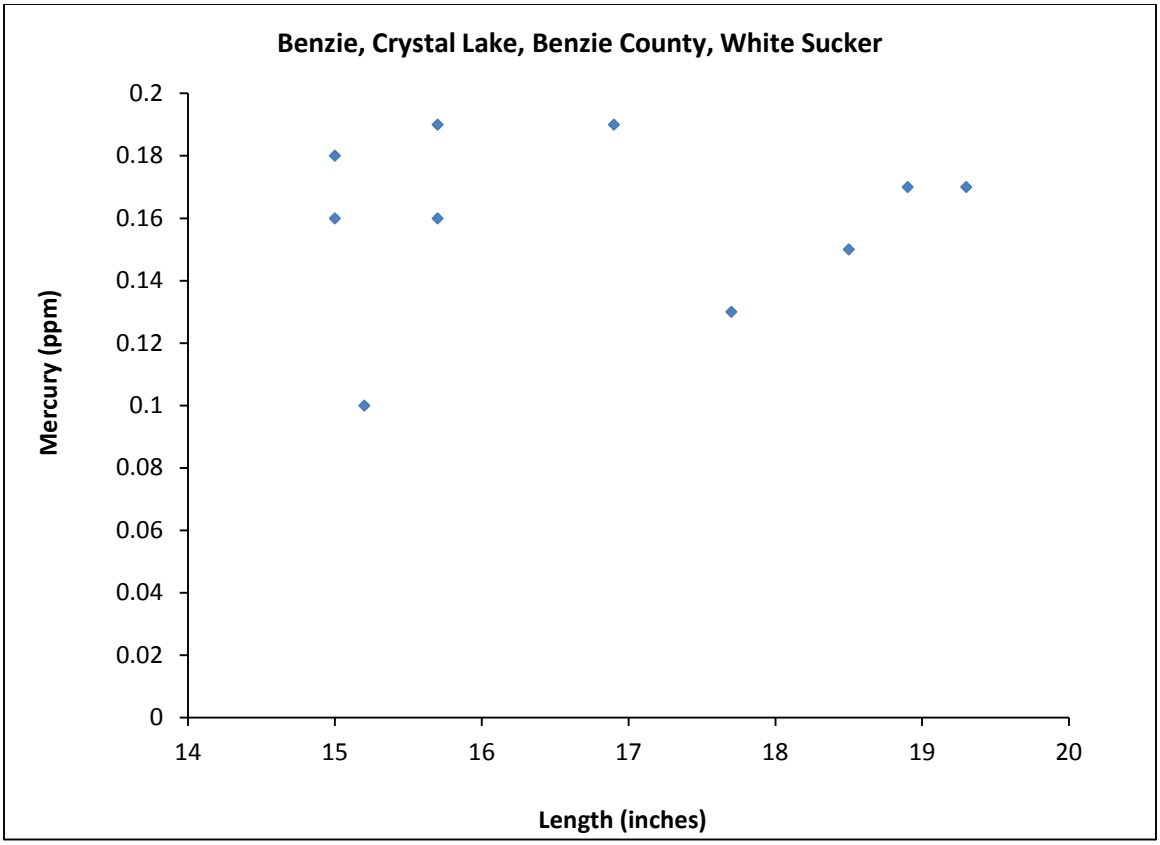
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1997	1997	10	15	na	15	19.3	
Datasets available:	1997						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.16		0.10	0.19	0.18	4
	Linear Regression	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.006	0.014					

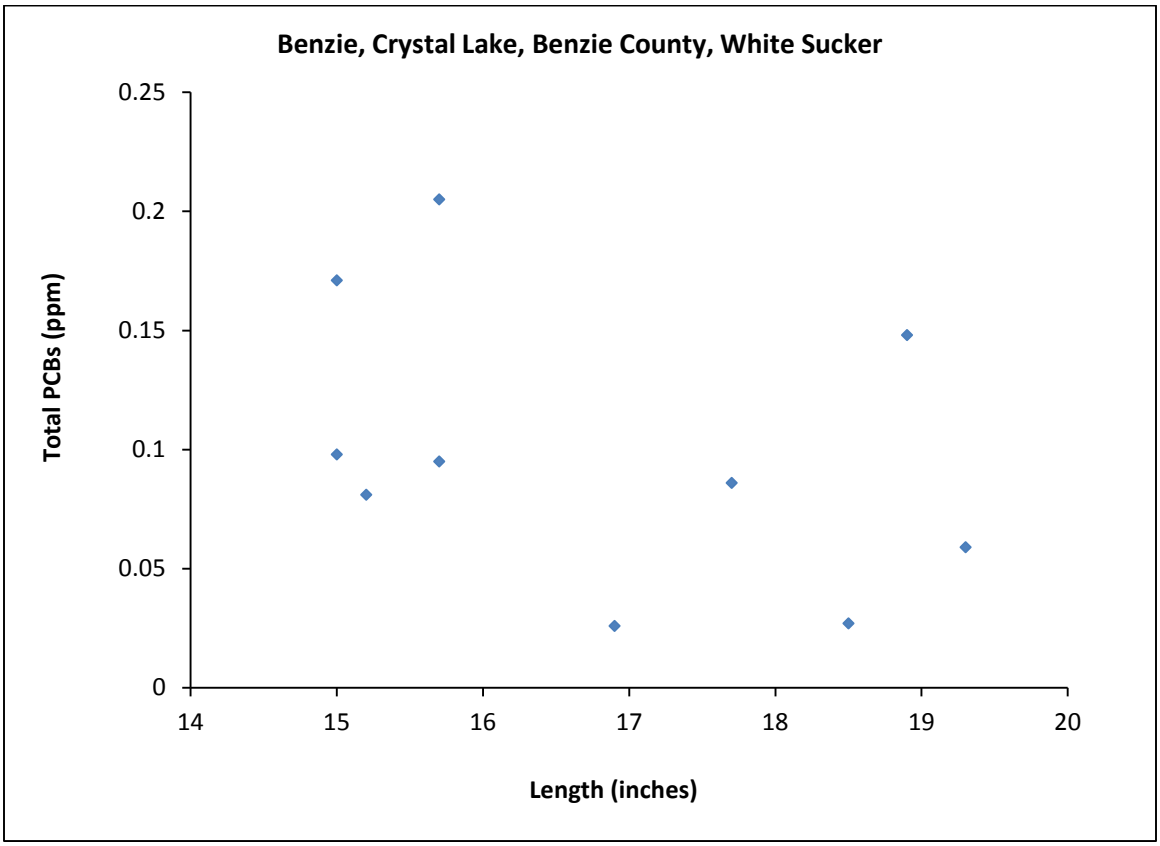
Organics Analysis:

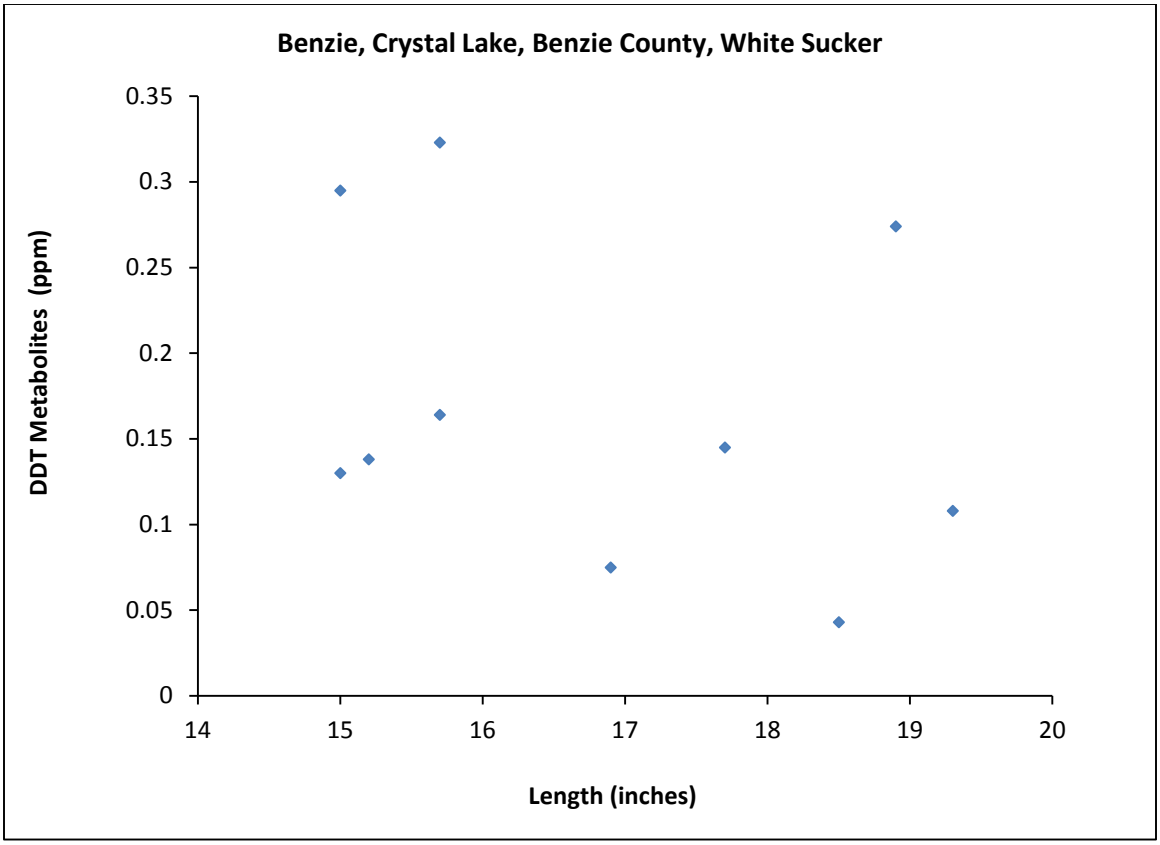
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1997	1997	10	15	na	15	19.3	
Datasets available:	1997						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.10		0.03	0.20	0.14	1*
DDT	10	0.17		0.04	0.32	0.24	4*
Chlordane	10	0.02		0.003	0.06	0.03	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.151	0.164					
DDT	0.095	0.136					
Chlordane	0.027	0.033					
Toxaphene	--	--		**Final meal category based on UCL:**			**1***

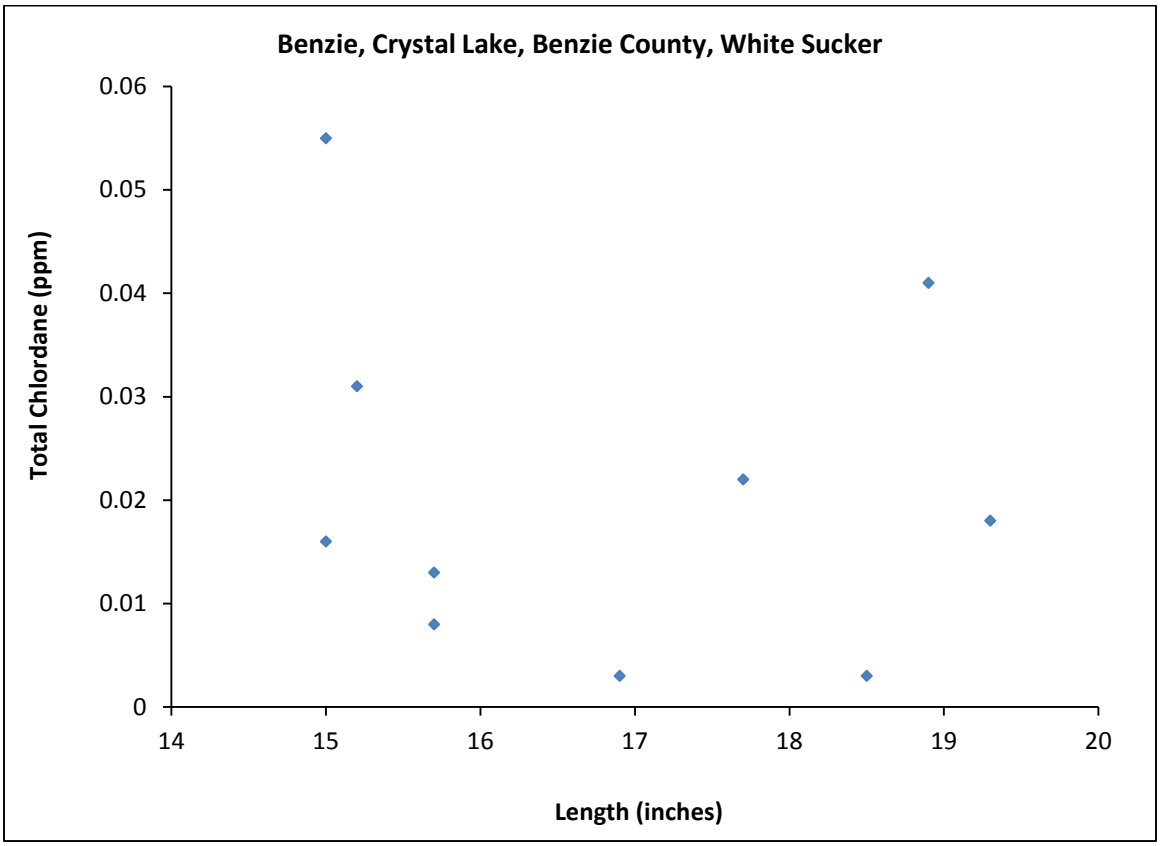
Existing Advisory: Women and children should not eat more than one meal per week of Crystal Lake white sucker due to PCBs.

Recommendation: No one should eat more than 2 meals per month of Crystal Lake sucker due to PCBs. Mercury and DDT would cause advisories. The quality of this dataset is limited due to the age of the data. *Based on the MDEQ Fish Contaminant Monitoring Program, PCB & DDT concentrations ≥15 years old are expected to have declined to a concentration that allows a less restrictive meal category.


Benzie, Crystal Lake, Benzie County, White Sucker
Mercury (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
15
16
17
18
19
20
Length (inches)


Benzie, Crystal Lake, Benzie County, White Sucker
Total PCBs (ppm)
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
20
Length (inches)


Benzie, Crystal Lake, Benzie County, White Sucker
DDT Metabolites (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
20
Length (inches)


Benzie, Crystal Lake, Benzie County, White Sucker
Total Chlordane (ppm)
0.06
0.05
0.04
0.03
0.02
0.01
0
14
15
16
17
18
19
20
Length (inches)

Yellow Perch **Crystal Lake** **Benzie 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	8.9	na	8.9	10.4

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.16	0.12	0.24	0.19	4

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.008	0.007

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	8.9	na	8.9	10.4

Datasets available: 1989

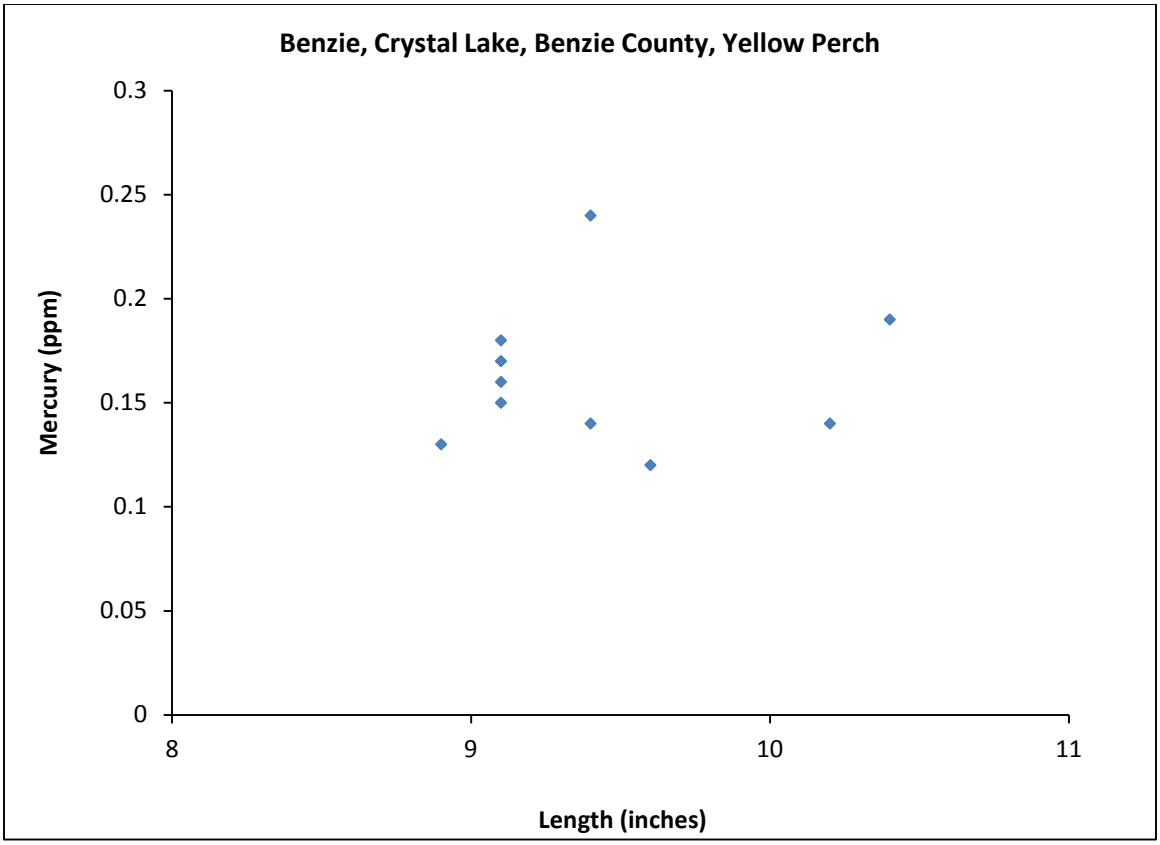
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.02	0.02	0.03	0.03	8
DDT	10	0.004	0.003	0.007	0.01	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--

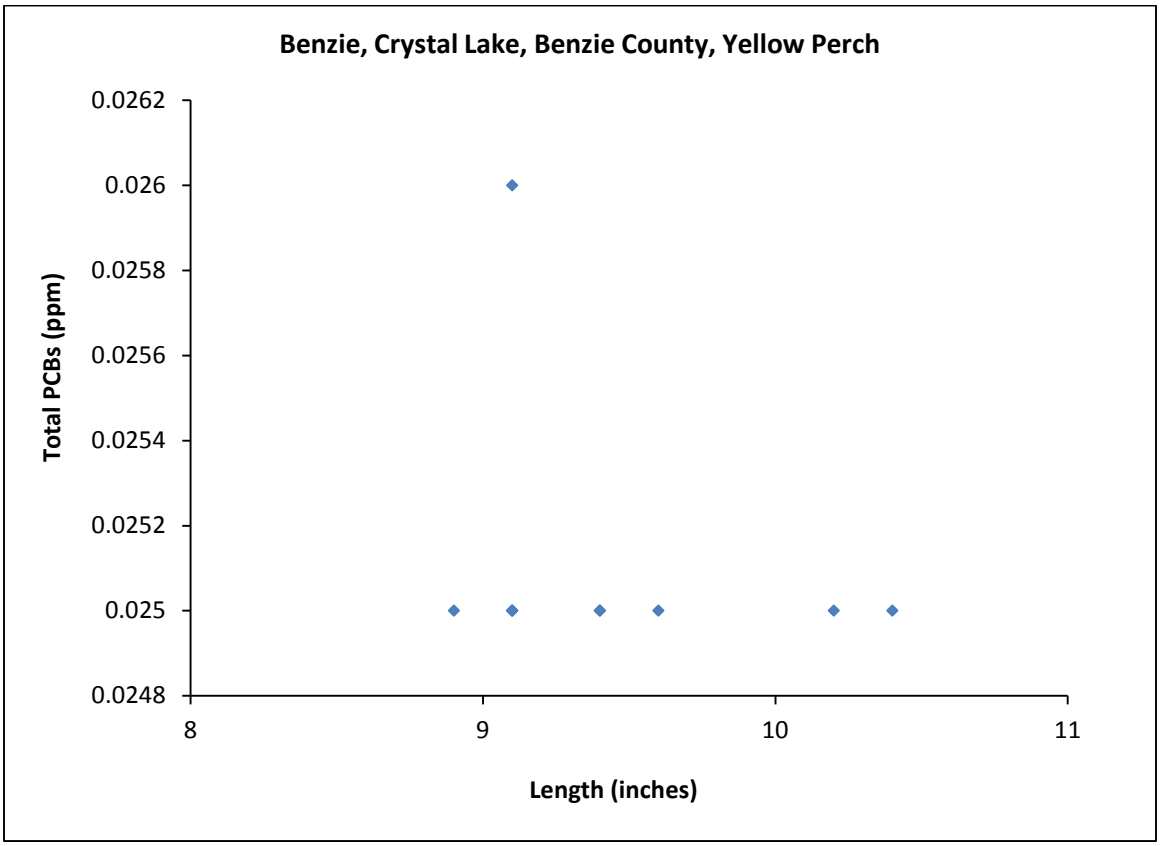
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.053	0.053
DDT	0.104	0.091
Chlordane	--	--
Toxaphene	--	--

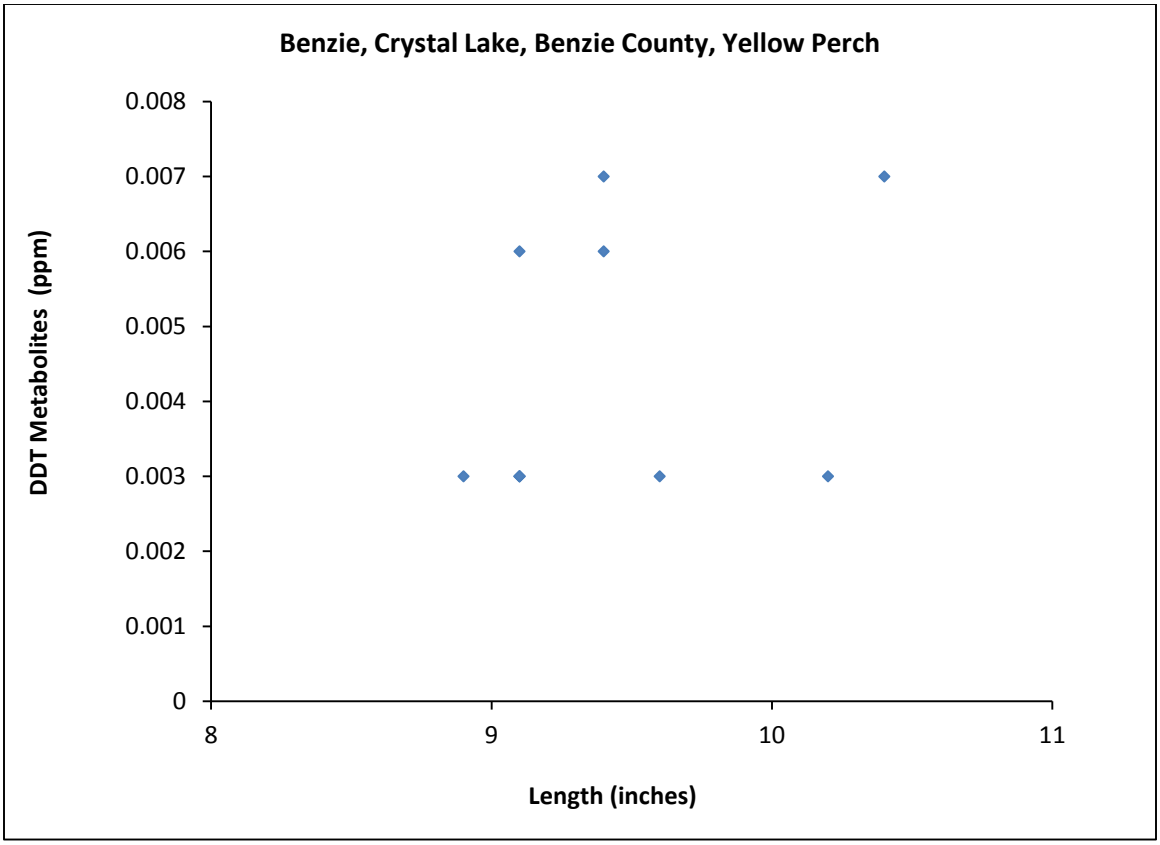
Final meal category based on UCL: 4

Existing Advisory: Crystal Lake yellow perch are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 4 meals per month of Crystal Lake yellow perch due to mercury. PCBs would cause an advisory.


Benzie, Crystal Lake, Benzie County, Yellow Perch
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
Length (inches)


Benzie, Crystal Lake, Benzie County, Yellow Perch
Total PCBs (ppm)
0.0262
0.026
0.0258
0.0256
0.0254
0.0252
0.025
0.0248
8
9
10
11
Length (inches)


Benzie, Crystal Lake, Benzie County, Yellow Perch
DDT Metabolites (ppm)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
8
9
10
11
Length (inches)

Northern Pike **Lake Ann** **Benzie 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	20.9	24	24	35.8

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.71	0.52	0.95	0.89	1

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.783	0.665

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	--	--

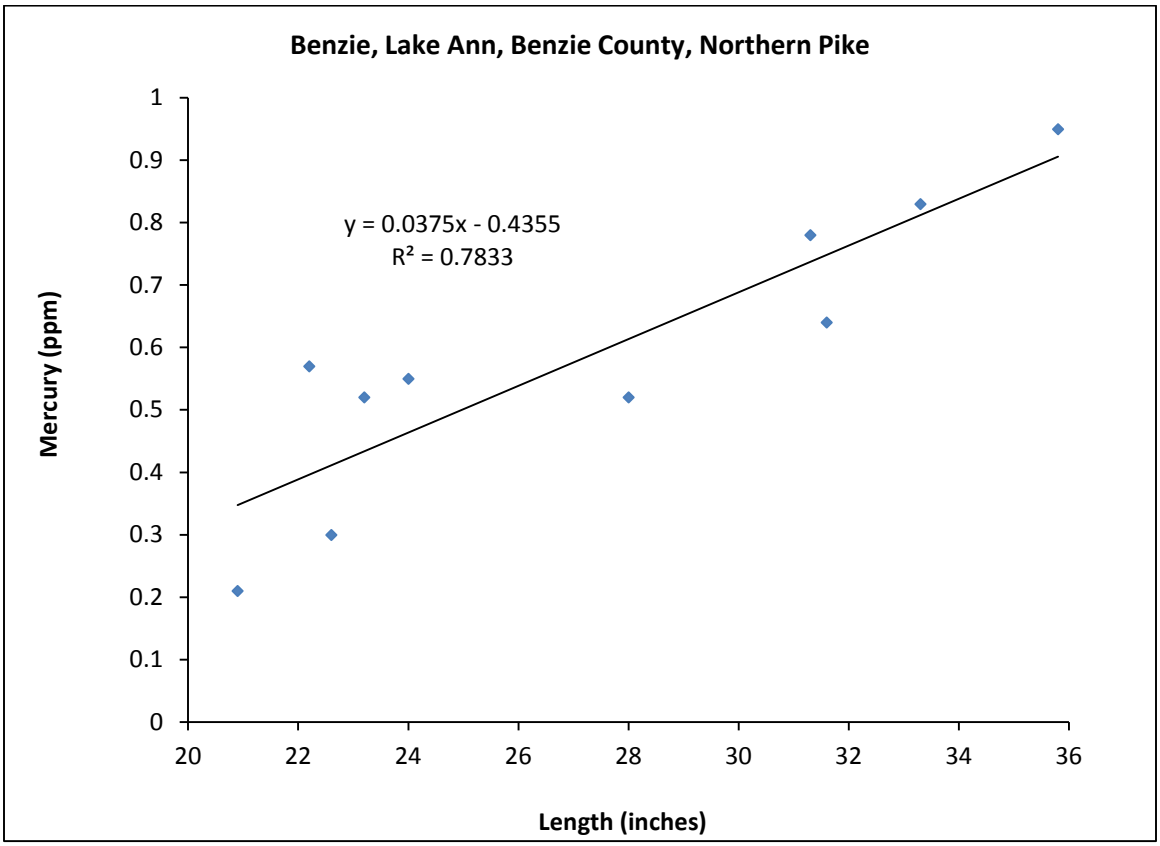
Final meal category based on UCL: 1

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

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

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.46	2
25	0.50	2
26	0.54	1
27	0.58	1
28	0.62	1
29	0.65	1
30	0.69	1
31	0.73	1
32	0.76	1

Shaded area denotes extrapolated estimates


Benzie, Lake Ann, Benzie County, Northern Pike
y = 0.0375x - 0.4355
R² = 0.7833
Mercury (ppm)
Length (inches)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
20
22
24
26
28
30
32
34
36

Smallmouth Bass **Lake Ann** **Benzie 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
1989	1989	10	11.6	14	11.6	16.6

Datasets available: 1989

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.27	0.18	0.4	0.34	2

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.805	0.842

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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	--	--

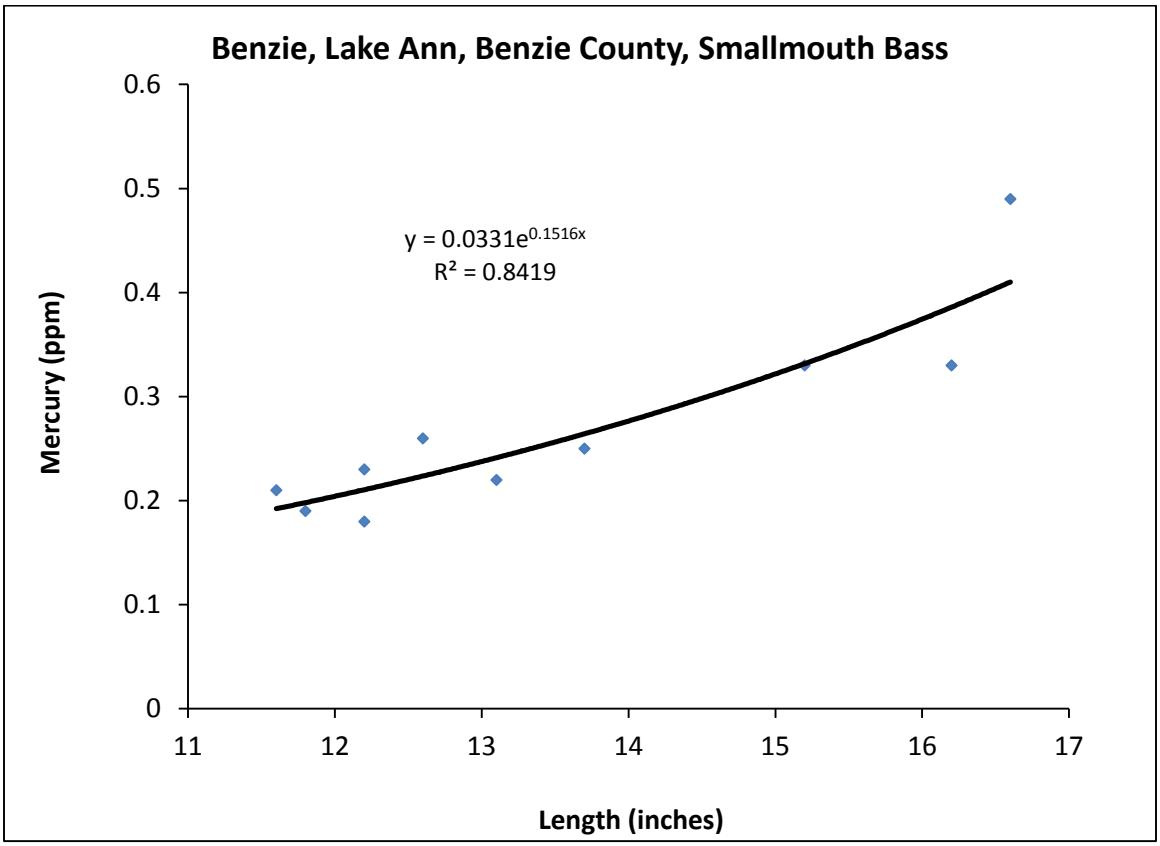
Final meal category based on UCL: 2

Existing Advisory: Lake Ann smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Lake Ann 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 length range was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.276	2
15	0.322	2
16	0.374	2
17	0.436	2
18	0.507	2
19	0.590	1
20	0.686	1
21	0.799	1
22	0.930	1

Shaded area denotes extrapolated estimates


Benzie, Lake Ann, Benzie County, Smallmouth Bass
y = 0.0331e^0.1516x
R² = 0.8419
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
11
12
13
14
15
16
17
Length (inches)

Northern Pike **Pearl Lake** **Benzie 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
1997	1997	3	23.4	24	23.4	26.4

Datasets available: 1997

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.533	0.370	0.620	--	--

	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
--	--	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: Pearl Lake northern pike are covered under the statewide mercury consumption advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Pearl Lake northern pike: 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 northern pike larger than 30 inches.

Channel Catfish **Platte Lake** **Benzie 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	2	21.3	12	21.3	24.6

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.32	0.18	0.45	--	--

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.783	0.665

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	2004	2	21.3	12	21.3	24.6

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	0.526	0.419	0.633	--	--
DDT	2	0.310	0.268	0.351	--	--
Chlordane	2	0.061	0.038	0.084	--	--
Toxaphene	2	ND	--	--	--	--

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 more than one meal per week of Platte Lake channel catfish due to PCBs.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice for channel catfish applies: No one should eat more than 4 meals per month of Platte Lake channel catfish.

Northern Pike **Platte Lake** **Benzie 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	1	33.8	24	33.8	33.8

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.544	--	--	--	--

	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
2004	2004	1	33.8	24	33.8	33.8

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.070	--	--	--	--
DDT	1	0.048	--	--	--	--
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: --

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

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Platte Lake northern pike: 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 northern pike larger than 30 inches.

Rock Bass **Platte Lake** **Benzie 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	2010	15	7.8	na	7.8	11.1

Datasets available: 2005, 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	15	0.21	0.08	0.36	0.27	4

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.833	0.891

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	5	7.8	na	7.8	8.7

Datasets available: 2005

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.001	0.001	0.001	0.001	16
DDT	5	0.002	0.001	0.006	0.005	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.844	0.844
Chlordane	--	--
Toxaphene	--	--

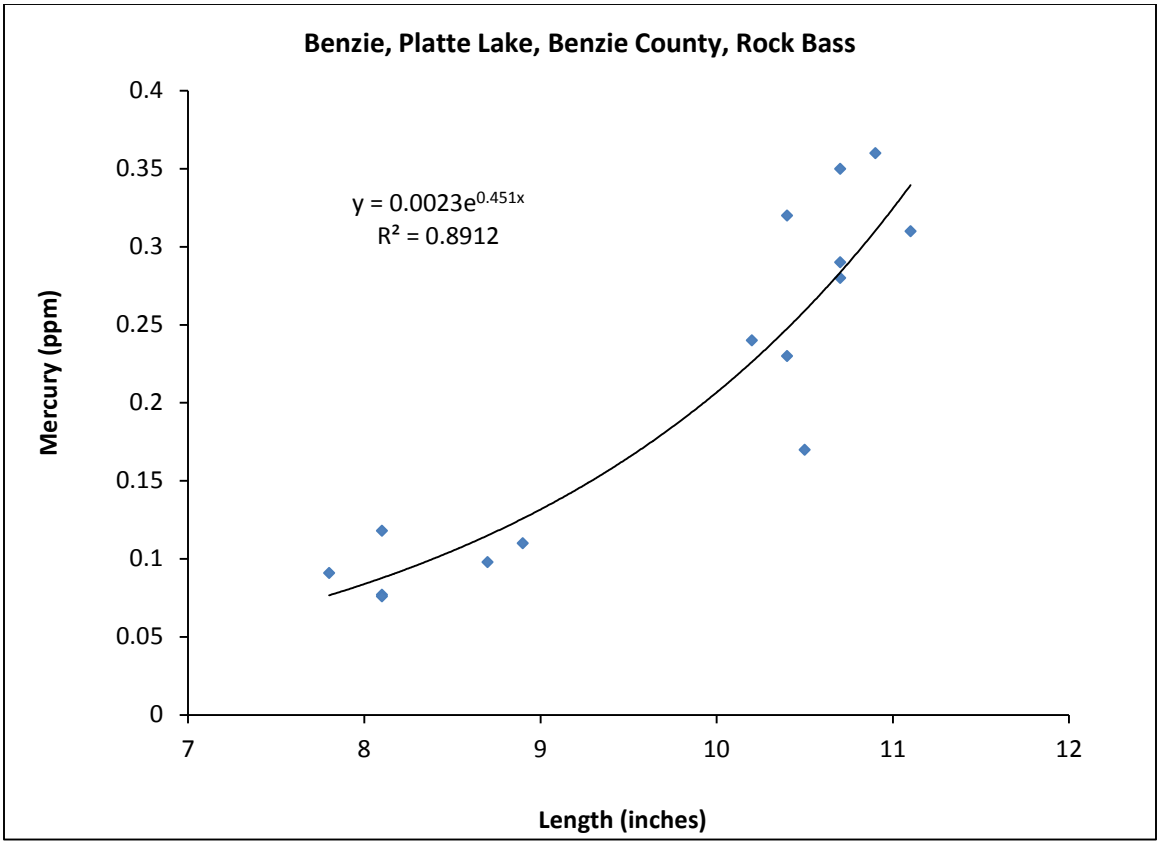
Final meal category based on UCL: 4

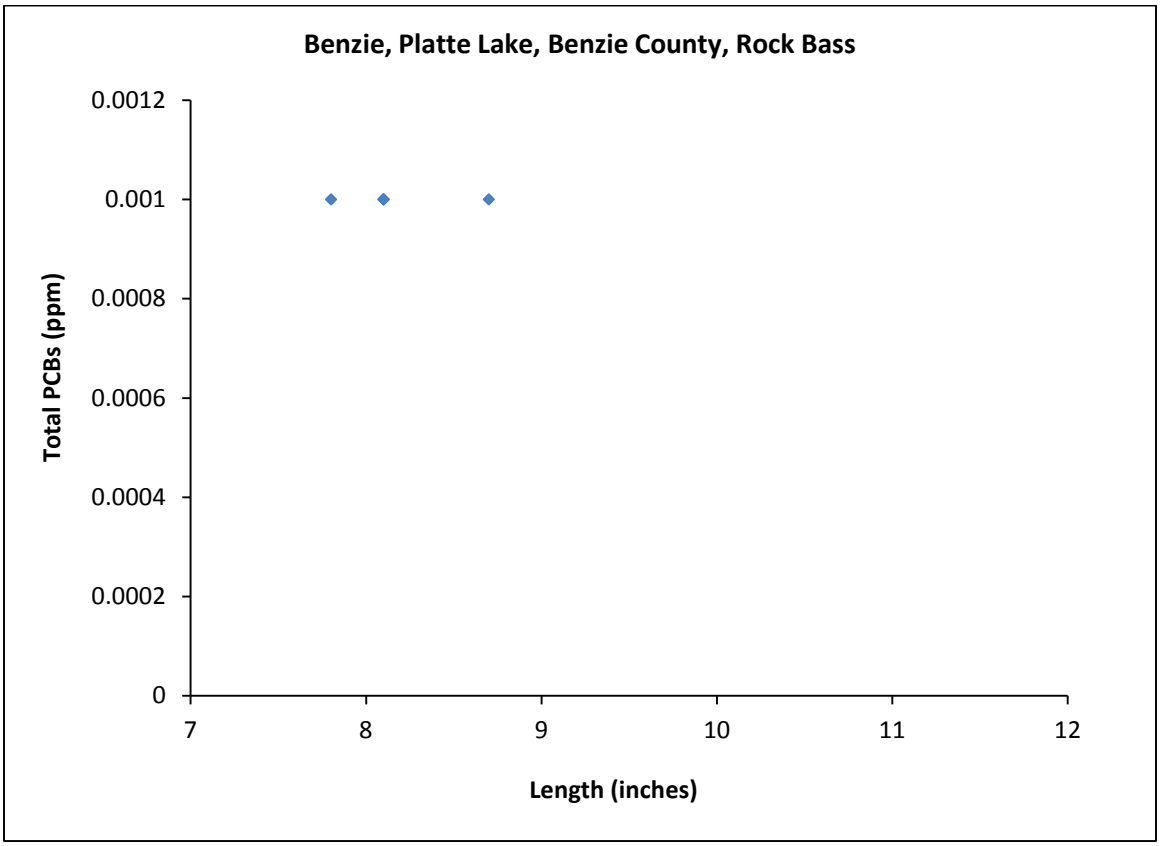
Existing Advisory: Women and children should not eat more than one meal per week of Platte Lake rock bass smaller than 10 inches or more than one meal per month of those fish larger than 10 inches due to mercury.

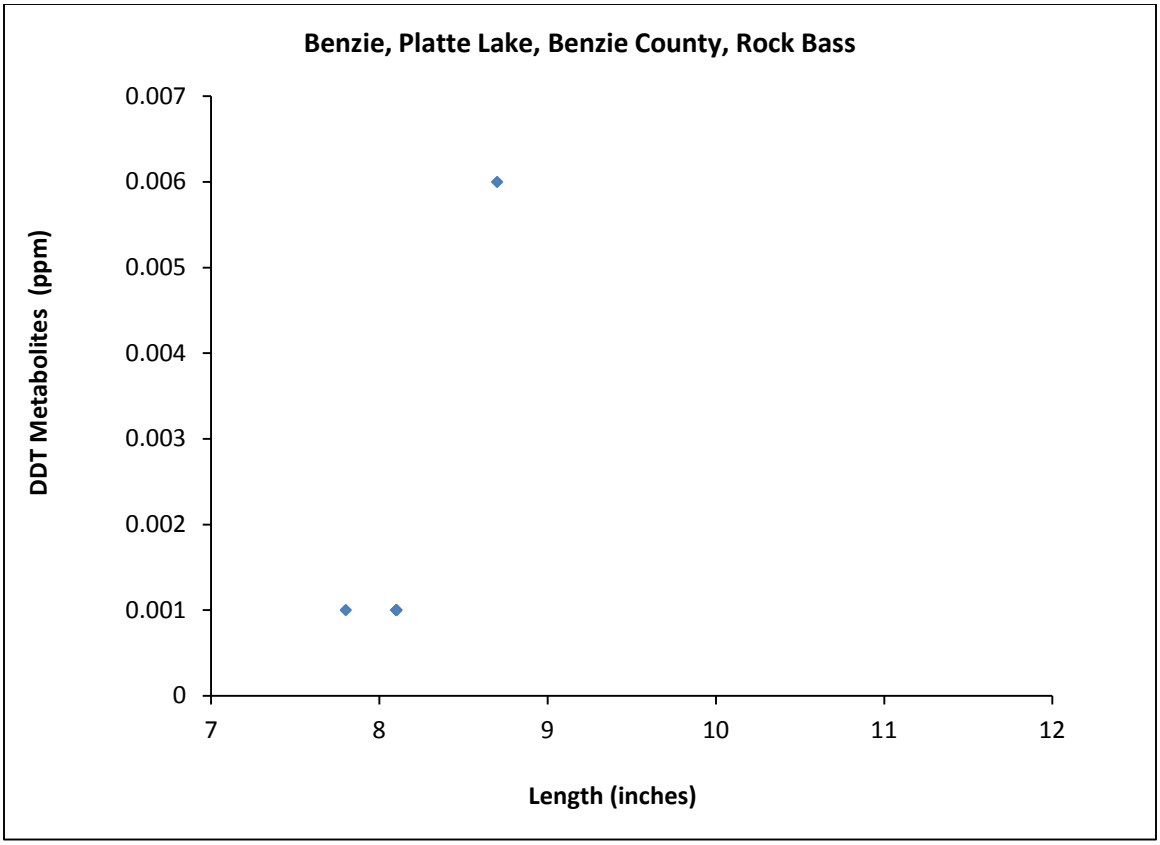
Recommendation: No one should eat more than 8 meals per month of Platte Lake rock bass less than 9 inches or 2 meals per month of those greater than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
6	0.03	16
7	0.05	16
8	0.08	12
9	0.13	8
10	0.21	4
11	0.33	2
12	0.52	2

Shaded area denotes extrapolated estimates


Benzie, Platte Lake, Benzie County, Rock Bass
y = 0.0023e^0.451x
R² = 0.8912
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
7
8
9
10
11
12
Length (inches)


Benzie, Platte Lake, Benzie County, Rock Bass
Total PCBs (ppm)
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
7
8
9
10
11
12
Length (inches)


Benzie, Platte Lake, Benzie County, Rock Bass
DDT Metabolites (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
7
8
9
10
11
12
Length (inches)

Smallmouth Bass **Platte Lake** **Benzie 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	2010	12	14.5	14	14.5	17.5

Datasets available: 2004, 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	12	0.37	0.17	0.60	0.46	2

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.168	0.208

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	2010	12	14.5	14	14.5	17.5

Datasets available: 2004, 2010

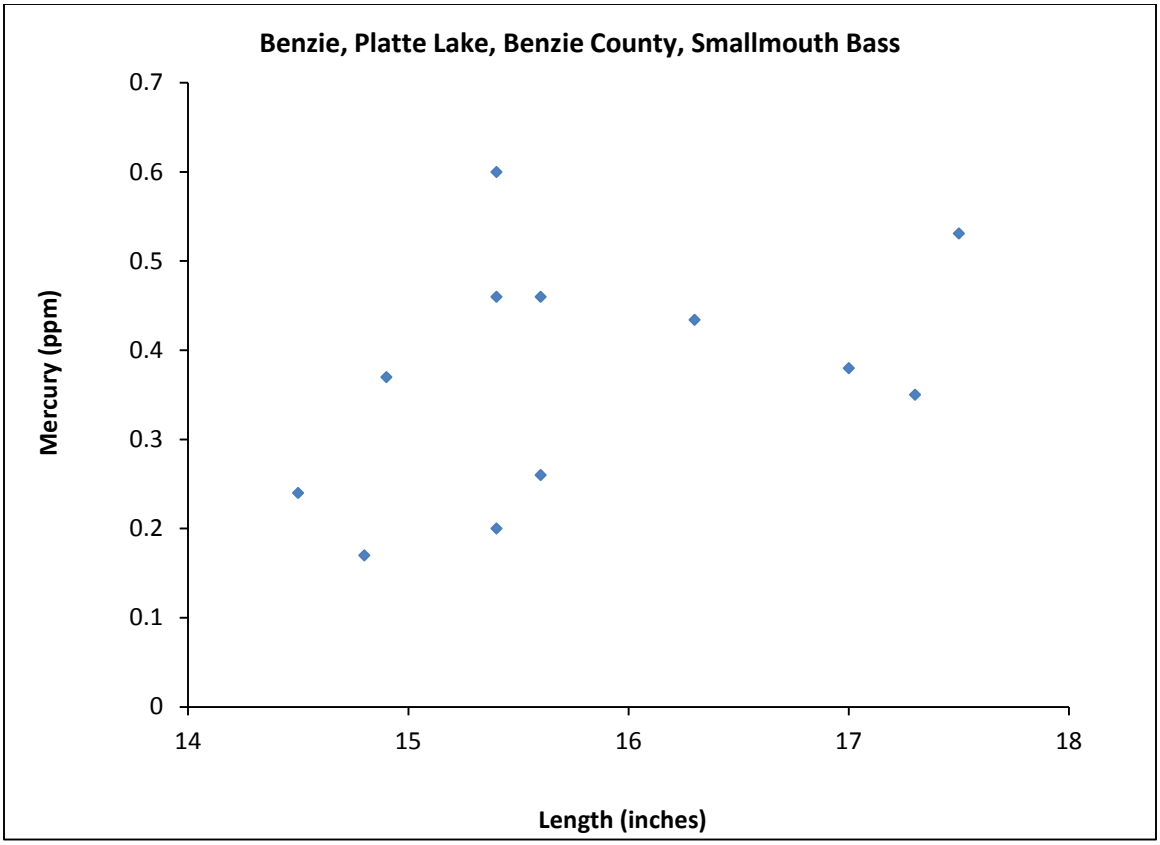
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	12	0.018	0.001	0.096	0.04	4
DDT	12	0.011	0.001	0.047	0.02	16
Chlordane	12	0.001	0.001	0.006	0.002	--
Toxaphene	12	ND	--	--	--	--

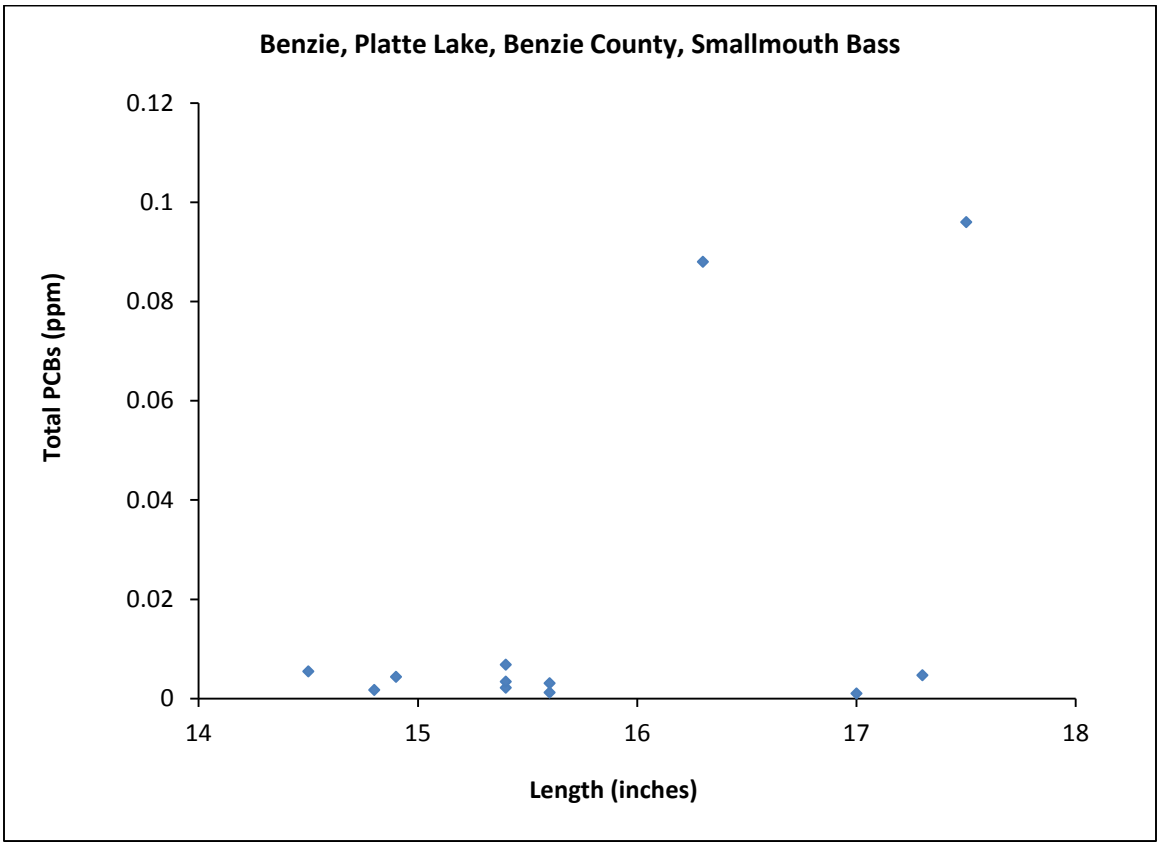
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.266	0.150
DDT	0.290	0.211
Chlordane	0.312	0.286
Toxaphene	--	--

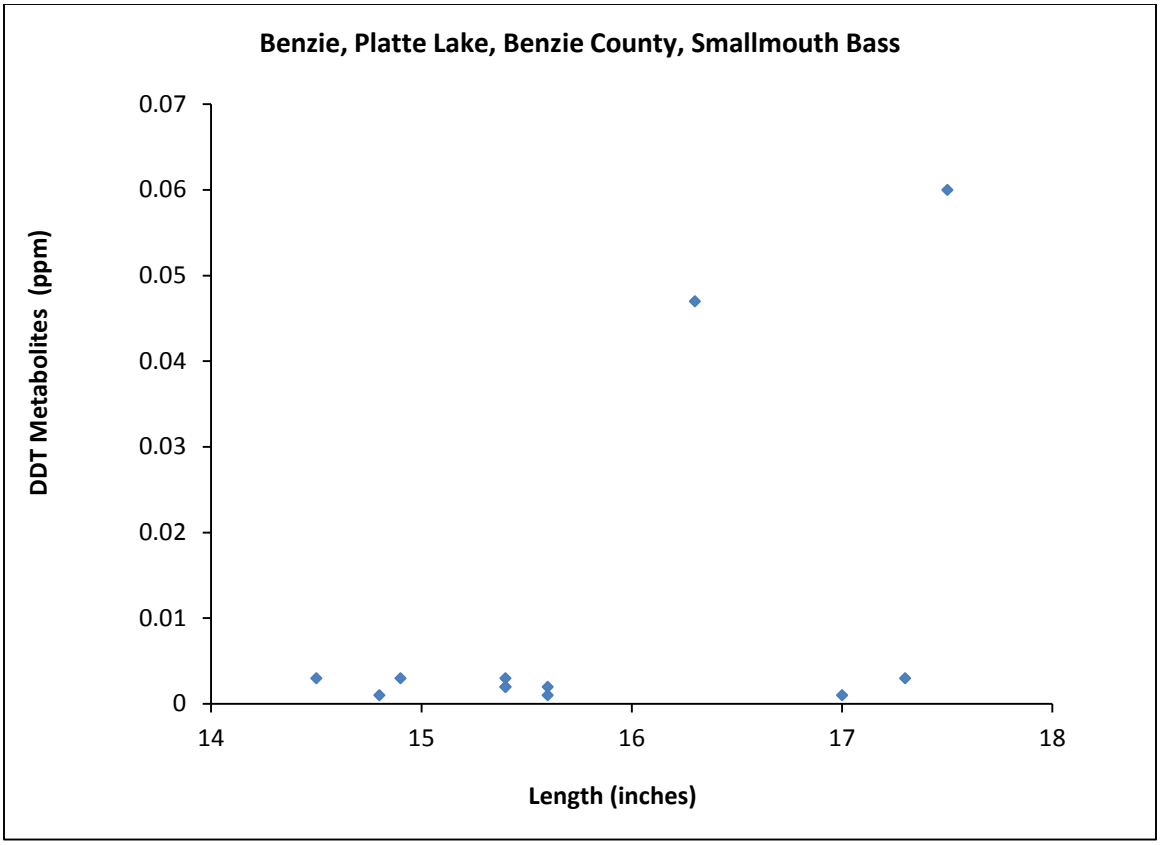
Final meal category based on UCL: 2

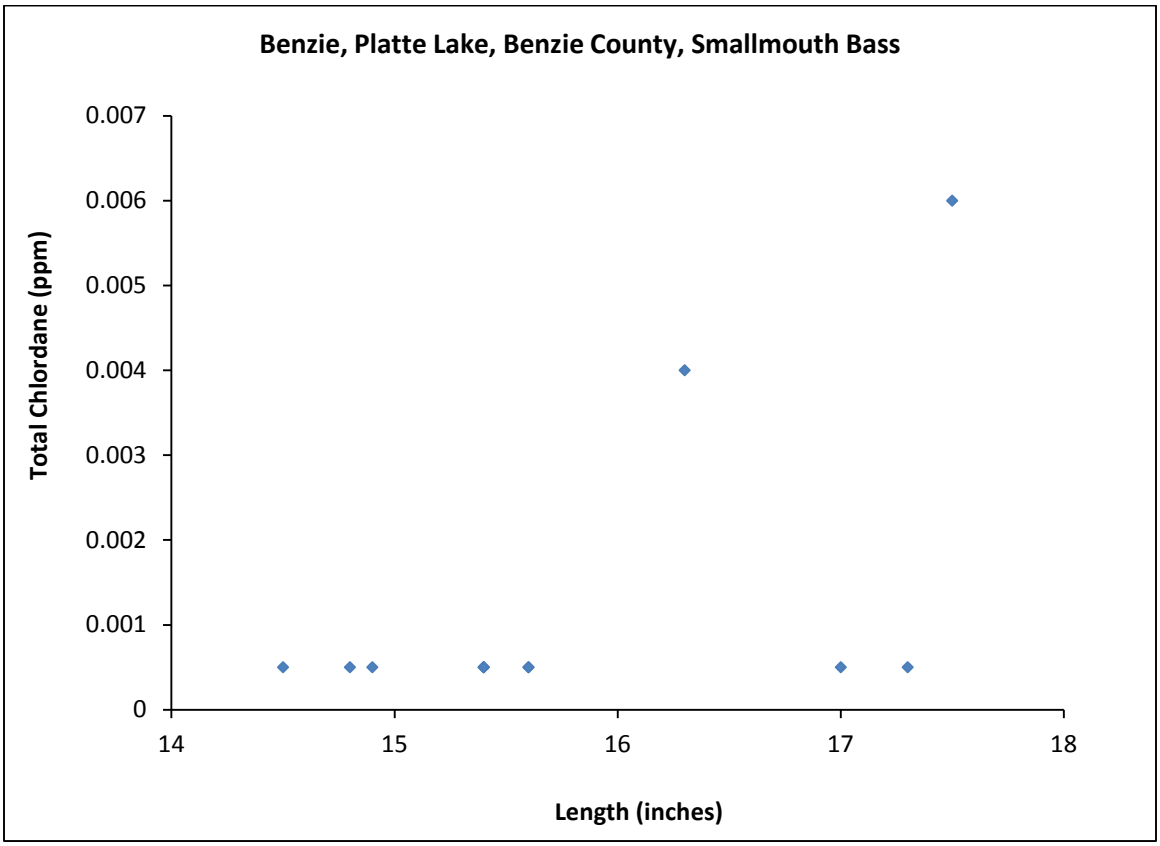
Existing Advisory: Women and children should not eat more than one meal per month of Platte Lake smallmouth bass due to mercury and PCBs.

Recommendation: No one should eat more than 2 meals per month of Platte 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. The statewide length break was applied as the size of the fish was limited. PCBs would cause and advisory.


Benzie, Platte Lake, Benzie County, Smallmouth Bass
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
14
15
16
17
18
Length (inches)


Benzie, Platte Lake, Benzie County, Smallmouth Bass
Total PCBs (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
14
15
16
17
18
Length (inches)


Benzie, Platte Lake, Benzie County, Smallmouth Bass
DDT Metabolites (ppm)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
14
15
16
17
18
Length (inches)


Benzie, Platte Lake, Benzie County, Smallmouth Bass
Total Chlordane (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
14
15
16
17
18
Length (inches)

Walleye **Platte Lake** **Benzie 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	2010	6	15.6	15	15.6	21.9

Datasets available: 2004, 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.42	0.29	0.55	0.52	2

	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.283	0.368

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	2010	6	15.6	15	15.6	21.9

Datasets available: 2004, 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	0.003	0.001	0.008	0.010	16
DDT	6	0.002	0.001	0.008	0.010	16
Chlordane	6	0.001	0.001	0.001	0.001	--
Toxaphene	6	ND	--	--	--	--

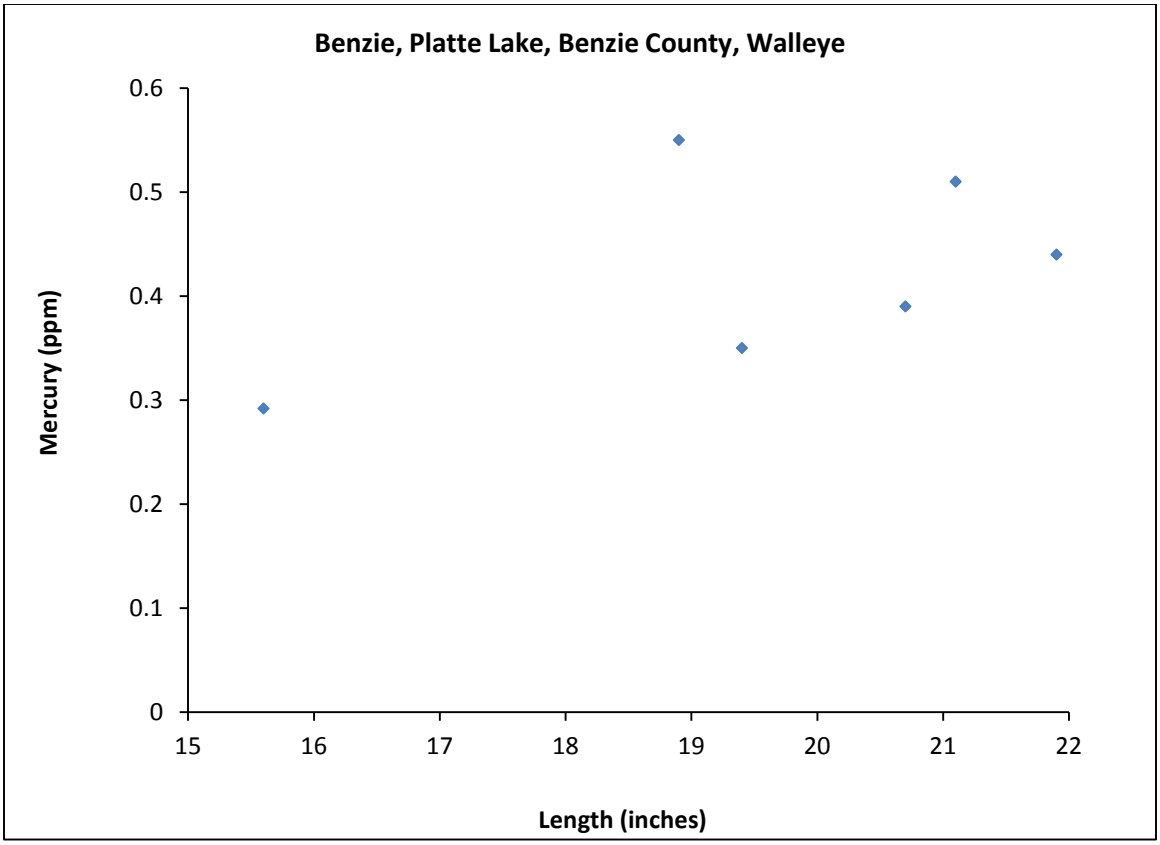
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.881*	0.894*
DDT	0.828*	0.870*
Chlordane	0.185	0.185
Toxaphene	--	--

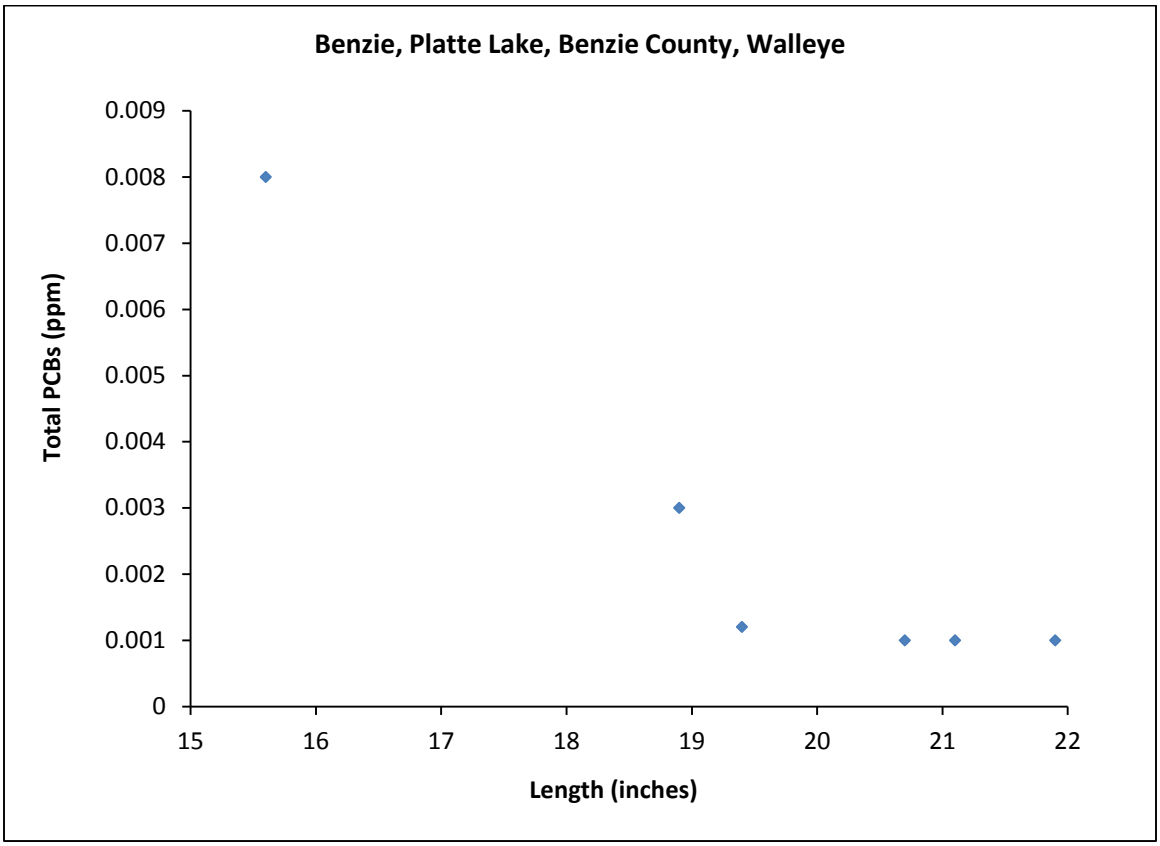
* - negative slope

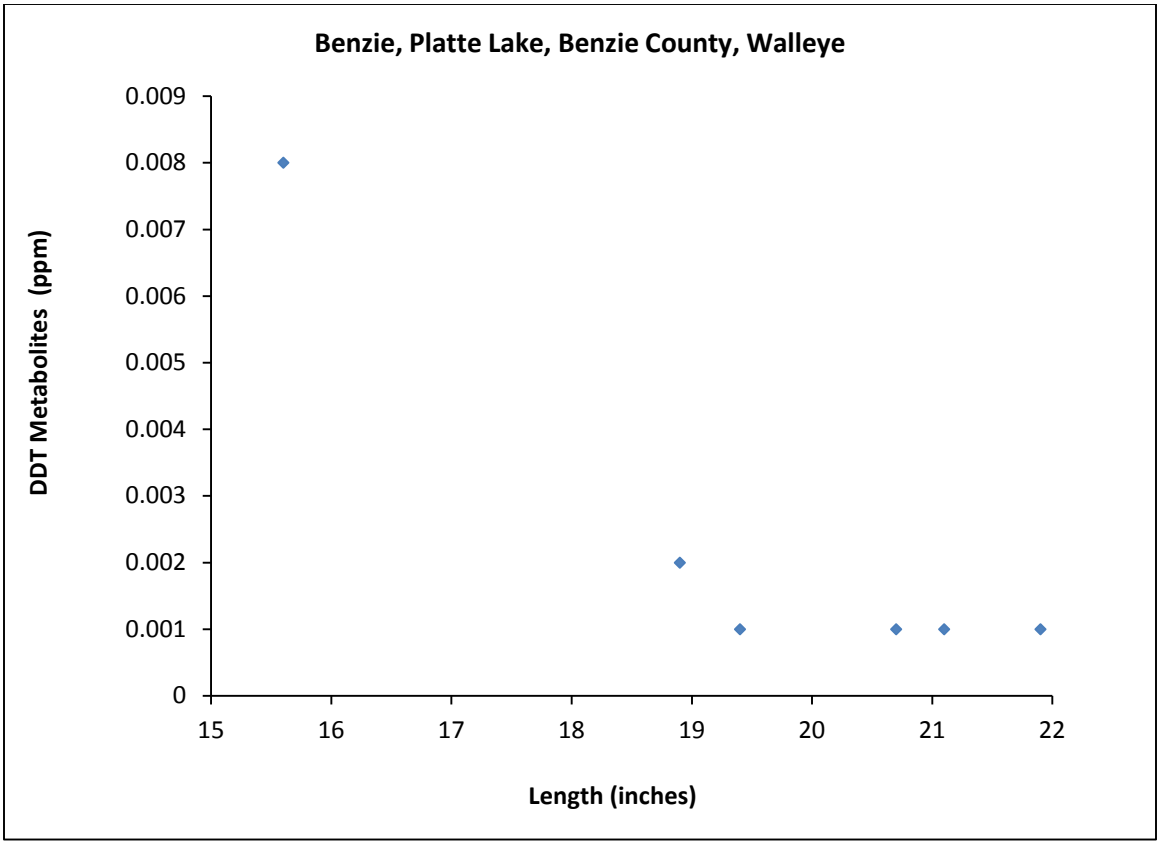
Final meal category based on UCL: 2

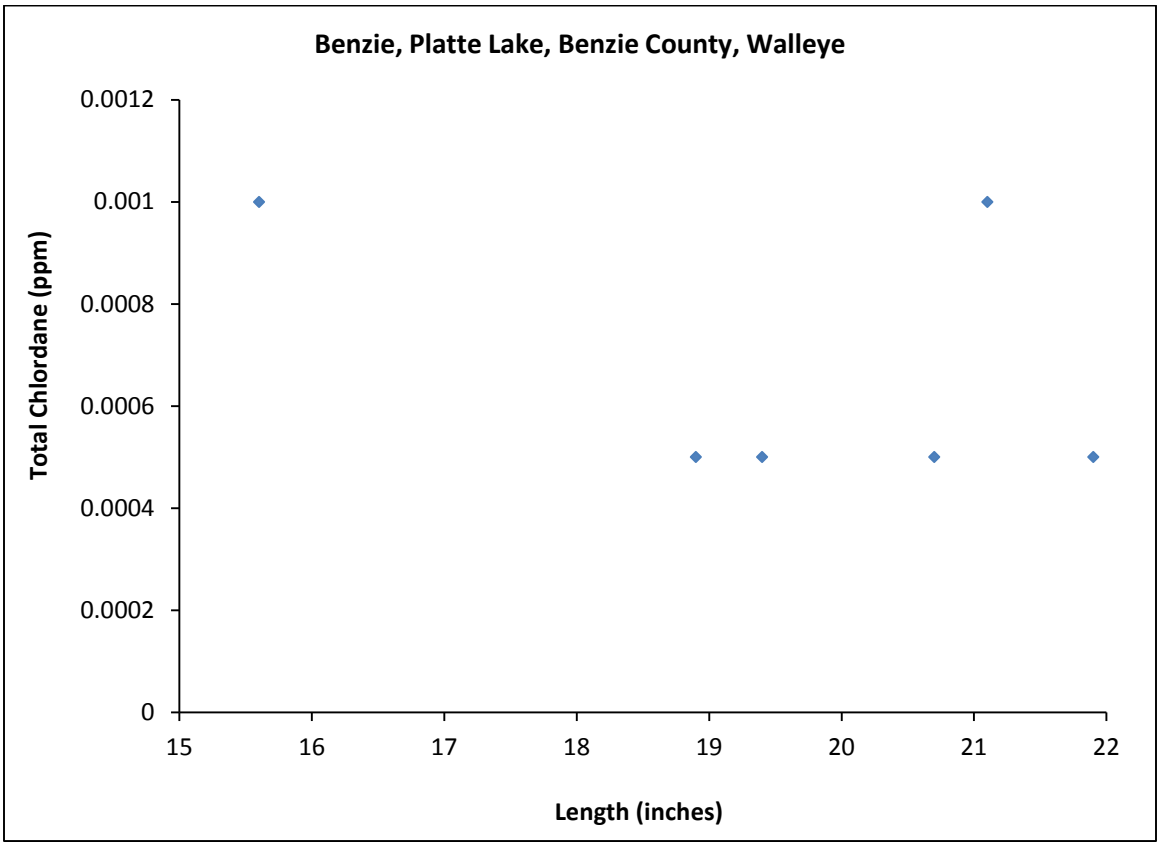
Existing Advisory: Platte Lake walleye are covered under the statewide mercury consumption advisory.

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


Benzie, Platte Lake, Benzie County, Walleye
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
15
16
17
18
19
20
21
22
Length (inches)


Benzie, Platte Lake, Benzie County, Walleye
Total PCBs (ppm)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
15
16
17
18
19
20
21
22
Length (inches)


Benzie, Platte Lake, Benzie County, Walleye
DDT Metabolites (ppm)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
15
16
17
18
19
20
21
22
Length (inches)


Benzie, Platte Lake, Benzie County, Walleye
Total Chlordane (ppm)
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
15
16
17
18
19
20
21
22
Length (inches)

Charlevoix County

Brown Trout **Boyne River** **Charlevoix 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	9	7.6	10	9.8	12

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.11	0.07	0.13	--	--

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	9	7.6	10	9.8	12

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	0.28	0.06	0.39	--	--
DDT	2*	0.14	0.03	0.19	--	--
Chlordane	2*	0.02	0.004	0.04	--	--
Toxaphene	2*	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 9 fish were analyzed as 2 composite samples

Existing Advisory: Women and children should not eat more than one meal per week of Boyne River brown trout between smaller than 10 inches and no more than one meal per month of those fish larger than 10 inches due to PCBs.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

White Sucker **Boyne River** **Charlevoix 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	5	10	na	10	11.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1*	0.09	--	--	--	--

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	5	10	na	10	11.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1*	ND	--	--	--	--
DDT	1*	0.01	--	--	--	--
Chlordane	1*	ND	--	--	--	--
Toxaphene	1*	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 5 fish were analyzed as 1 composite sample

Existing Advisory: There are no current consumption advisories for Boyne River white sucker.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice applies: No one should eat more than 8 meals per month of sucker from inland waters.

Largemouth Bass **Deer Lake** **Charlevoix 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	13	14	13	17.8

Datasets available: 2003

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.38	0.24	0.68	0.61	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.678	0.565

Regression slope determined by single value, thus the regression was not used.

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
--	--	--	--	--	--	--

Datasets available: --

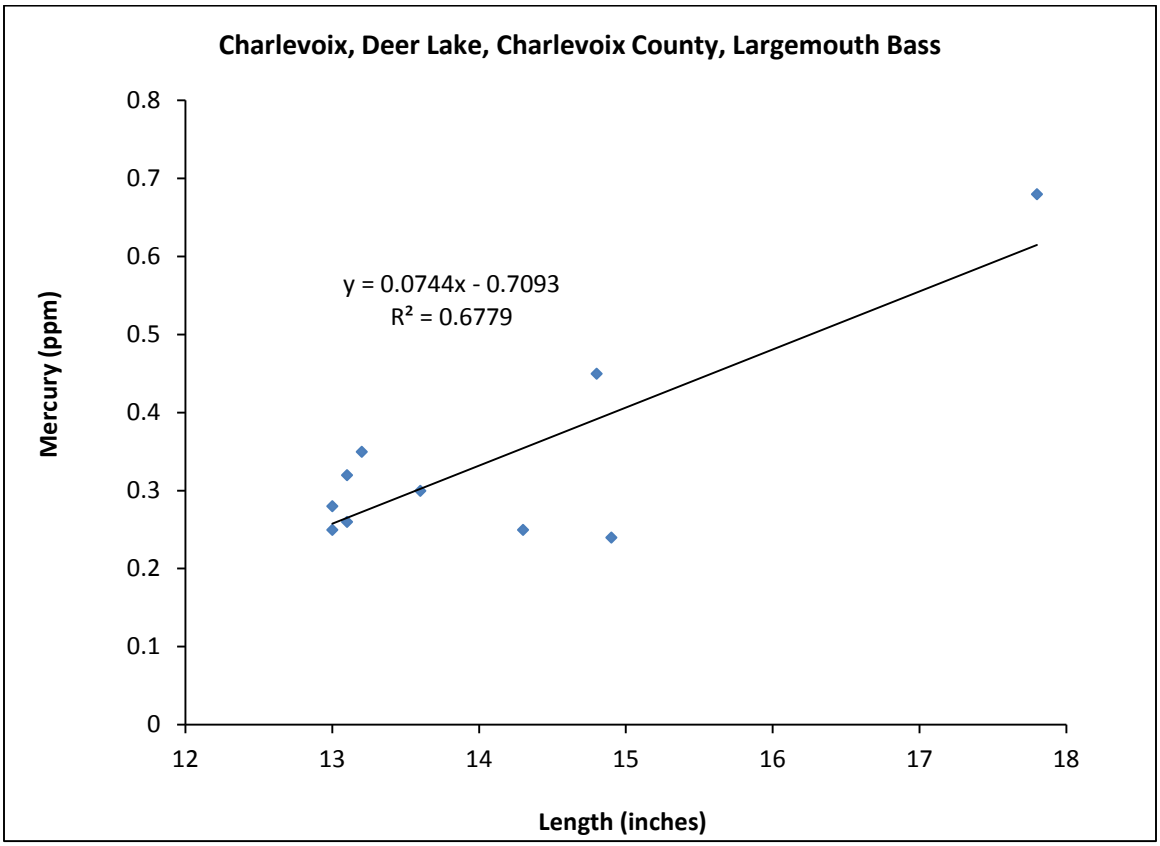
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Deer 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. The statewide length break was applied as the size of the fish was limited.


Charlevoix, Deer Lake, Charlevoix County, Largemouth Bass
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
y = 0.0744x - 0.7093
R² = 0.6779
12
13
14
15
16
17
18
Length (inches)

Northern Pike **Deer Lake** **Charlevoix 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
2003	2003	5	14.7	na*	14.7	19.7

Datasets available: 2003

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.42	0.13	0.71	0.69	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.171	0.374

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
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	--	--	--	--	--

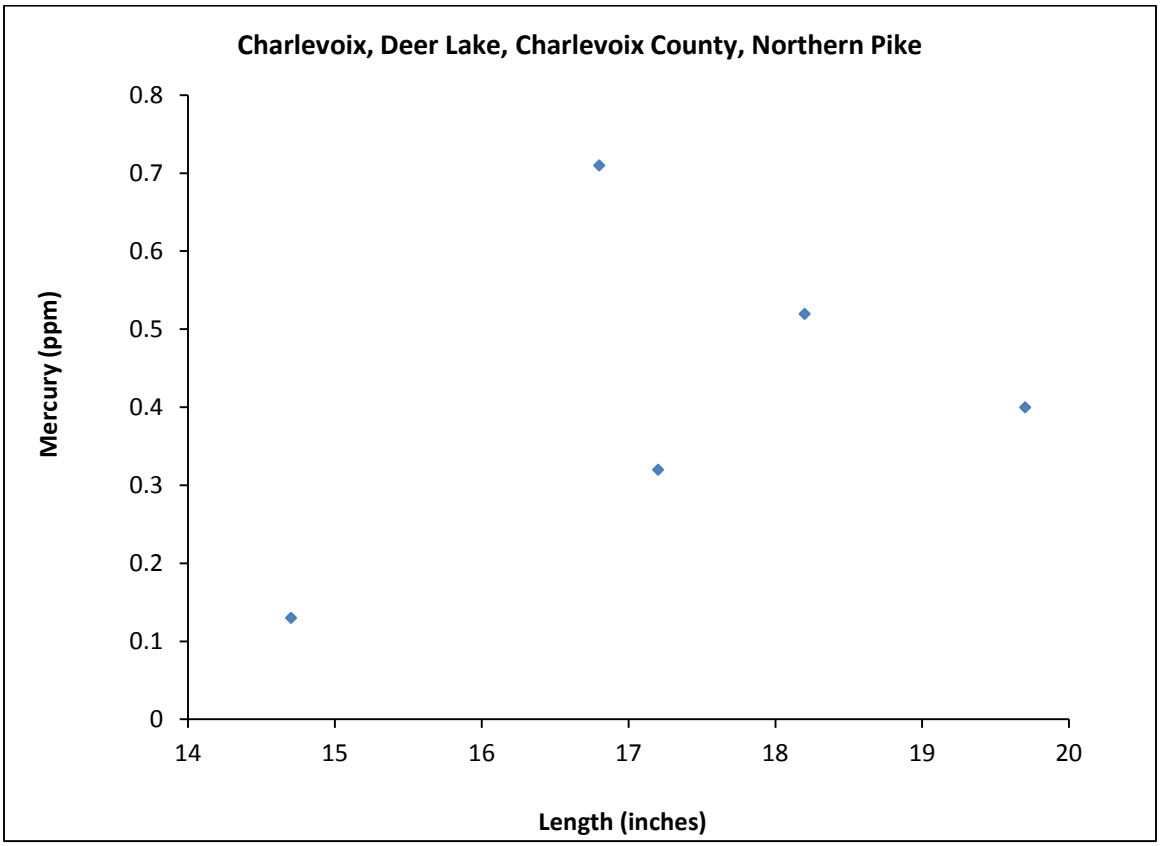
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

* - there is no minimum size limit on Deer Lake northern pike

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

Recommendation: No one should eat more than 1 meal per month of Deer Lake northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches. Statewide length break applied as the size range of fish in this sample set is limited.


Charlevoix, Deer Lake, Charlevoix County, Northern Pike
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
14
15
16
17
18
19
20
Length (inches)

Brown Trout **Lake Charlevoix** **Charlevoix County**

Hg Analysis:

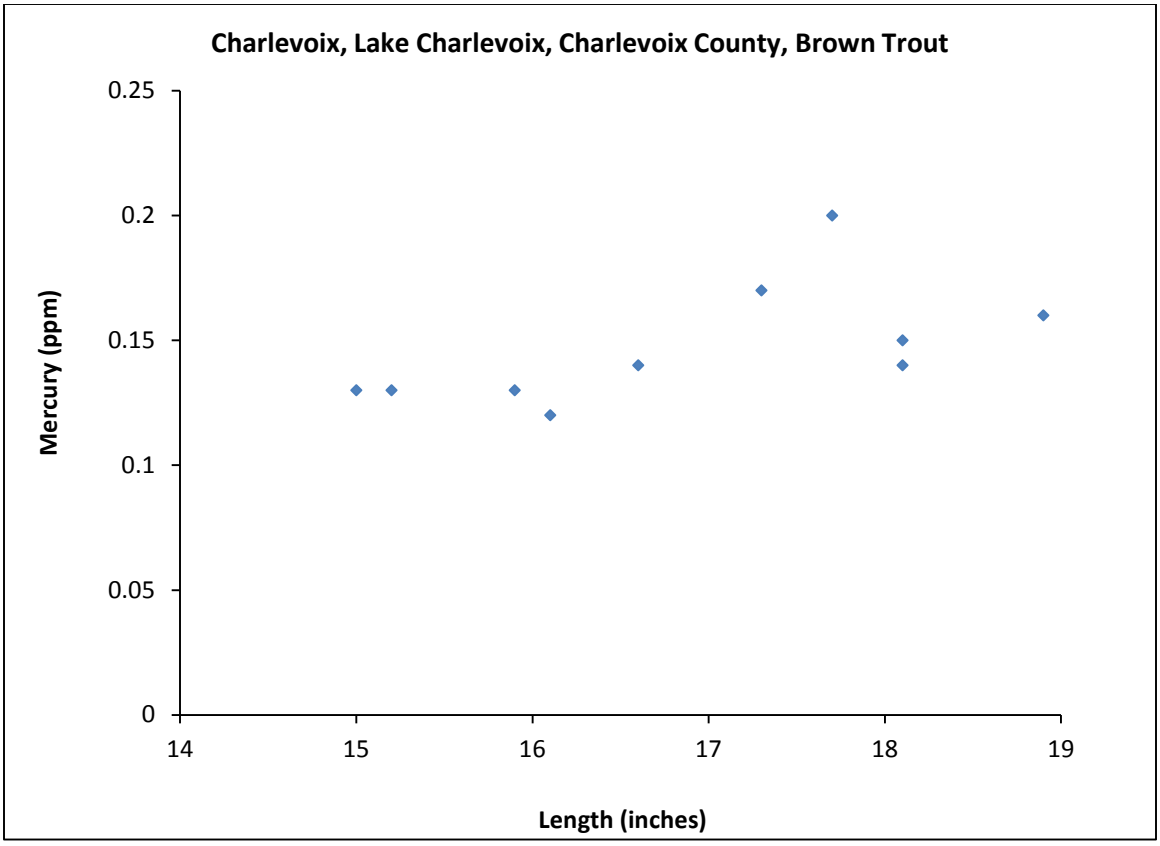
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1990	1990	10	15	15	15	18.9	
Datasets available:	1990						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.15		0.12	0.20	0.16	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.368	0.410					

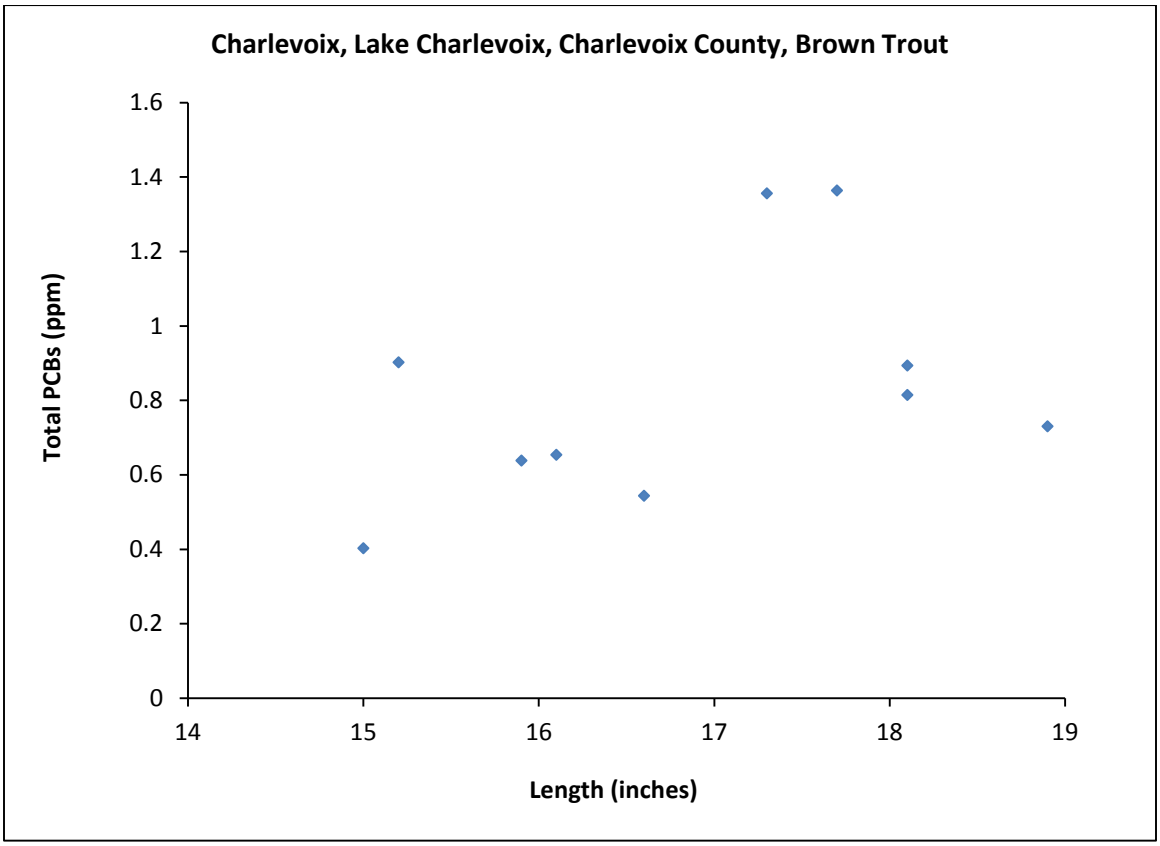
Organics Analysis:

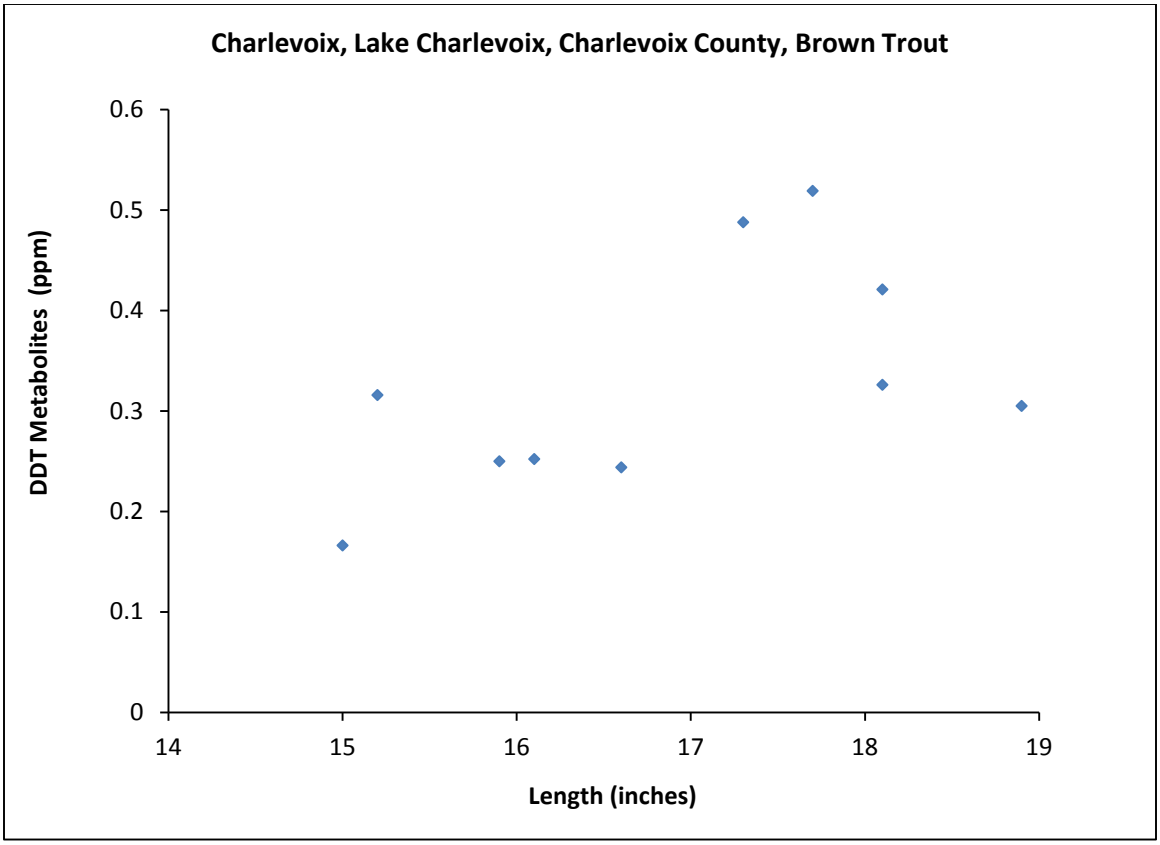
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1990	1990	10	15	15	15	18.9	
Datasets available:	1990						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.83		0.40	1.36	1.06	Limited*
DDT	10	0.33		0.17	0.52	0.41	4
Chlordane	10	0.08		0.03	0.13	0.10	--
Toxaphene	10	0.16		0.05	0.22	0.20	1
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.177	0.236					
DDT	0.322	0.383					
Chlordane	0.158	0.202					
Toxaphene	0.194	0.229		**Final meal category based on UCL:**			**Limited***

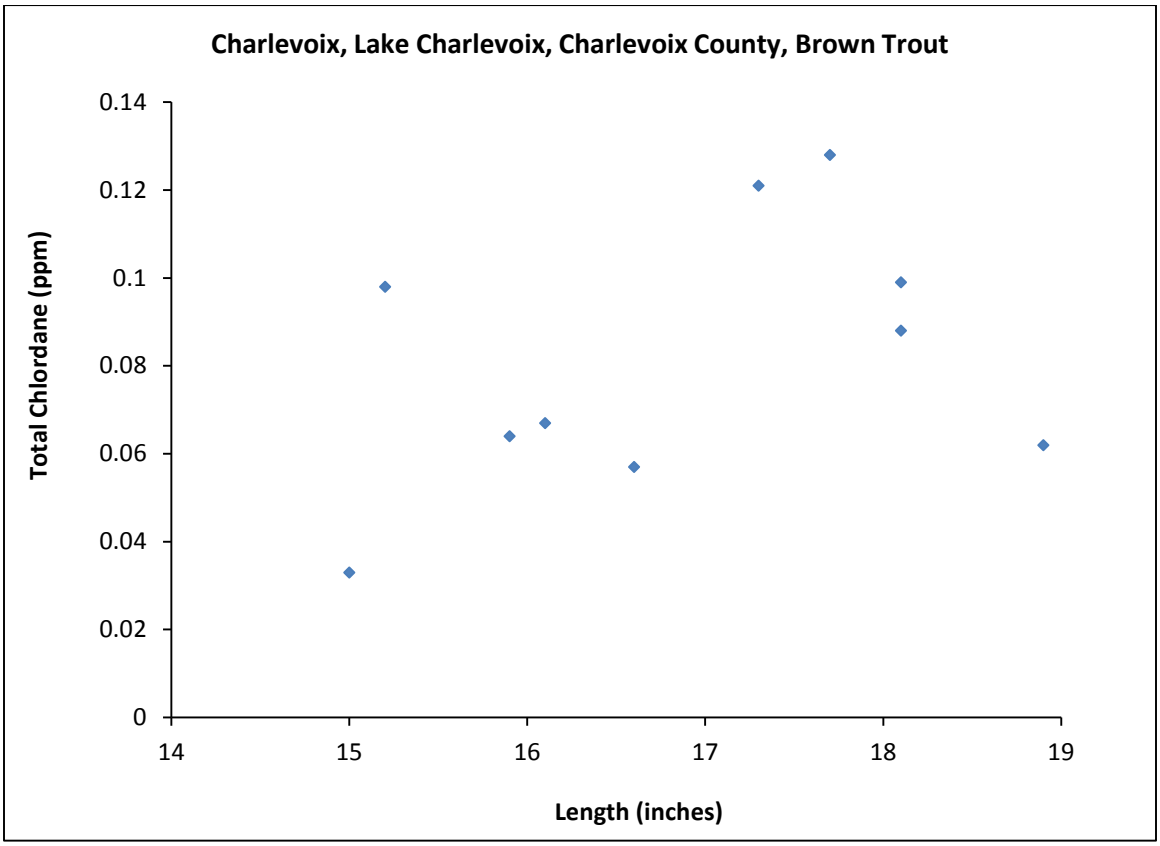
Existing Advisory: Women and children should not eat more than one meal per month of Lake Charlevoix brown trout smaller than 22 inches or more than 6 meals per year of those fish larger than 22 inches due to PCBs.

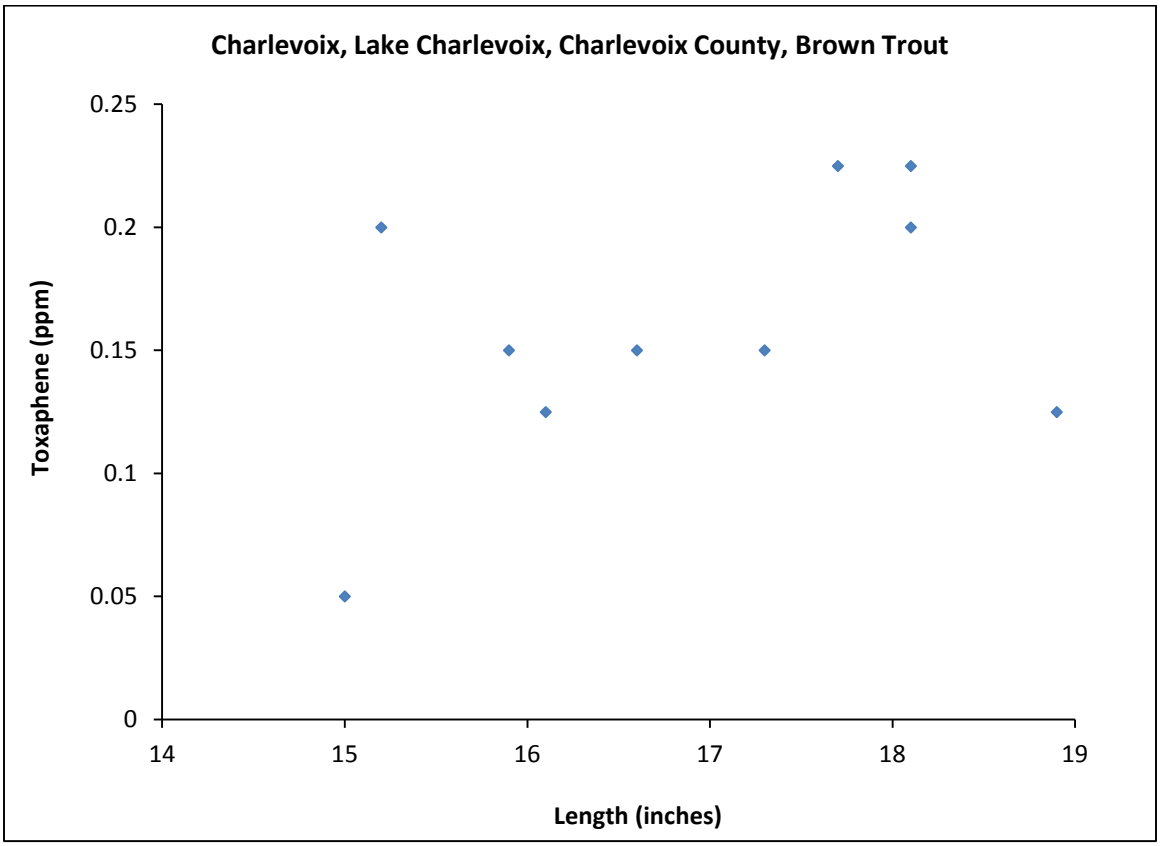
Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of Lake Charlevoix brown trout to no more than 1 or 2 meals per year due to PCBs. Mercury, DDT, and toxaphene would cause advisories. *Based on the MDEQ Fish Contaminant Monitoring Program, PCB, DDT, and Toxaphene concentrations ≥15 years old are expected to have declined. However, levels of PCBs may still be in the Limited category.


Charlevoix, Lake Charlevoix, Charlevoix County, Brown Trout
Mercury (ppm)
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Brown Trout
Total PCBs (ppm)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
14
15
16
17
18
19
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Brown Trout
DDT Metabolites (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
14
15
16
17
18
19
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Brown Trout
Total Chlordane (ppm)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
15
16
17
18
19
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Brown Trout
Toxaphene (ppm)
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
Length (inches)

Lake Trout **Lake Charlevoix** **Charlevoix 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	15.9	15	15.9	19.5

Datasets available: 1990

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.14	0.11	0.16	0.14	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.140	0.120

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	10	15.9	15	15.9	19.5

Datasets available: 1990

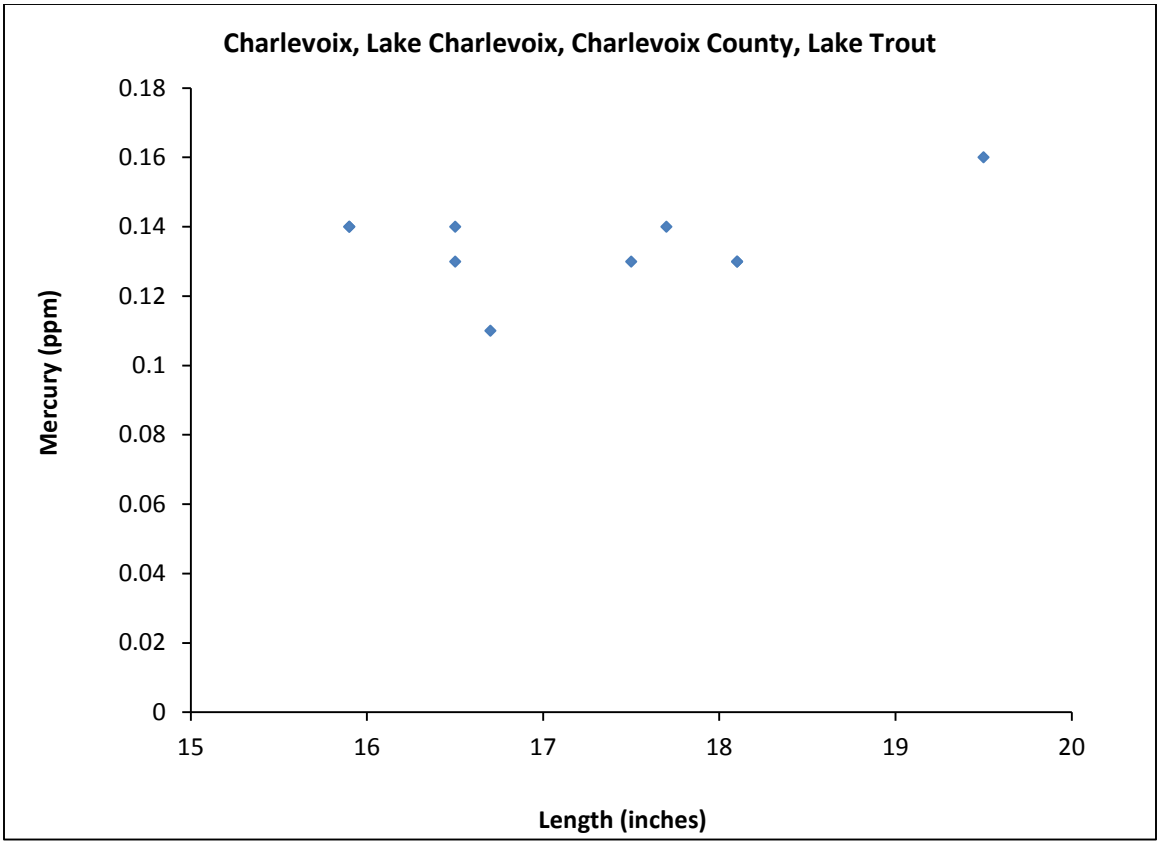
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.50	0.30	0.84	0.62	Limited*
DDT	10	0.22	0.17	0.32	0.25	4
Chlordane	10	0.06	0.03	0.10	0.07	--
Toxaphene	10	0.12	0.05	0.25	0.16	2

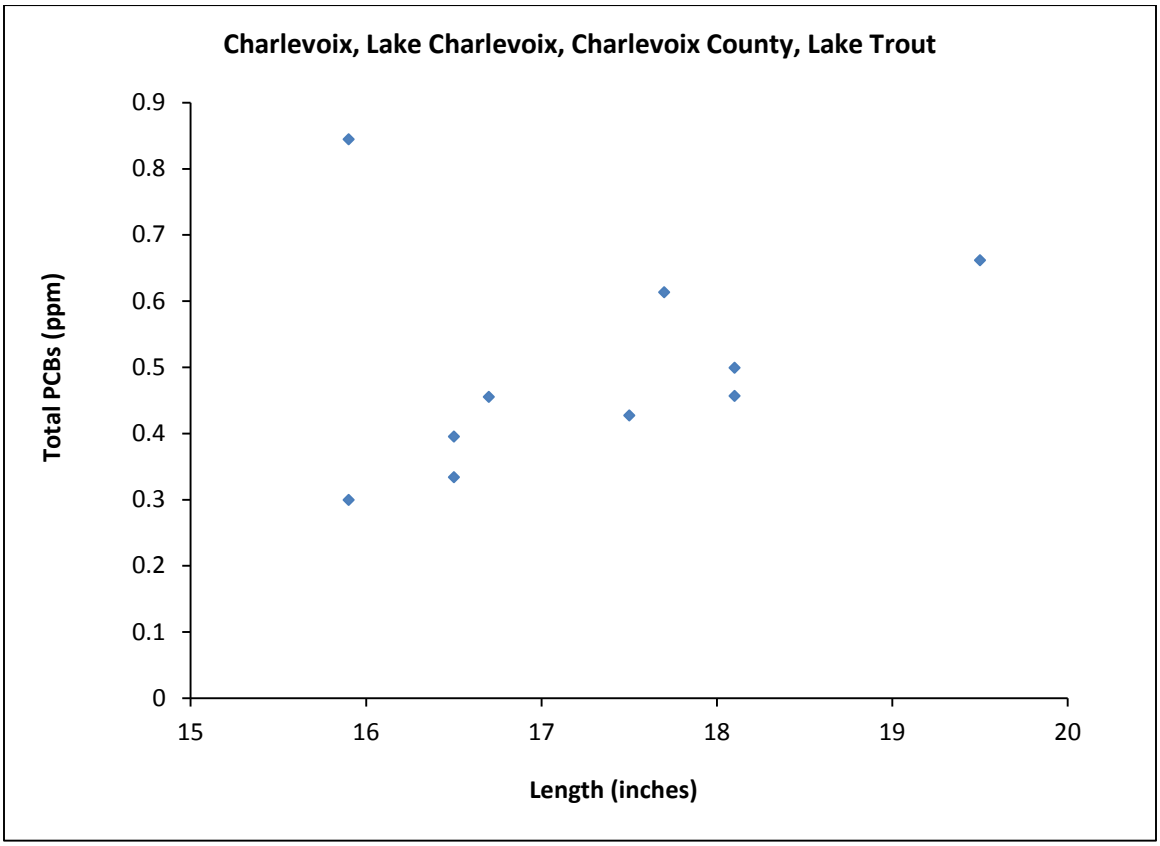
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.053	0.118
DDT	0.186	0.189
Chlordane	0.276	0.271
Toxaphene	0.337	0.309

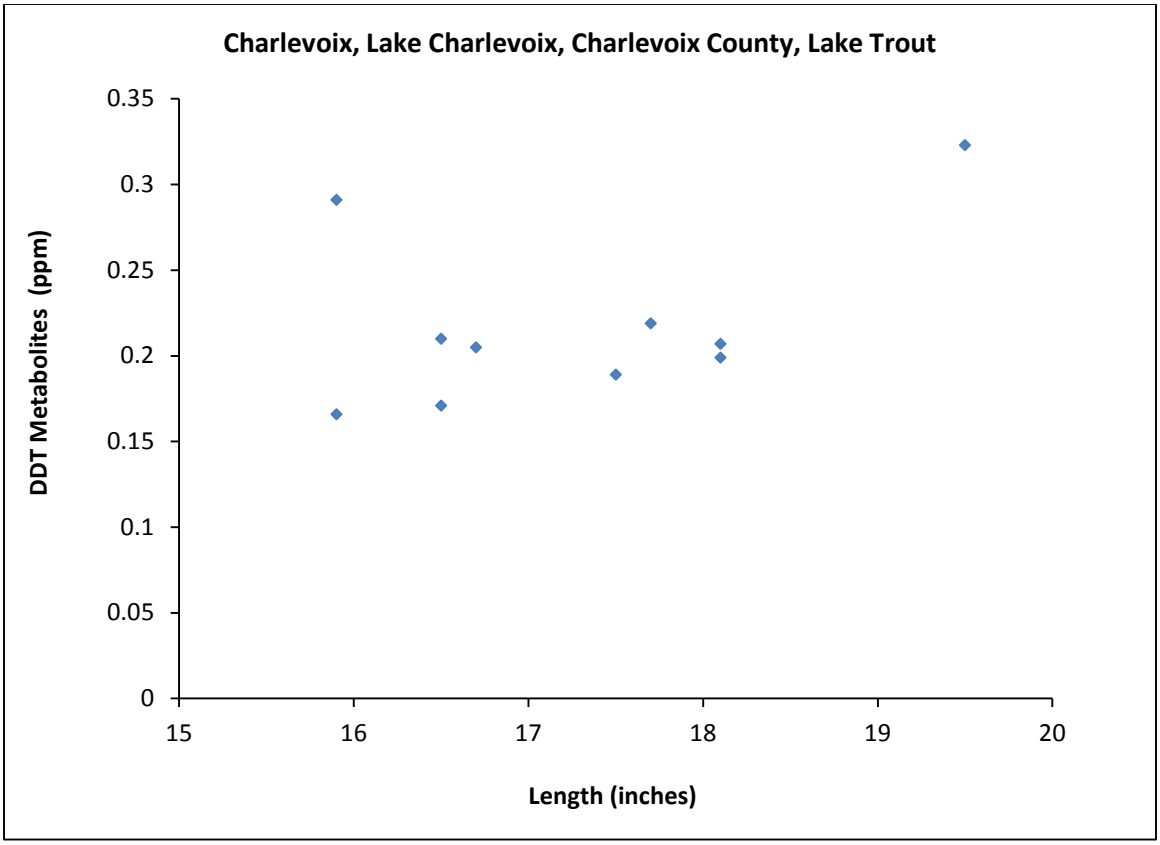
Final meal category based on UCL: Limited*

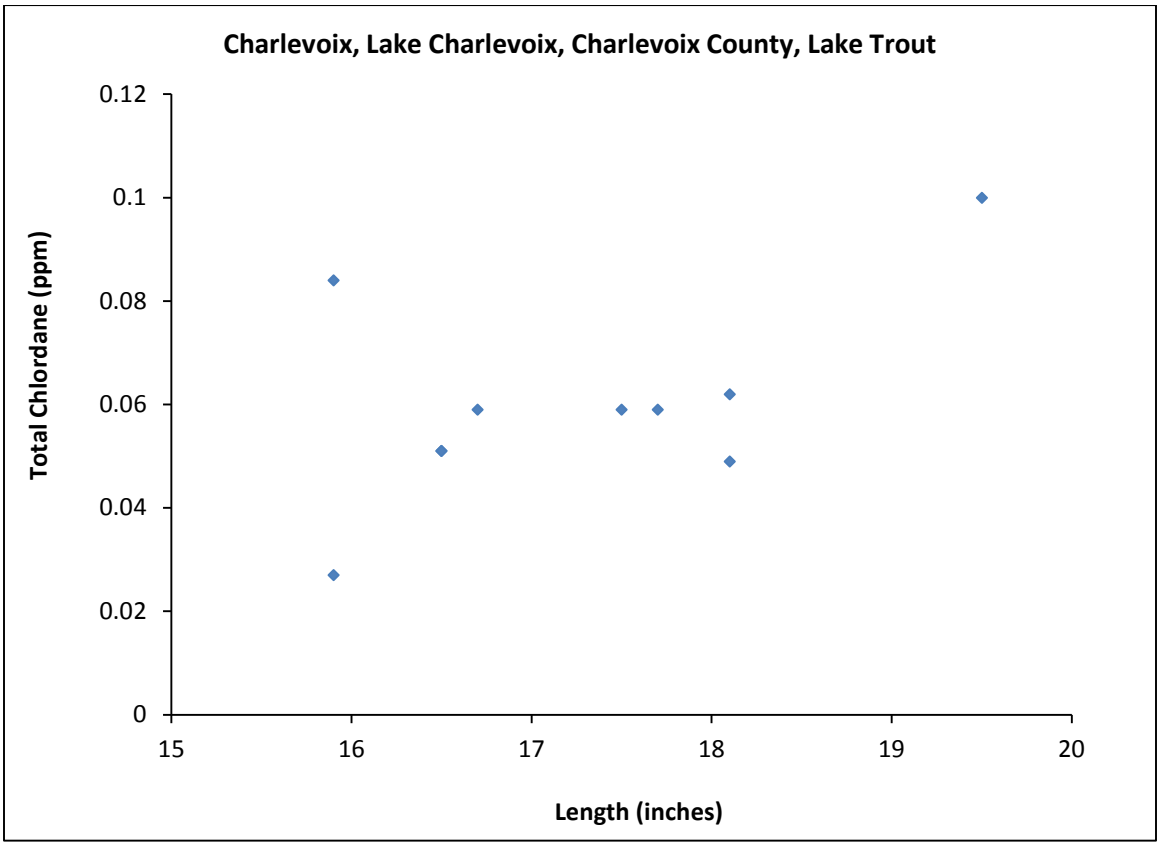
Existing Advisory: Women and children should not eat more than one meal per month of Lake Charlevoix lake trout due to PCBs.

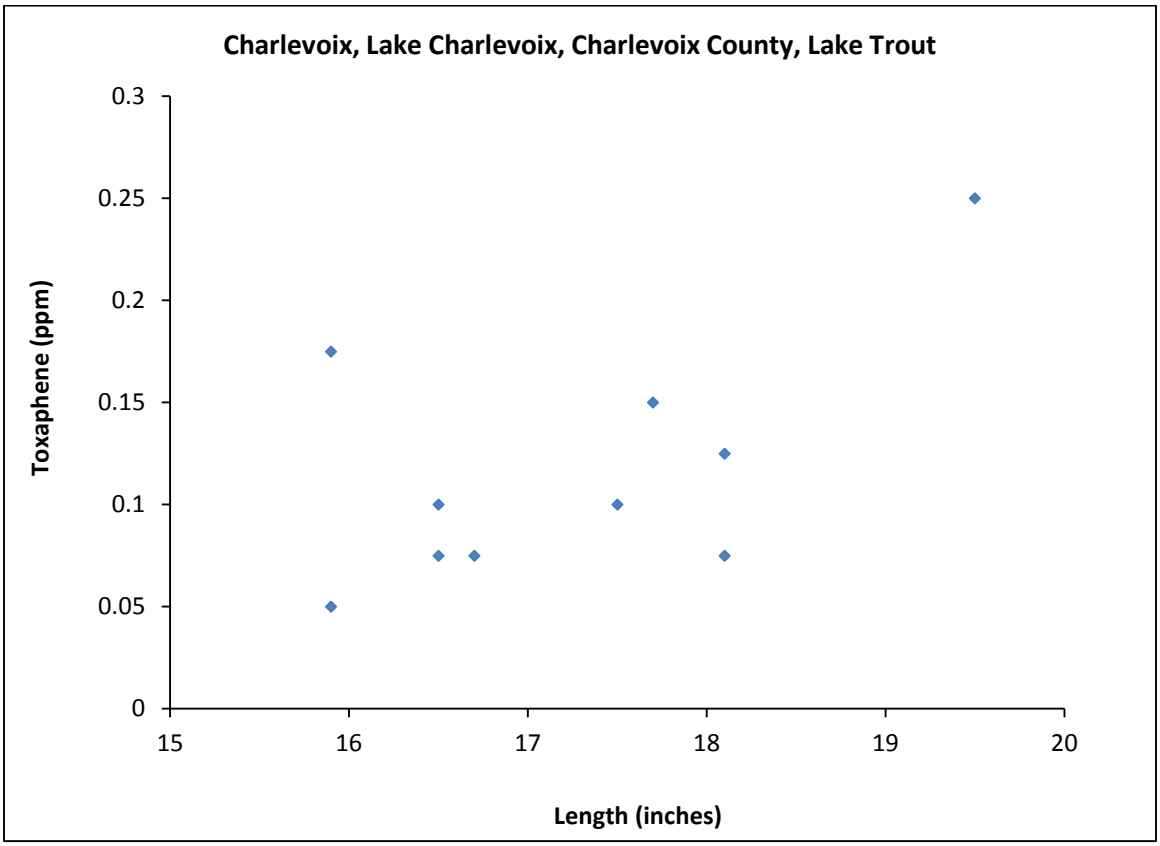
Recommendation: Sensitive populations should not eat these fish. Healthy adults should limit consumption of Lake Charlevoix lake trout to no more than 1 or 2 meals per year due to PCBs. Mercury, DDT, and toxaphene would cause advisories. *Based on the MDEQ Fish Contaminant Monitoring Program, PCB, DDT, and Toxaphene concentrations ≥15 years old are expected to have declined. However, levels of PCBs may still be in the Limited category and the length range for lake trout is limited.


Charlevoix, Lake Charlevoix, Charlevoix County, Lake Trout
Mercury (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
15
16
17
18
19
20
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Lake Trout
Total PCBs (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
15
16
17
18
19
20
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Lake Trout
DDT Metabolites (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Lake Trout
Total Chlordane (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
15
16
17
18
19
20
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, Lake Trout
Toxaphene (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
Length (inches)

Walleye **Lake Charlevoix** **Charlevoix 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	15.5	15	15.5	21.8

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.21	0.13	0.36	0.26	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.273	0.220

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: --

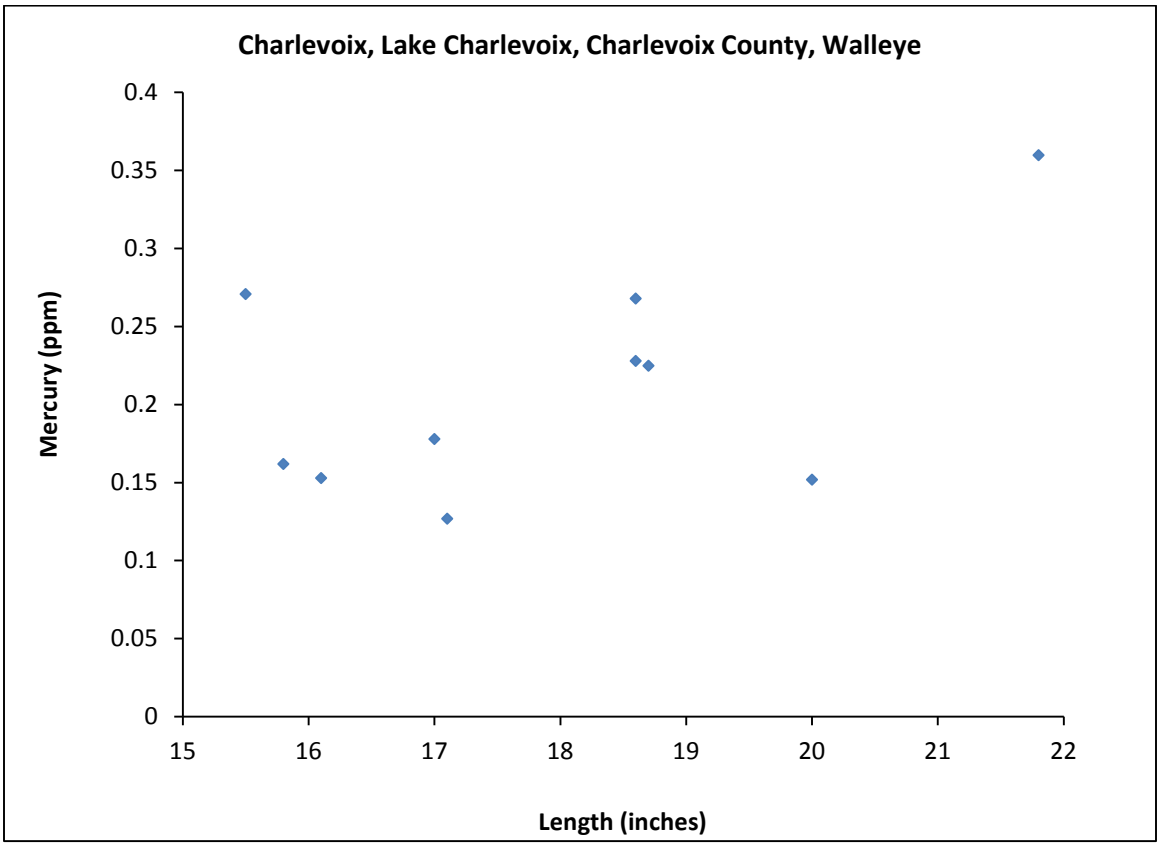
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 4

Existing Advisory: Women and children should not eat more than one meal per month of Lake Charlevoix walleye greater than 22 inches due to mercury.

Recommendation: No one should eat more than 4 meals per month of Lake Charlevoix walleye smaller than 20 inches or more than 2 meals per month of those fish larger than 20 inches due to mercury. The statewide length break was applied as the size of the fish was limited.


Charlevoix, Lake Charlevoix, Charlevoix County, Walleye
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
21
22
Length (inches)

White Sucker **Lake Charlevoix** **Charlevoix County**

Hg Analysis:

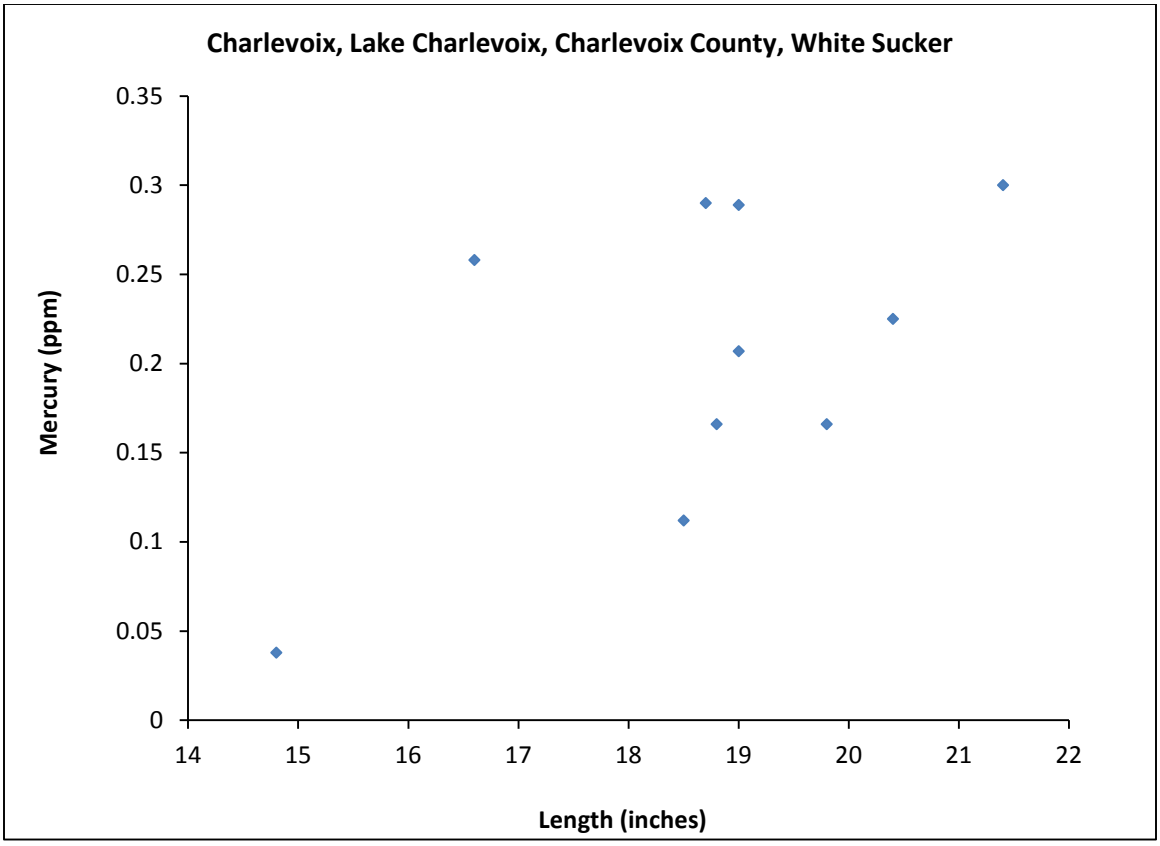
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2006	2006	10	14.8	na	14.8	21.4	
Datasets available:	2006						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.20		0.04	0.29	0.27	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.332	0.471					

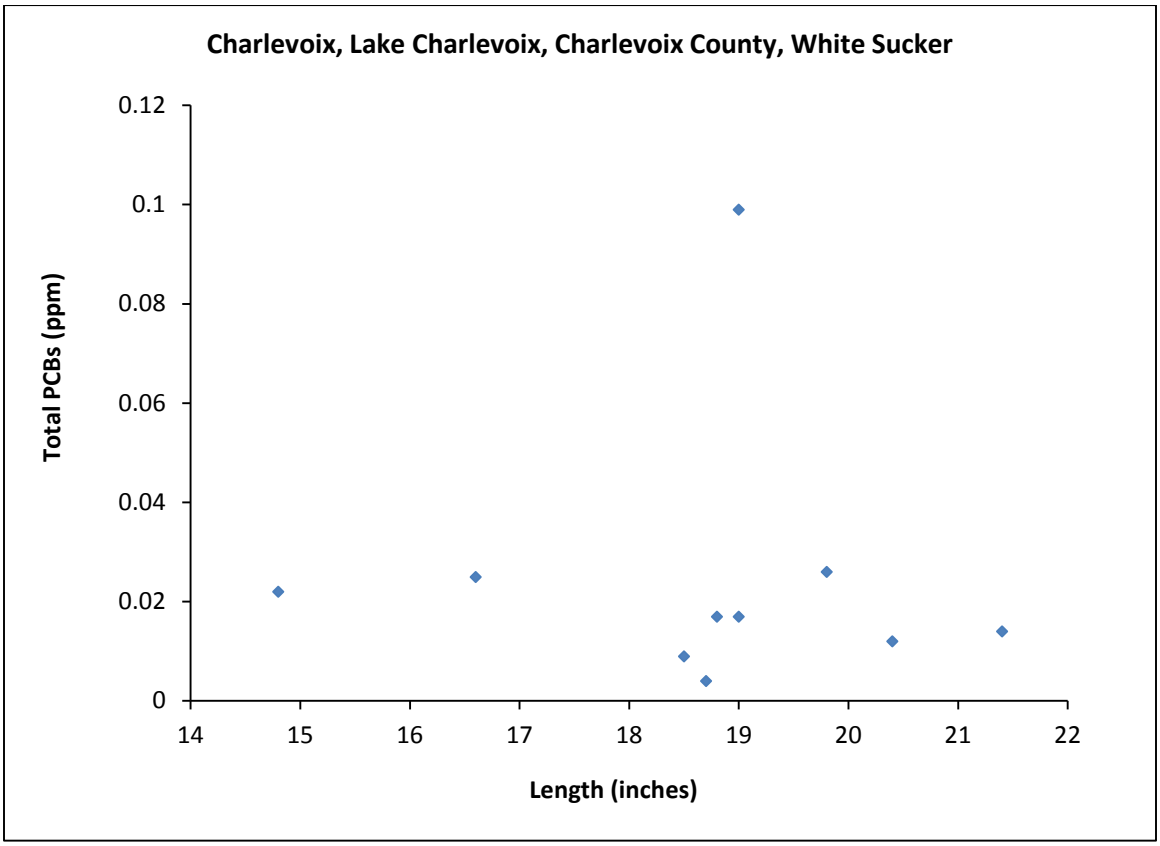
Organics Analysis:

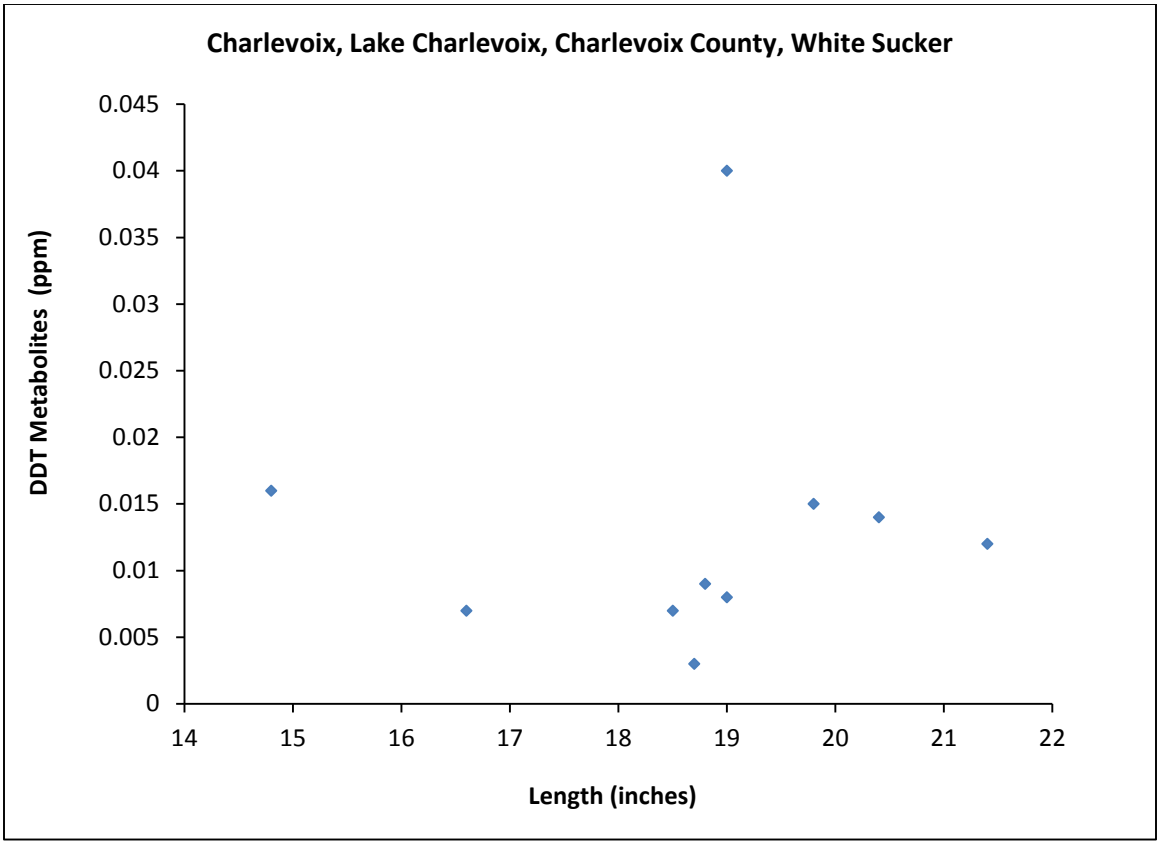
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2006	2006	10	14.8	na	14.8	21.4	
Datasets available:	2006						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.03		0.004	0.10	0.04	4
DDT	10	0.01		0.003	0.02	0.02	16
Chlordane	10	0.001		0.001	0.003	0.002	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.001	0.017					
DDT	0.003	0.005					
Chlordane	0.259	0.259					
Toxaphene	--	--		**Final meal category based on UCL:**			**4**

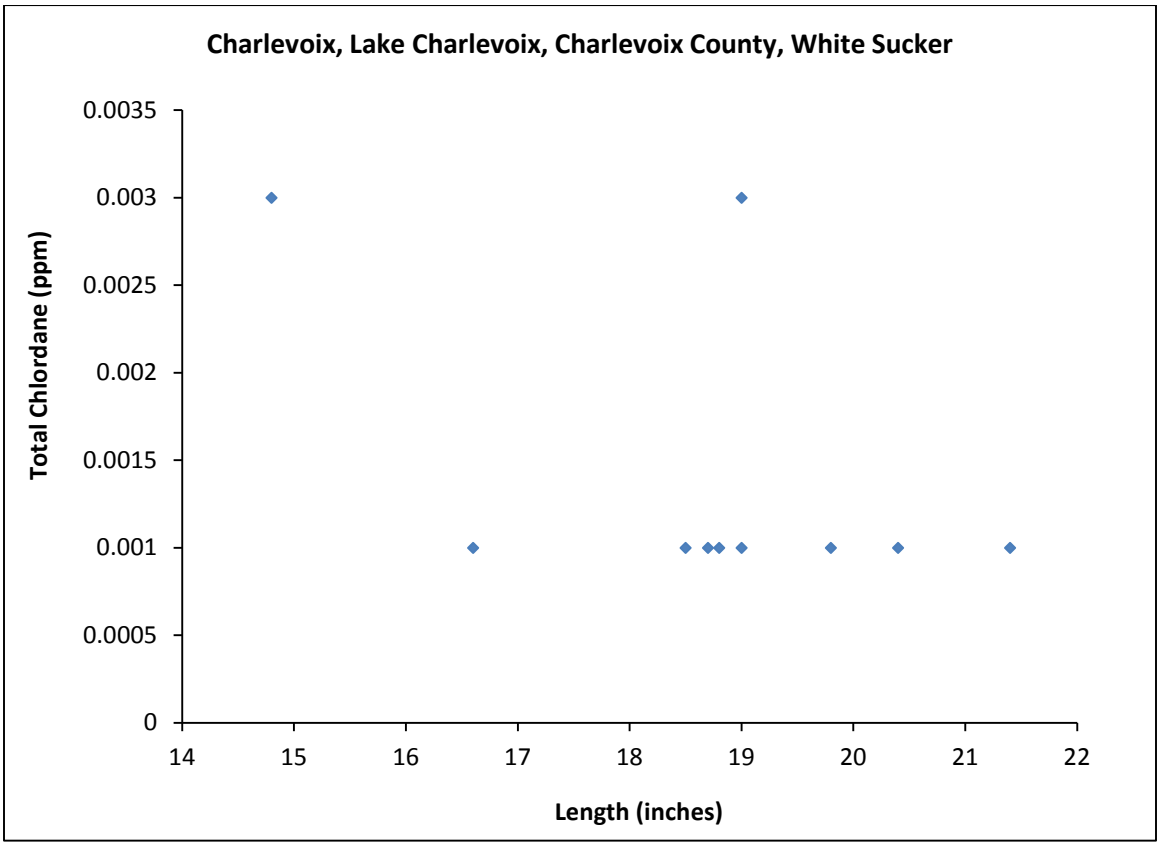
Existing Advisory: There are no current consumption advisories for Lake Charlevoix white sucker.

Recommendation: No one should eat more than 4 meals per month of Lake Charlevoix sucker due to mercury and PCBs.


Charlevoix, Lake Charlevoix, Charlevoix County, White Sucker
Mercury (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
20
21
22
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, White Sucker
Total PCBs (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
14
15
16
17
18
19
20
21
22
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, White Sucker
DDT Metabolites (ppm)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
14
15
16
17
18
19
20
21
22
Length (inches)


Charlevoix, Lake Charlevoix, Charlevoix County, White Sucker
Total Chlordane (ppm)
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
14
15
16
17
18
19
20
21
22
Length (inches)

Largemouth Bass **Lake Geneserath** **Charlevoix 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
1990	1990	4	12	14	12	14.6

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.52	0.22	0.89	--	--

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
1990	1990	4	12	14	12	14.6

Datasets available: 1990

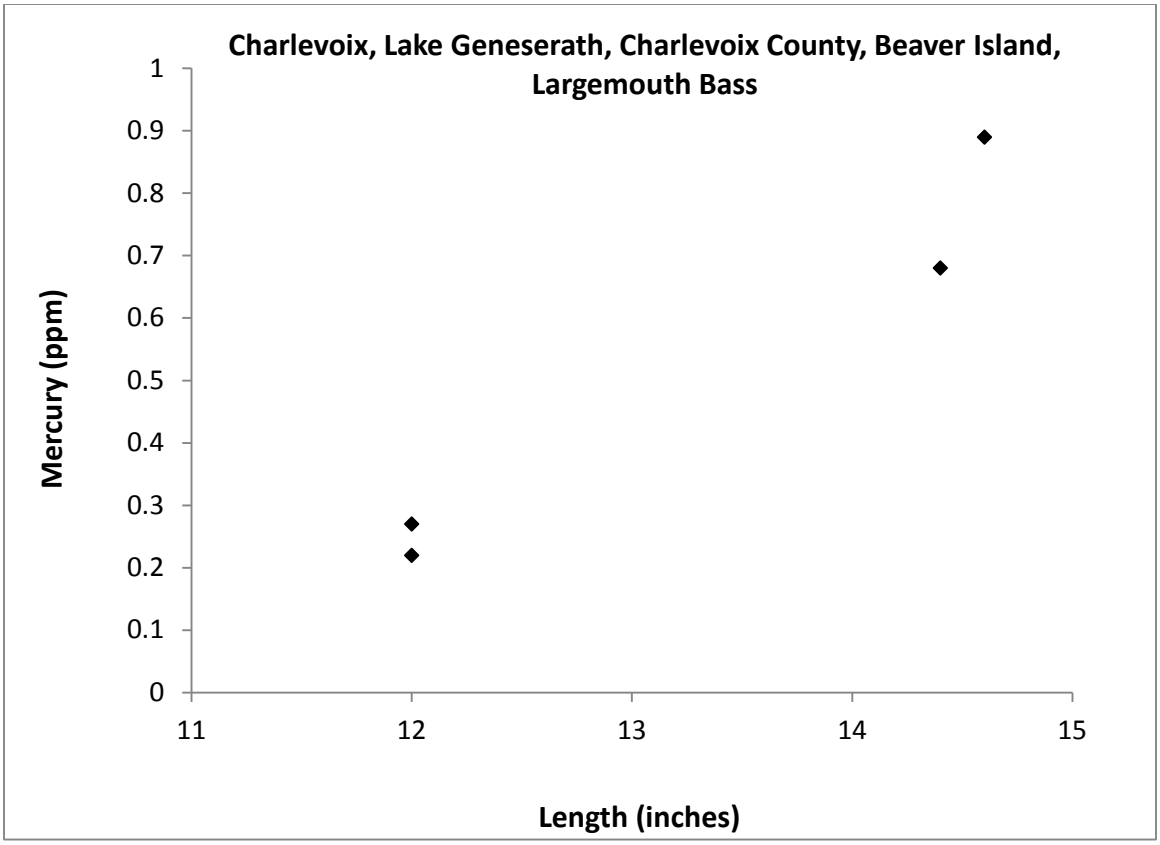
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	ND	--	--	--	--
DDT	4	0.011	0.004	0.02	--	--
Chlordane	4	ND	--	--	--	--
Toxaphene	4	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

Existing Advisory: Lake Geneserath largemouth bass are covered by the statewide mercury consumption advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Lake Geneserath largemouth and smallmouth bass: 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.


Charlevoix, Lake Geneserath, Charlevoix County, Beaver Island, Largemouth Bass
Mercury (ppm)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
11
12
13
14
15
Length (inches)

Northern Pike **Lake Geneserath** **Charlevoix 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
1990	1990	2	19.1	na*	19.1	20.1

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.34	0.30	0.37	--	--

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
1990	1990	2	19.1	24	19.1	20.1

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2	ND	--	--	--	--
DDT	2	0.007	0.003	0.01	--	--
Chlordane	2	ND	--	--	--	--
Toxaphene	2	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - There is no minimum size limit on Lake Geneserath northern pike

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

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies to Lake Geneserath northern pike: 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 northern pike larger than 30 inches.

Walleye | **Lake Geneserath Beaver Island** | **Charlevoix 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	14.4	15	14.6	21.9

Datasets available:

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.31	0.21	0.73	0.44	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.753	0.702

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	--	--

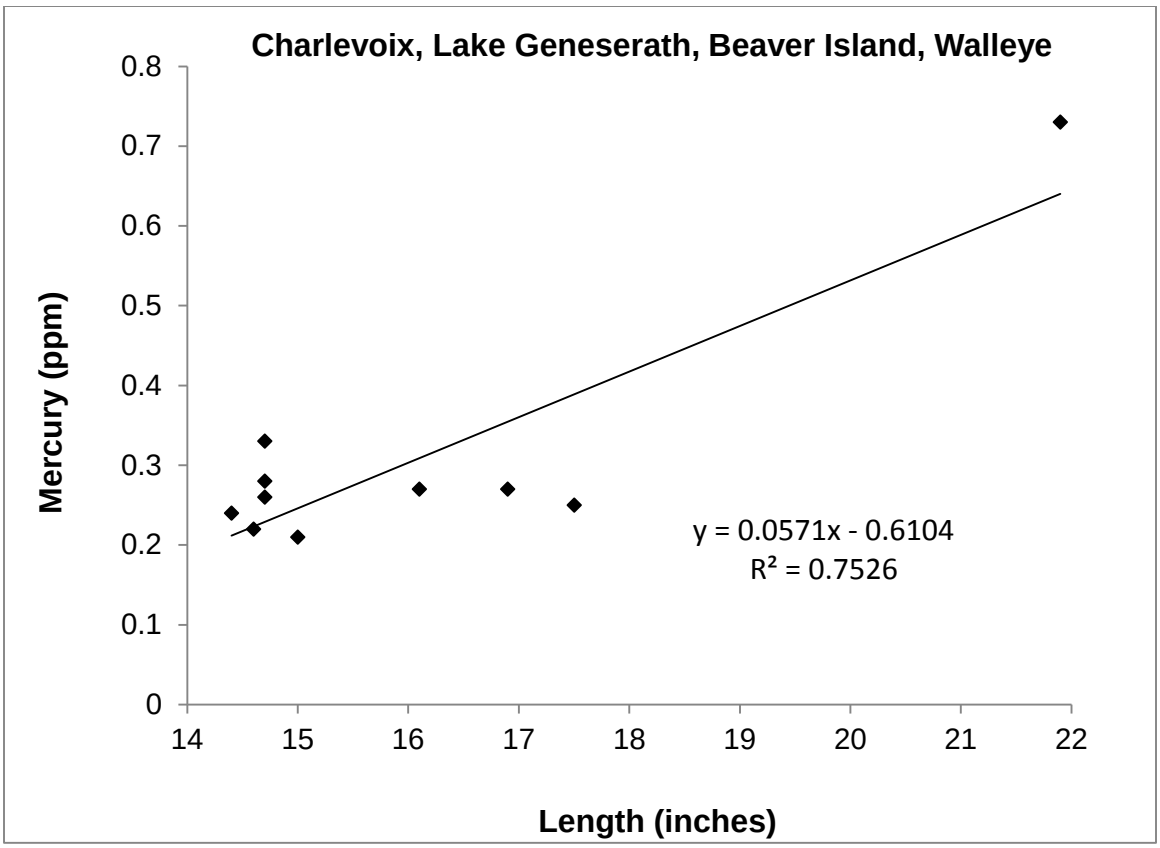
Final meal category based on UCL: 2

Existing Advisory: Lake Geneserath walleye are covered by the statewide advisory: No one should eat more than 2 meals of per month of walleye smaller than 20 inches or more than 1 meal per month of those fish larger than 20 inches.

Recommendation: No one should eat more than 2 meals of per month of walleye smaller than 20 inches or more than 1 meal per month of those fish larger than 20 inches.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.19	4
16	0.30	2
18	0.42	2
20	0.53	2
22	0.65	1
24	0.76	1
26	0.87	1

Shaded area denotes extrapolated estimates


Charlevoix, Lake Geneserath, Beaver Island, Walleye
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
14
15
16
17
18
19
20
21
22
Length (inches)
y = 0.0571x - 0.6104
R² = 0.7526

Northern Pike **Six Mile Lake** **Charlevoix 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
2003	2003	10	17.3	na*	17.3	24.1

Datasets available: 2003

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.37	0.21	0.52	0.46	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.412	0.358

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
--	--	--	--	--	--	--

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	--	--	--	--	--

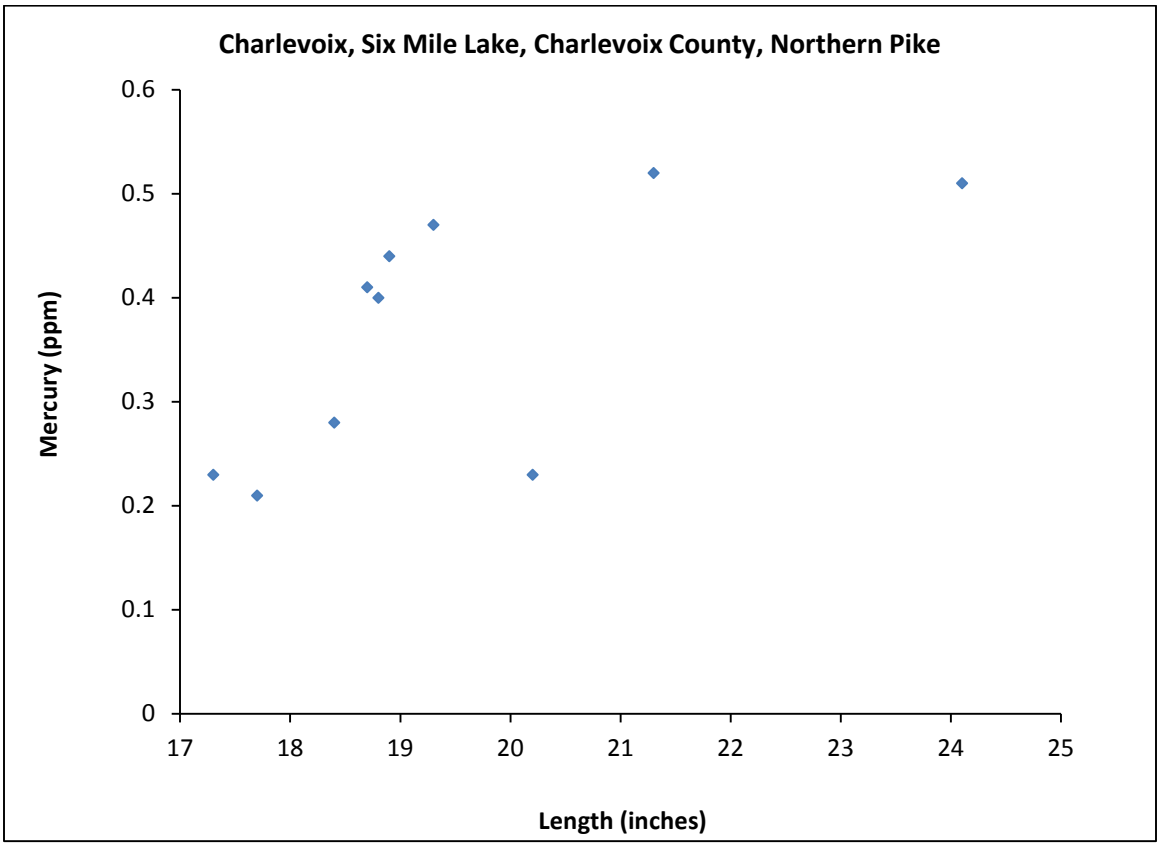
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

* - there is no minimum size limit on Six Mile Lake northern pike

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

Recommendation: No one should eat more than 2 meals per month of Six Mile Lake 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 of the fish was limited.


Charlevoix, Six Mile Lake, Charlevoix County, Northern Pike
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
17
18
19
20
21
22
23
24
25
Length (inches)

Largemouth & Smallmouth Bass | **Thumb Lake** | **Charlevoix County**

Hg Analysis:

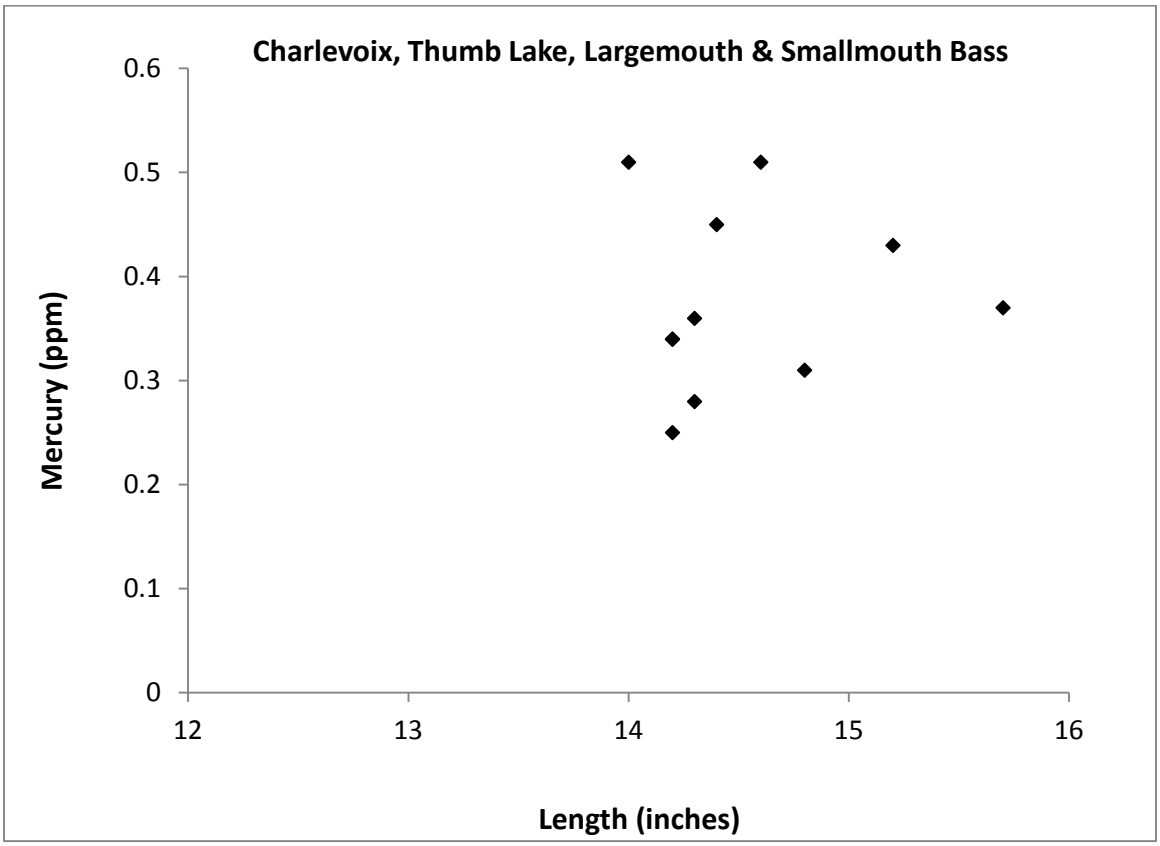
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2008	2008	12	13	14	14.2	15.7	
Datasets available: 2008							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	11	0.38		0.25	0.51	0.44	2
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.177	0.269					

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 (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:**			**2**

Existing Advisory: Thumb Lake largemouth and smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Thumb 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 was applied as the length range was limited.


Charlevoix, Thumb Lake, Largemouth & Smallmouth Bass
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
12
13
14
15
16
Length (inches)

Brown Bullhead **Walloon Lake** **Charlevoix County**
Yellow Bullhead

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	2006	11	8.7	na	8.7	13.4

Datasets available: 2000, 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	11	0.10	0.06	0.21	0.13	8

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.340	0.217

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	2006	11	8.7	na	8.7	13.4

Datasets available: 2000, 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	11	0.001	0.001	0.004	0.002	16
DDT	11	0.002	0.001	0.005	0.003	16
Chlordane	11	ND	--	--	--	--
Toxaphene	11	ND	--	--	--	--

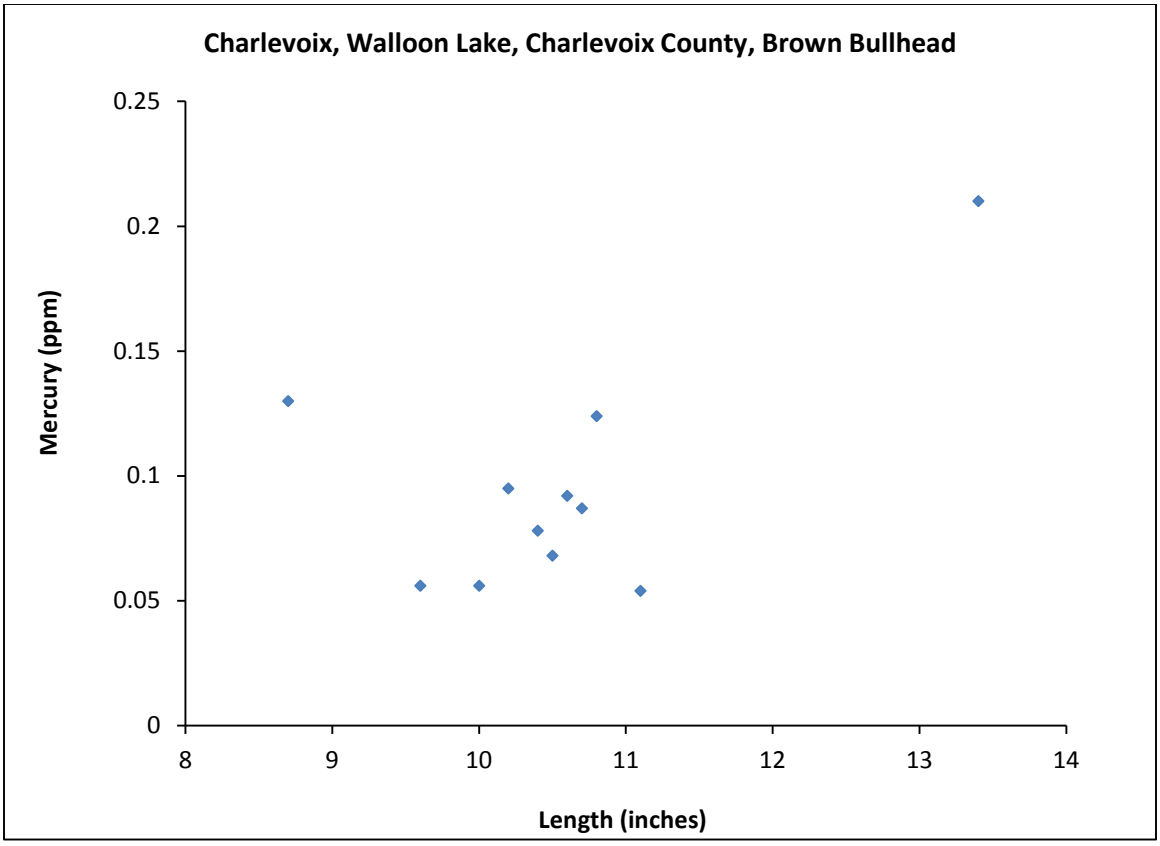
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.675*	0.675*
DDT	0.283	0.167
Chlordane	--	--
Toxaphene	--	--

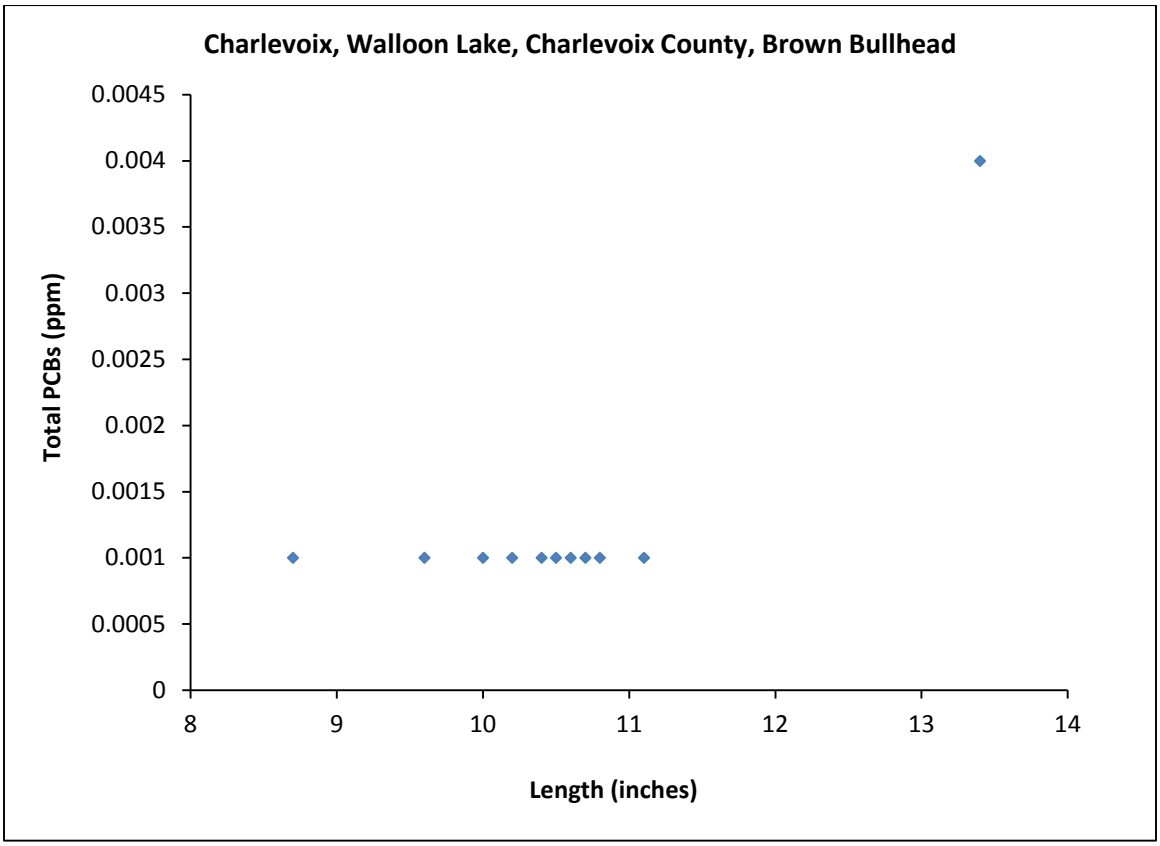
*Regression driven by single point

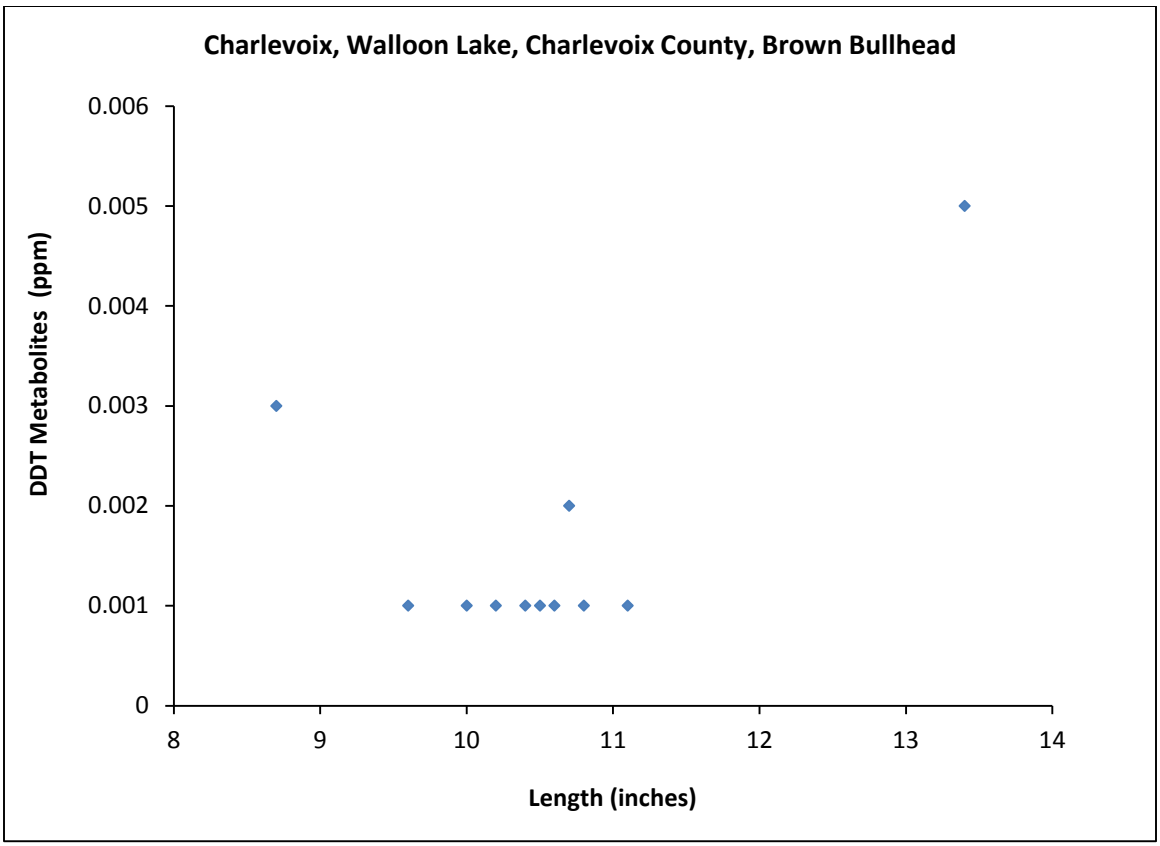
Final meal category based on UCL: 8

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

Recommendation: No one should eat more than 8 meals per month of Walloon Lake bullhead due to mercury.


Charlevoix, Walloon Lake, Charlevoix County, Brown Bullhead
Mercury (ppm)
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
14
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Brown Bullhead
Total PCBs (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
8
9
10
11
12
13
14
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Brown Bullhead
DDT Metabolites (ppm)
0.006
0.005
0.004
0.003
0.002
0.001
0
8
9
10
11
12
13
14
Length (inches)

Northern Pike **Walloon Lake** **Charlevoix 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	20.7	24	23.5	34.1

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.38	0.23	0.71	0.49	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.058	0.135

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: --

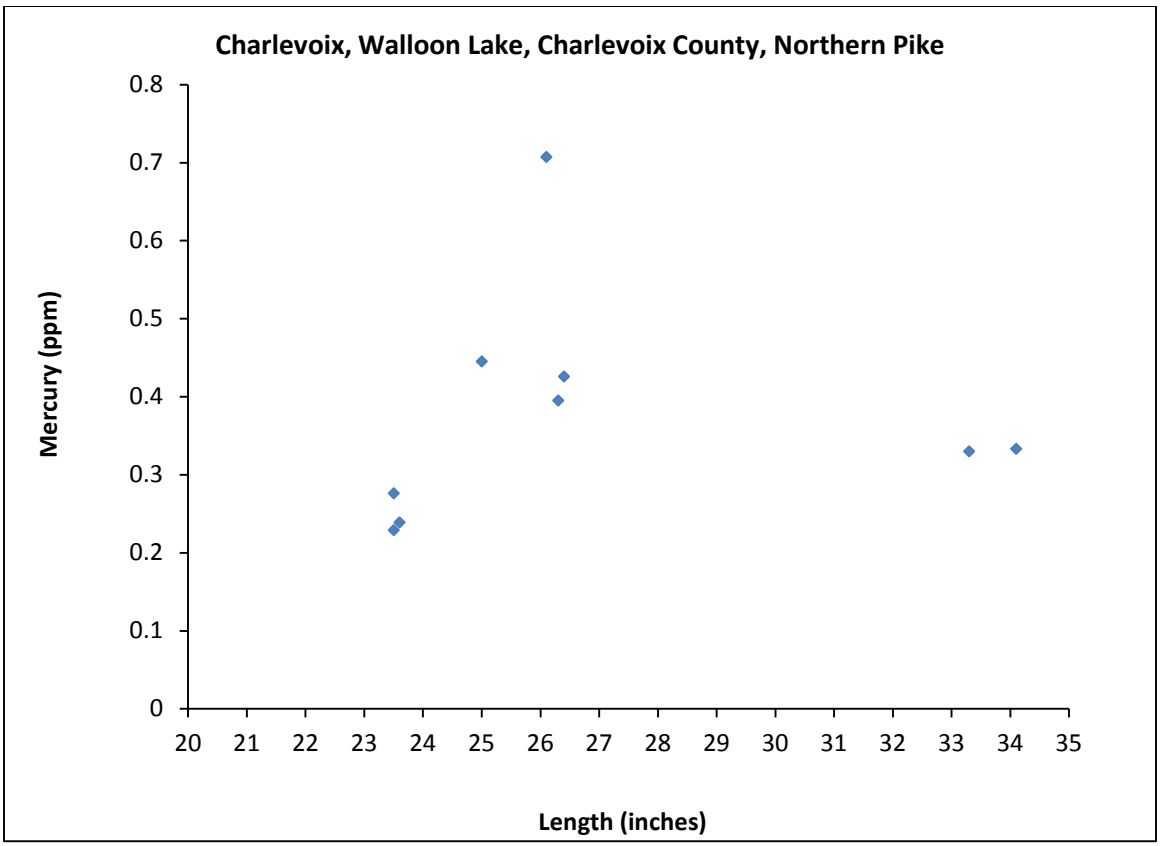
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of Walloon 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 as the sample size about 30 inches was limited.


Charlevoix, Walloon Lake, Charlevoix County, Northern Pike
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
Length (inches)

Rainbow Trout **Walloon Lake** **Charlevoix 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	9	17.1	12	17.1	23.6

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.12	0.10	0.17	0.14	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.029	0.014

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	2006	9	17.1	12	17.1	23.6

Datasets available: 2006

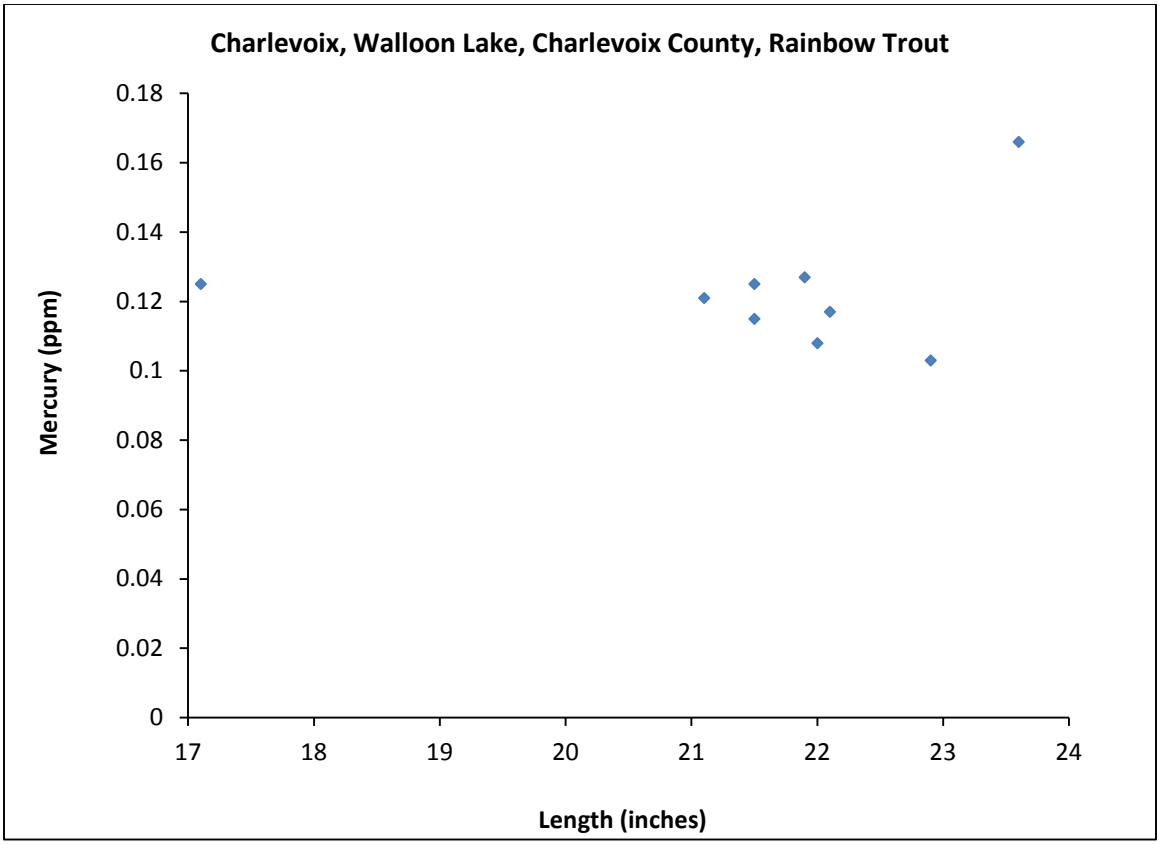
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.03	0.02	0.05	0.04	4
DDT	9	0.02	0.01	0.03	0.03	16
Chlordane	9	0.003	0.001	0.006	0.004	--
Toxaphene	9	ND	--	--	--	--

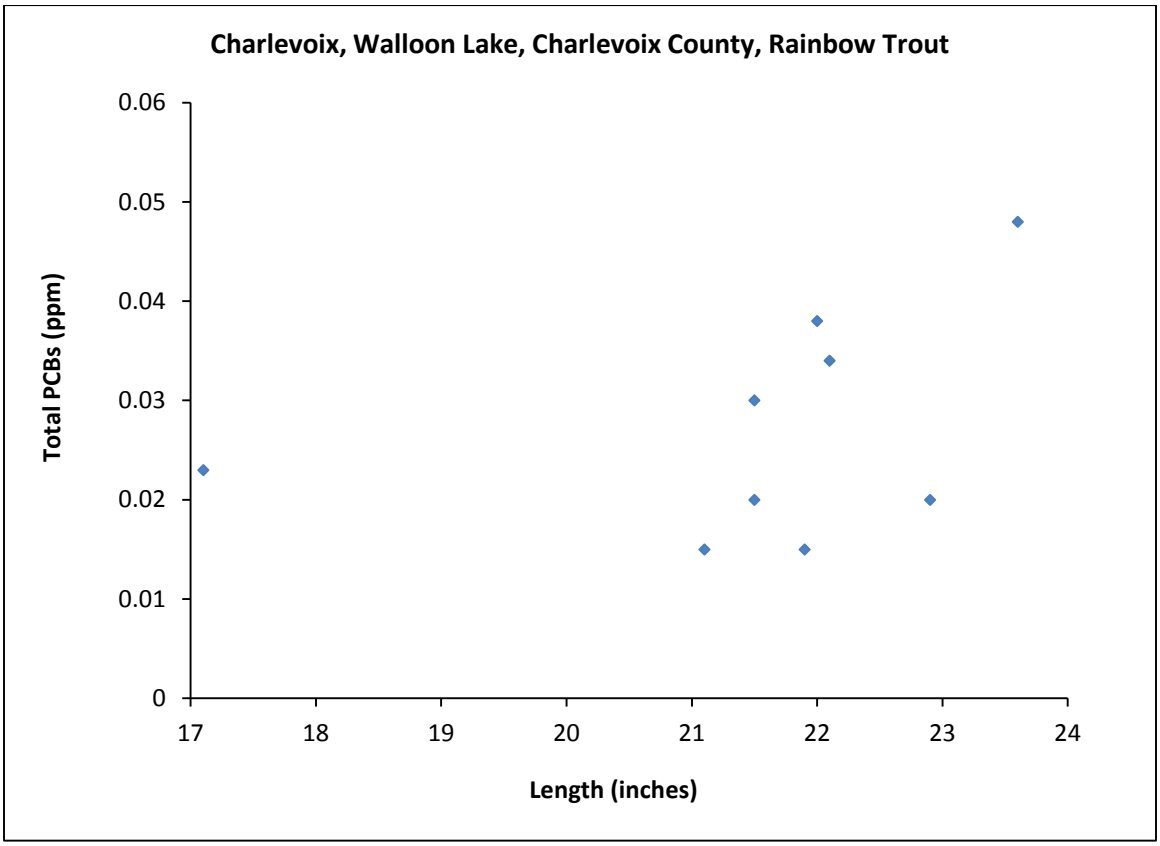
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.139	0.091
DDT	0.269	0.317
Chlordane	0.140	0.106
Toxaphene	--	--

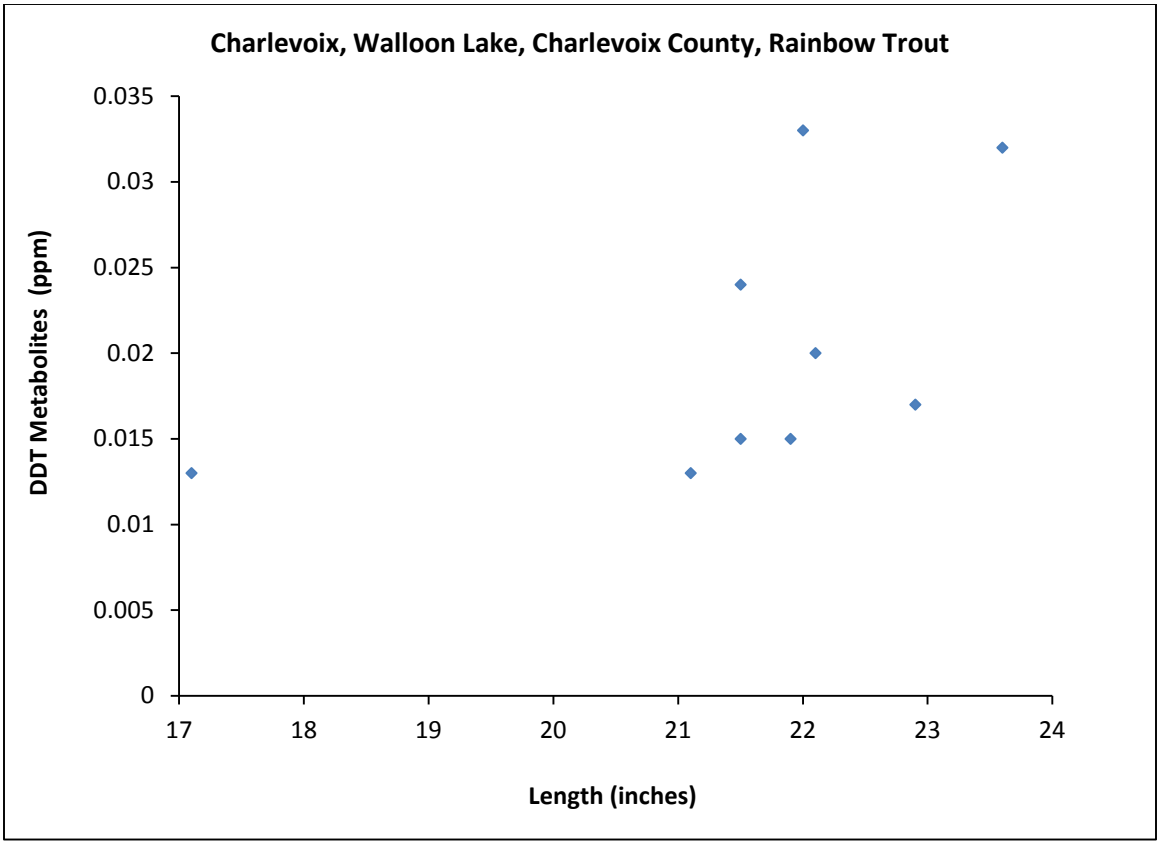
Final meal category based on UCL: 4

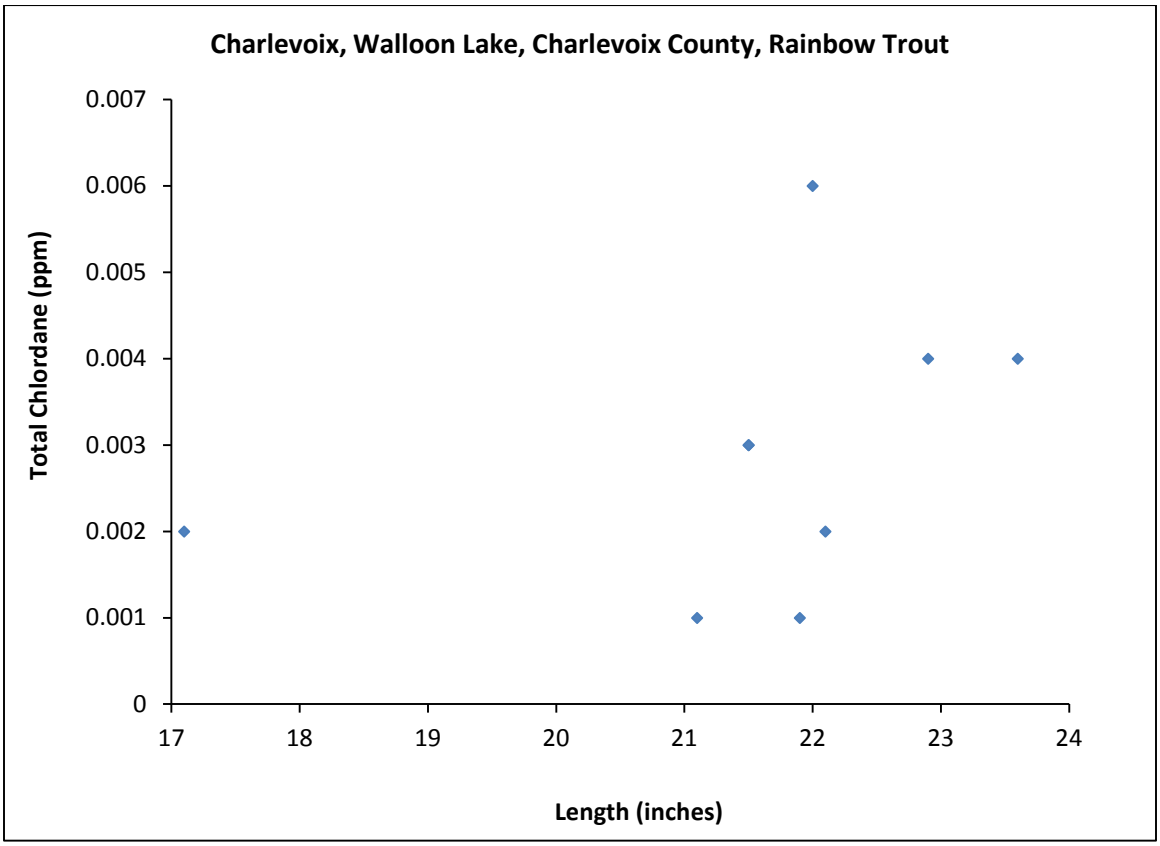
Existing Advisory: There are no current consumption advisories for Walloon Lake rainbow trout.

Recommendation: No one should eat more than 4 meals per month of Walloon Lake rainbow trout due to mercury or PCBs.


Charlevoix, Walloon Lake, Charlevoix County, Rainbow Trout
Mercury (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
17
18
19
20
21
22
23
24
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Rainbow Trout
Total PCBs (ppm)
0.06
0.05
0.04
0.03
0.02
0.01
0
17
18
19
20
21
22
23
24
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Rainbow Trout
DDT Metabolites (ppm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
17
18
19
20
21
22
23
24
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Rainbow Trout
Total Chlordane (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
17
18
19
20
21
22
23
24
Length (inches)

Rock Bass **Walloon Lake** **Charlevoix County**

Hg Analysis:

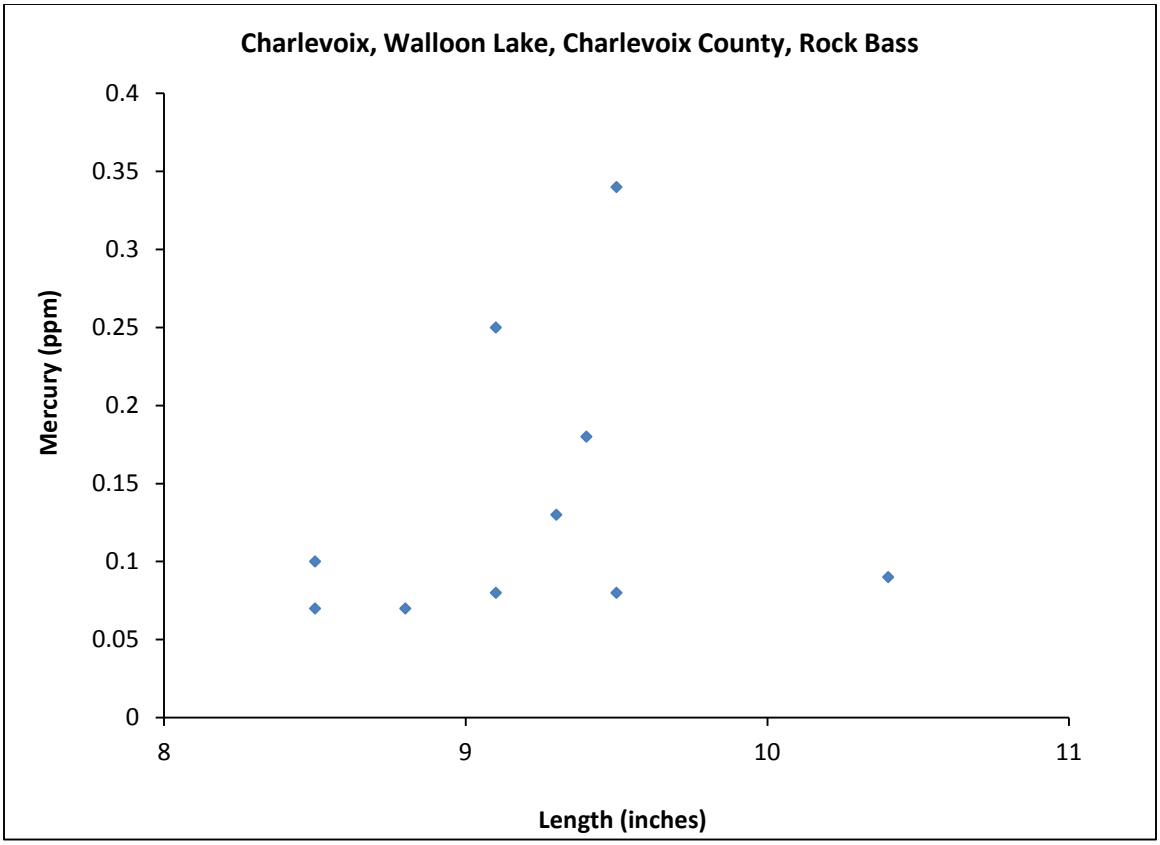
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2000	10	8.5	na	8.5	10.4	
Datasets available:	2000						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.14		0.07	0.34	0.2	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.037	0.049					

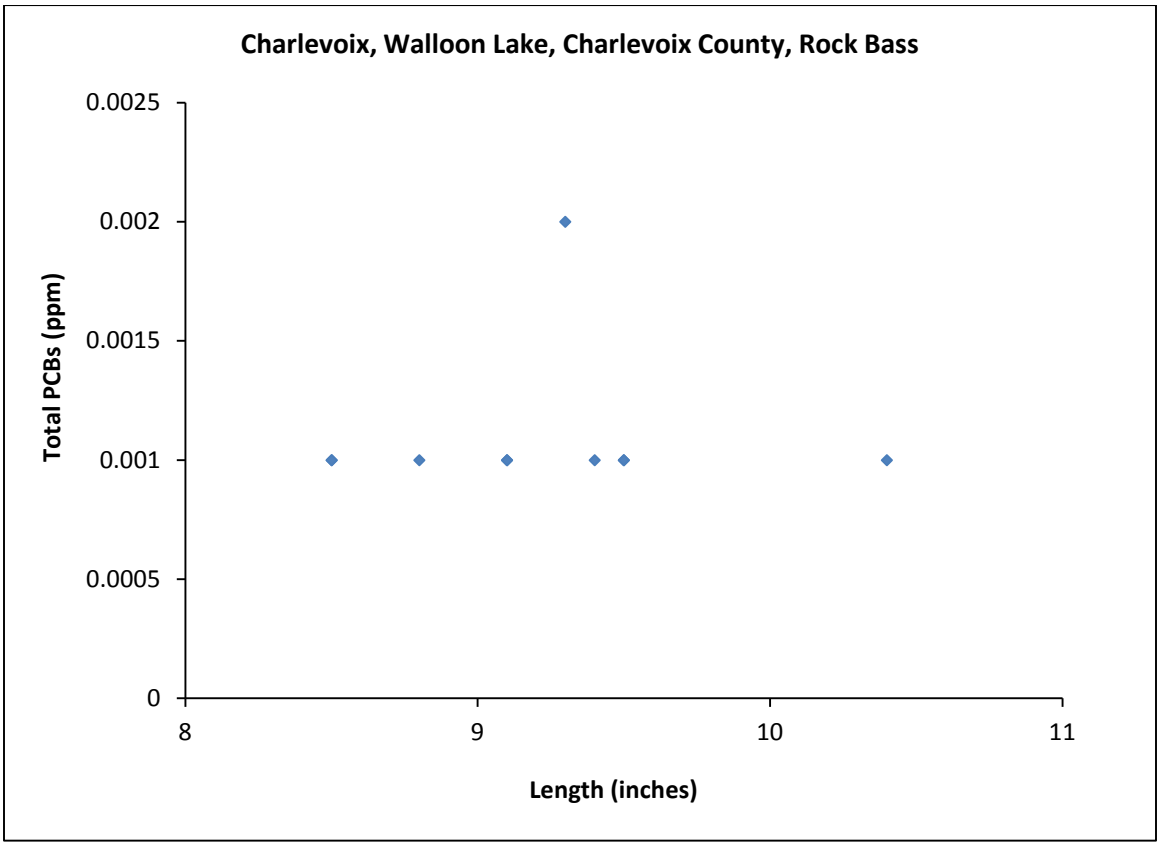
Organics Analysis:

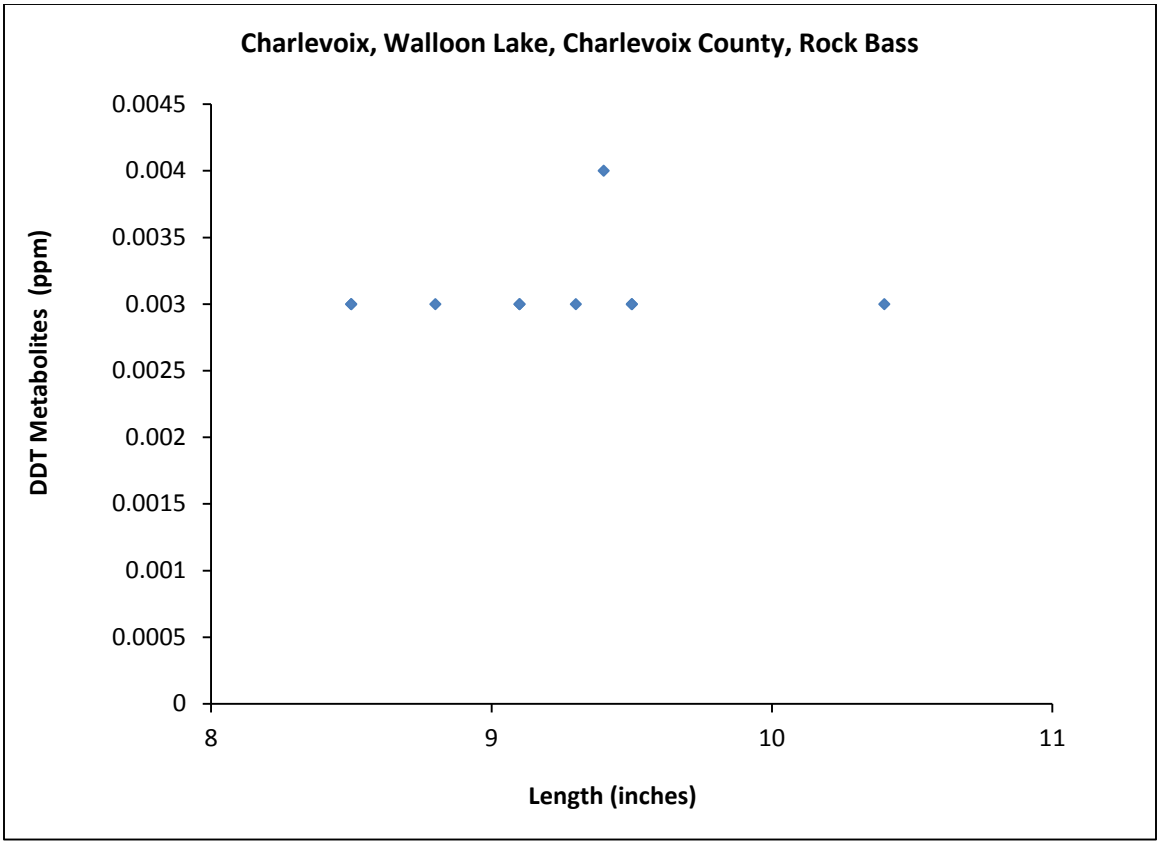
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2000	10	8.5	na	8.5	10.4	
Datasets available:	2000						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.001		0.001	0.002	0.001	16
DDT	10	0.003		0.003	0.004	0.003	16
Chlordane	10	ND		--	--	--	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.003	0.003					
DDT	0.014	0.014					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**4**

Existing Advisory: Walloon Lake rock bass are covered by the statewide mercury advisory.

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


Charlevoix, Walloon Lake, Charlevoix County, Rock Bass
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Rock Bass
Total PCBs (ppm)
0.0025
0.002
0.0015
0.001
0.0005
0
8
9
10
11
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Rock Bass
DDT Metabolites (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
8
9
10
11
Length (inches)

Smallmouth Bass **Walloon Lake** **Charlevoix 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	2006	19	7.9	14	14	16.1

Datasets available: 1987, 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.33	0.20	0.49	0.38	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.508	0.629

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 (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	--	--

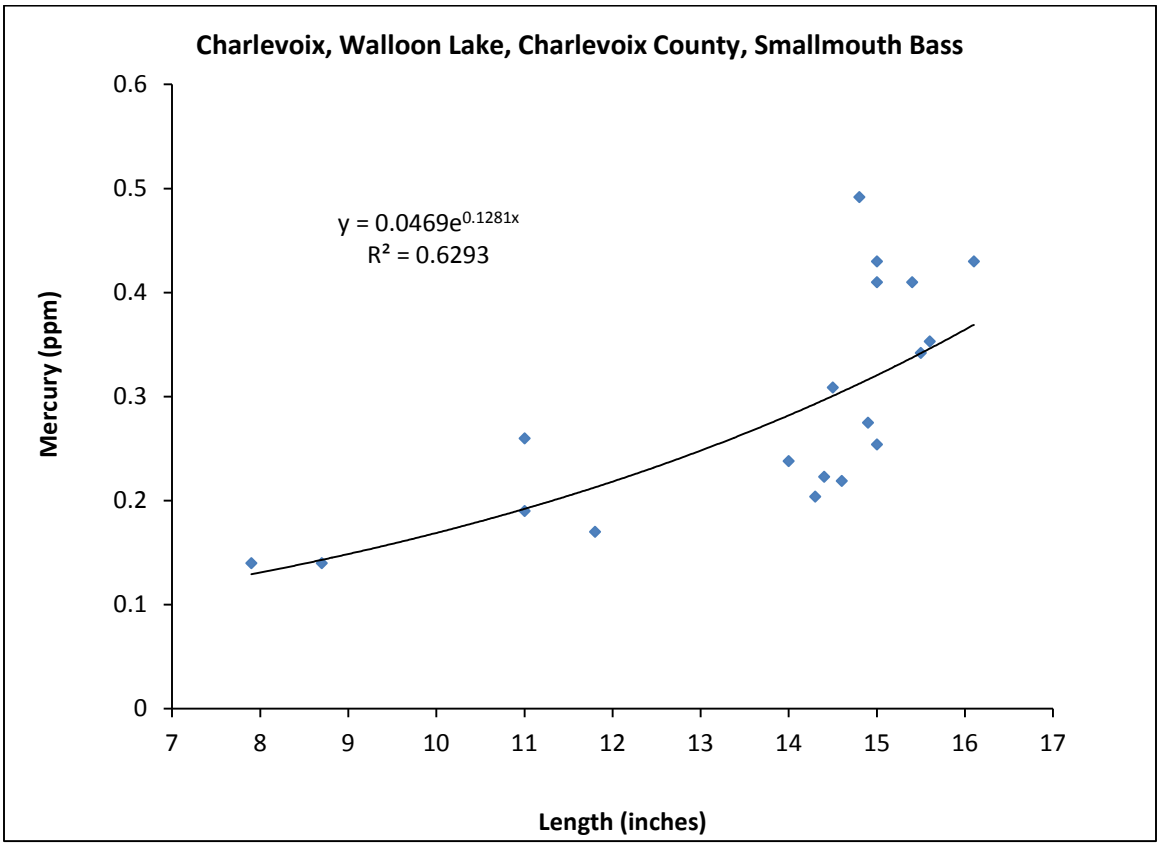
Final meal category based on UCL: 2

Existing Advisory: Walloon Lake smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Walloon 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 length range was limited.

Length (Inches)	Regression Equation Estimate (ppm)	Meal Category
14	0.282	2
15	0.320	2
16	0.364	2
17	0.414	2
18	0.471	2
19	0.535	1
20	0.608	1
21	0.691	1
22	0.785	1

Shaded area denotes extrapolated estimates


Charlevoix, Walloon Lake, Charlevoix County, Smallmouth Bass
y = 0.0469e^0.1281x
R² = 0.6293
Mercury (ppm)
Length (inches)
0
0.1
0.2
0.3
0.4
0.5
0.6
7
8
9
10
11
12
13
14
15
16
17

Walleye **Walloon Lake** **Charlevoix 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	15	15	15	25.6

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.30	0.13	0.85	0.45	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.836	0.902

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 (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	--	--

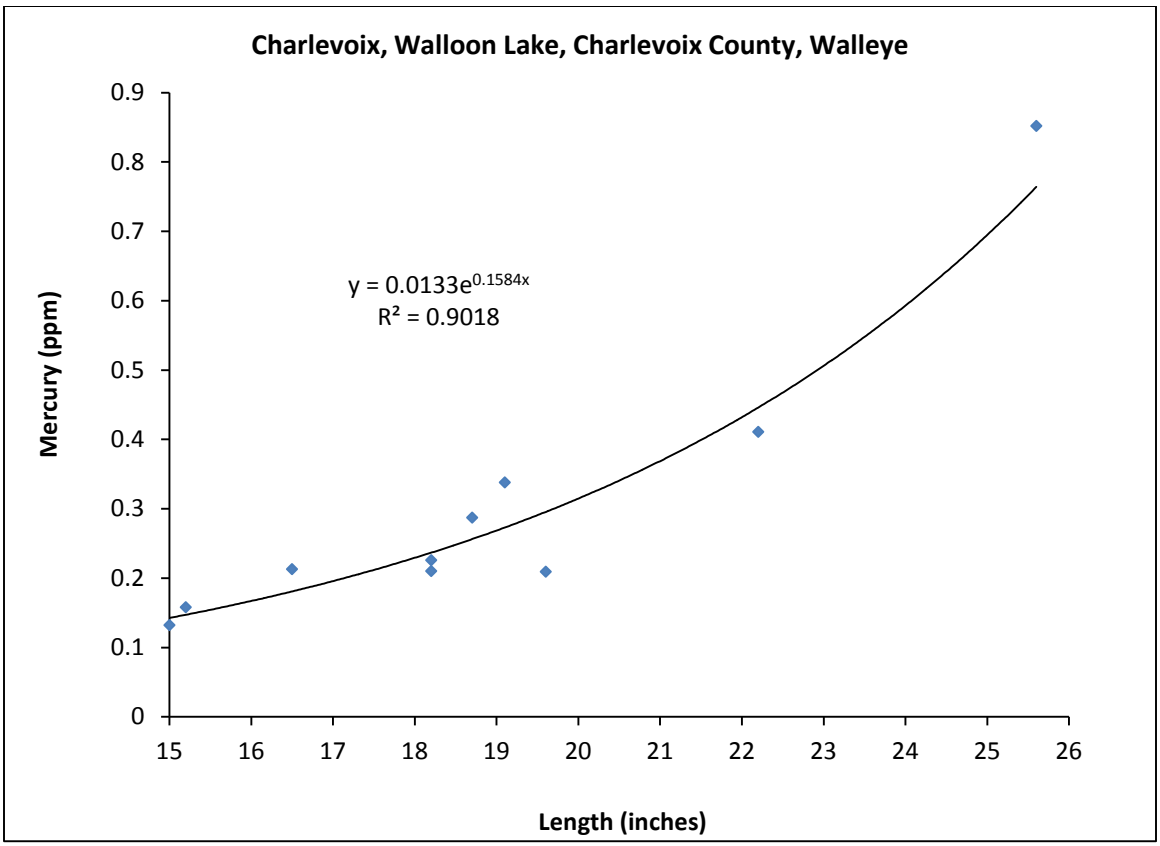
Final meal category based on UCL: 2

Existing Advisory: Women and children should not eat more than 1 meal per month of Walloon Lake walleye larger than 22 inches due to mercury.

Recommendation: No one should eat more than 2 meals per month of Walloon Lake walleye smaller than 22 inches or more than 1 meal per month of those fish larger than 22 inches due to mercury.

Length (Inches)	Regression Equation Estimate (ppm)	Meal Category
14	0.12	8
16	0.17	4
18	0.23	4
20	0.32	2
22	0.43	2
24	0.60	1
26	0.82	1
28	1.12	0.5
30	1.54	0.5

Shaded area denotes extrapolated estimates


Charlevoix, Walloon Lake, Charlevoix County, Walleye
y = 0.0133e^0.1584x
R² = 0.9018
Mercury (ppm)
Length (inches)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
15
16
17
18
19
20
21
22
23
24
25
26

White Sucker **Walloon Lake** **Charlevoix County**

Hg Analysis:

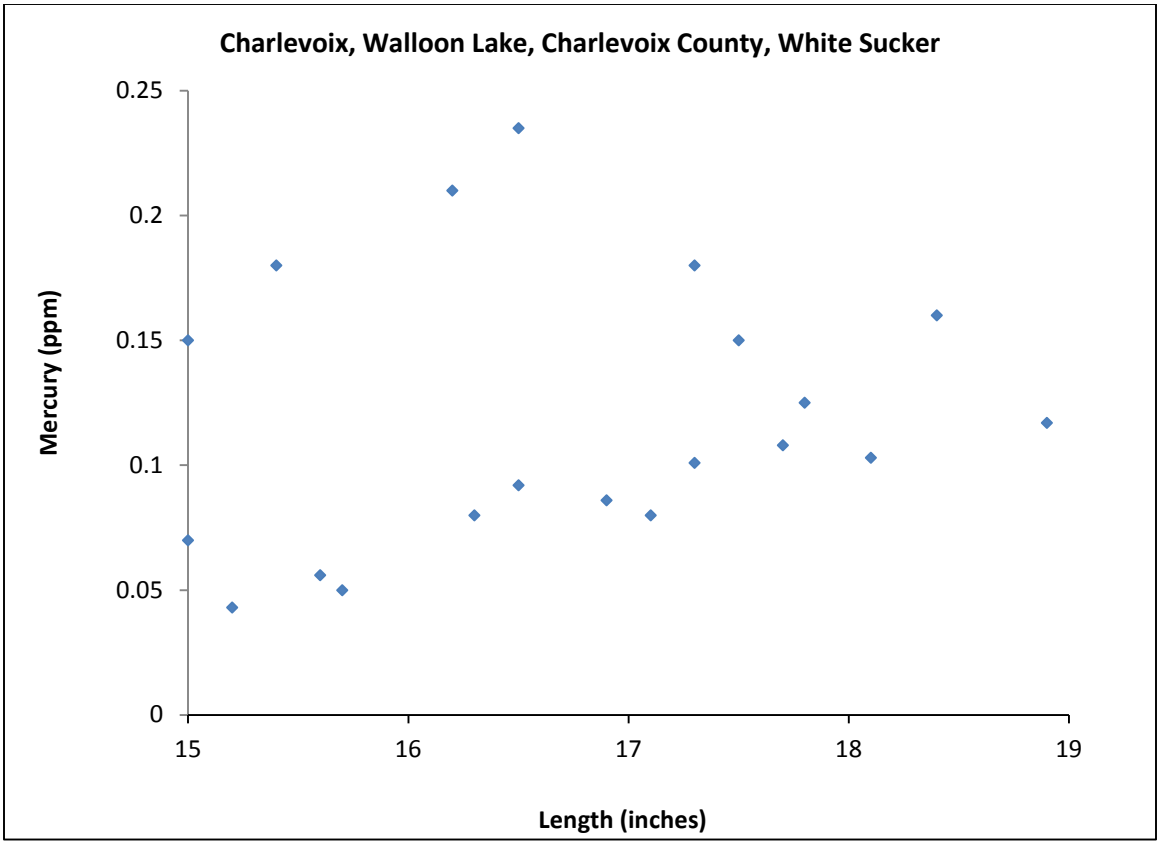
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2006	20	15	na	15	18.9	
Datasets available:	2006						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	20	0.12		0.04	0.24	0.14	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.035	0.102					

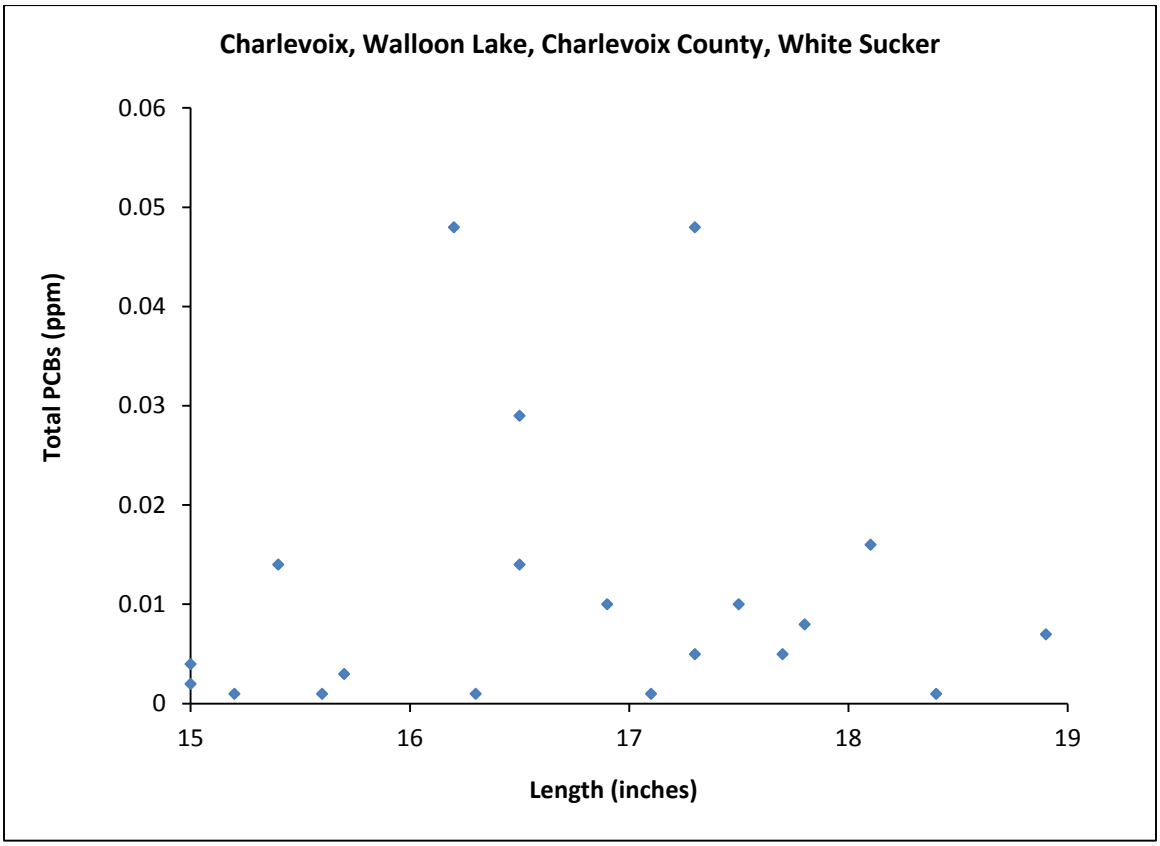
Organics Analysis:

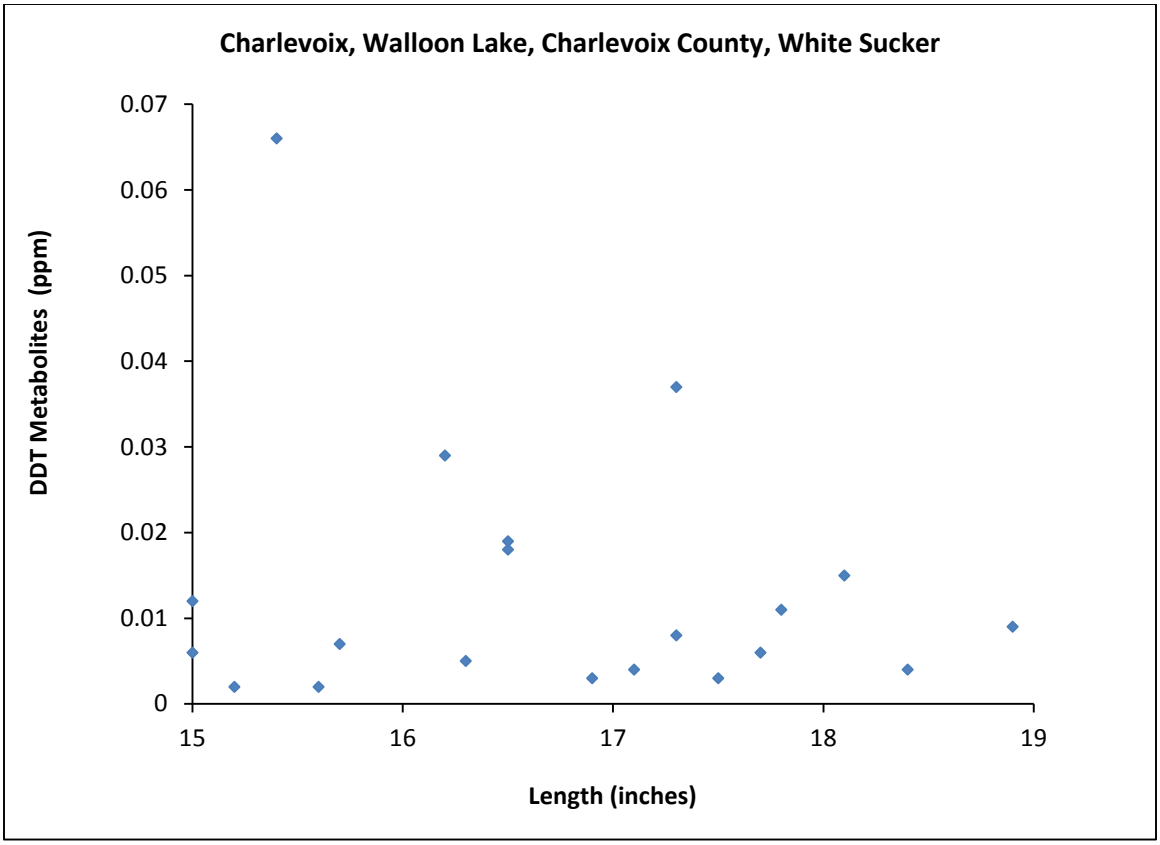
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2006	20	15	na	15	18.9	
Datasets available:	2006						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	20	0.01		0.001	0.05	0.02	12
DDT	20	0.01		0.002	0.07	0.02	16
Chlordane	20	0.002		0.001	0.003	0.003	--
Toxaphene	20	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.006	0.040					
DDT	0.031	0.000					
Chlordane	0.110	0.112					
Toxaphene	--	--		**Final meal category based on UCL:**			**4**

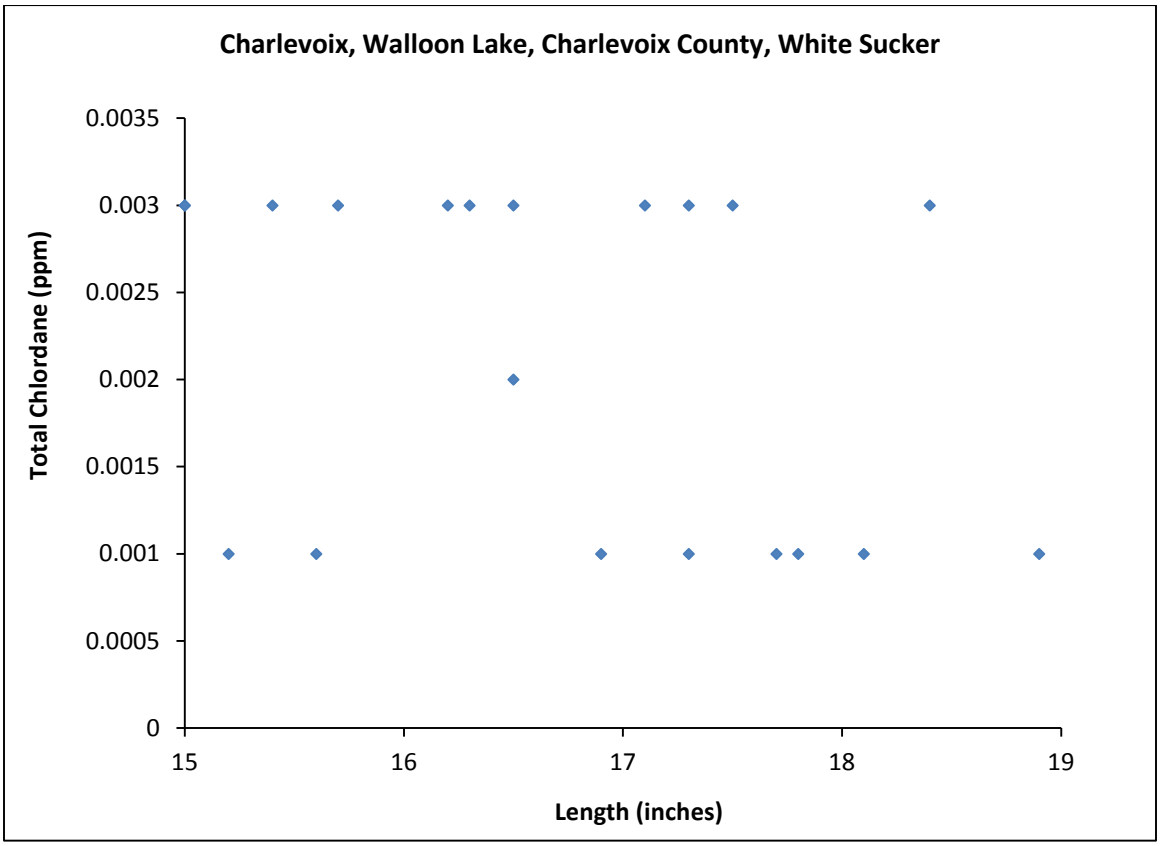
Existing Advisory: There are no current consumption advisories for Walloon Lake white sucker.

Recommendation: No one should eat more than 4 meals per month of Walloon Lake sucker due to mercury. PCBs would cause an advisory.


Charlevoix, Walloon Lake, Charlevoix County, White Sucker
Mercury (ppm)
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, White Sucker
Total PCBs (ppm)
0.06
0.05
0.04
0.03
0.02
0.01
0
15
16
17
18
19
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, White Sucker
DDT Metabolites (ppm)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
15
16
17
18
19
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, White Sucker
Total Chlordane (ppm)
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
15
16
17
18
19
Length (inches)

Yellow Perch **Walloon Lake** **Charlevoix County**

Hg Analysis:

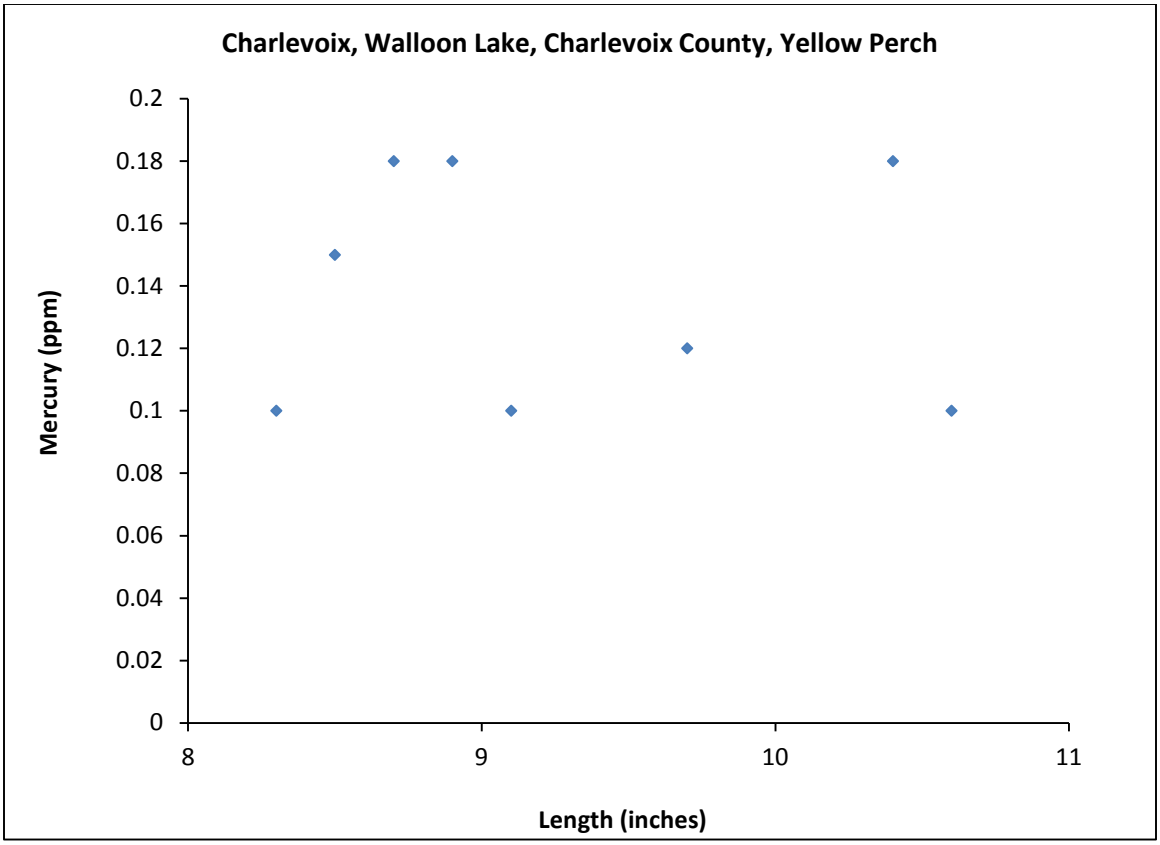
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2000	8	8.3	na	8.3	10.6	
Datasets available:	2000						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	8	0.14		0.10	0.18	0.17	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.005	0.006					

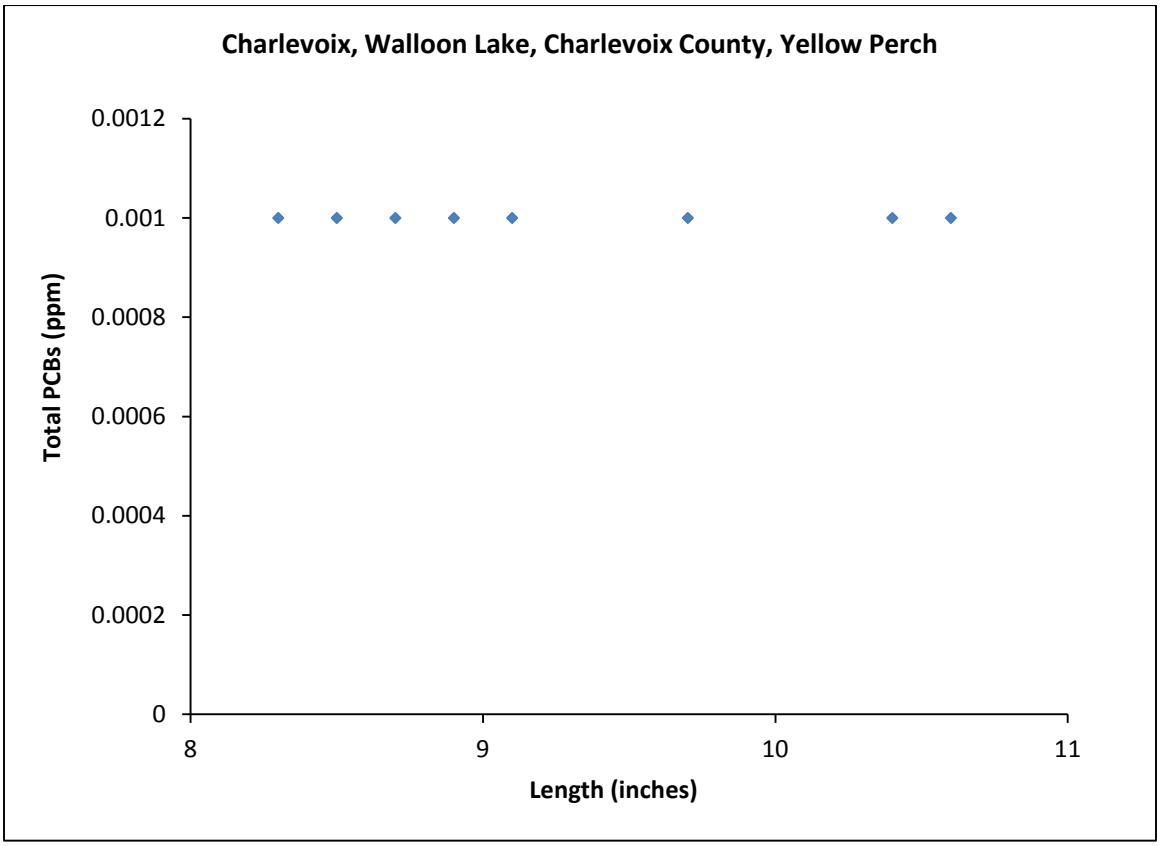
Organics Analysis:

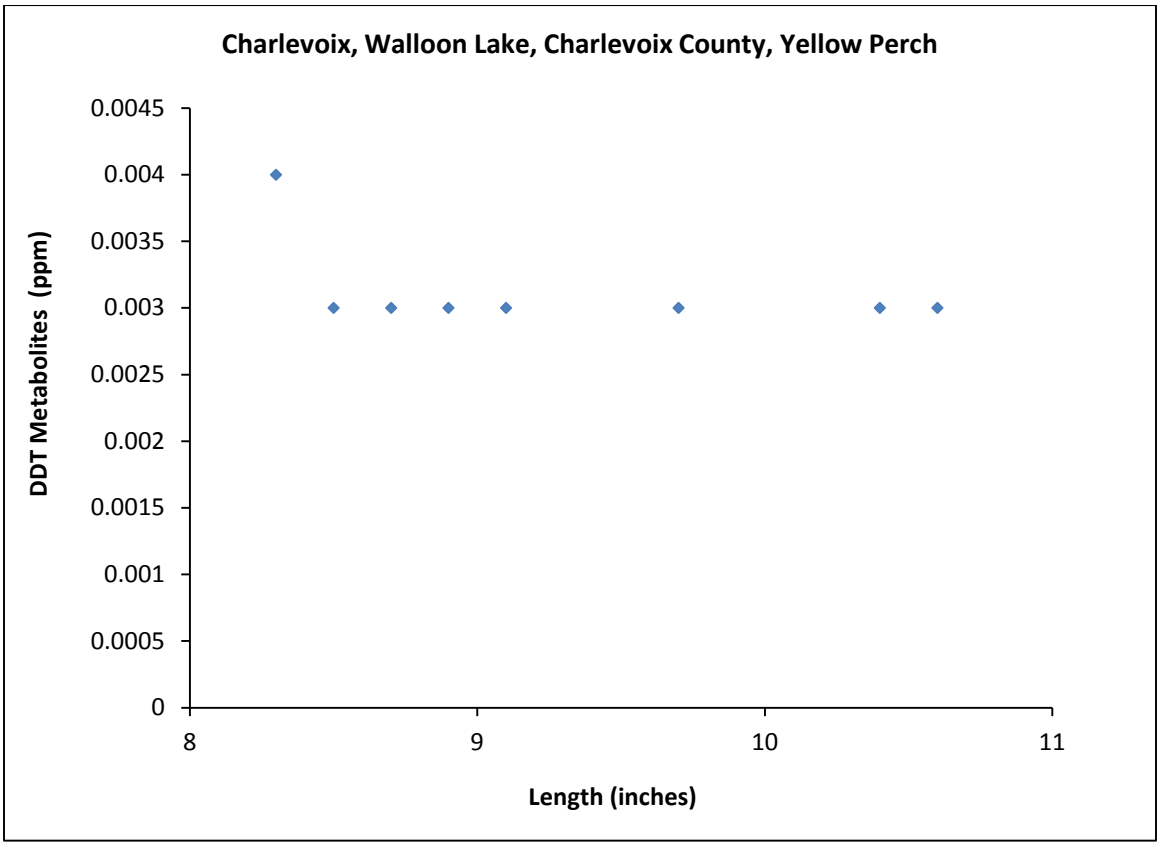
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2000	2000	8	8.3	na	8.3	10.6	
Datasets available:	2000						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	8	0.001		0.001	0.001	0.001	16
DDT	8	0.003		0.003	0.004	0.003	16
Chlordane	8	ND		--	--	--	--
Toxaphene	8	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	--	--					
DDT	0.207	0.207					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**4**

Existing Advisory: Walloon Lake yellow perch are covered by the statewide mercury advisory.

Recommendation: No one should eat more than 4 meals per month of Walloon Lake yellow perch due to mercury.


Charlevoix, Walloon Lake, Charlevoix County, Yellow Perch
Mercury (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
9
10
11
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Yellow Perch
Total PCBs (ppm)
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
8
9
10
11
Length (inches)


Charlevoix, Walloon Lake, Charlevoix County, Yellow Perch
DDT Metabolites (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
8
9
10
11
Length (inches)

Clare County

Largemouth Bass **Budd Lake** **Clare 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	7	14	14	14	17.3

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.12	0.09	0.17	0.14	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.656	0.569

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	--	--

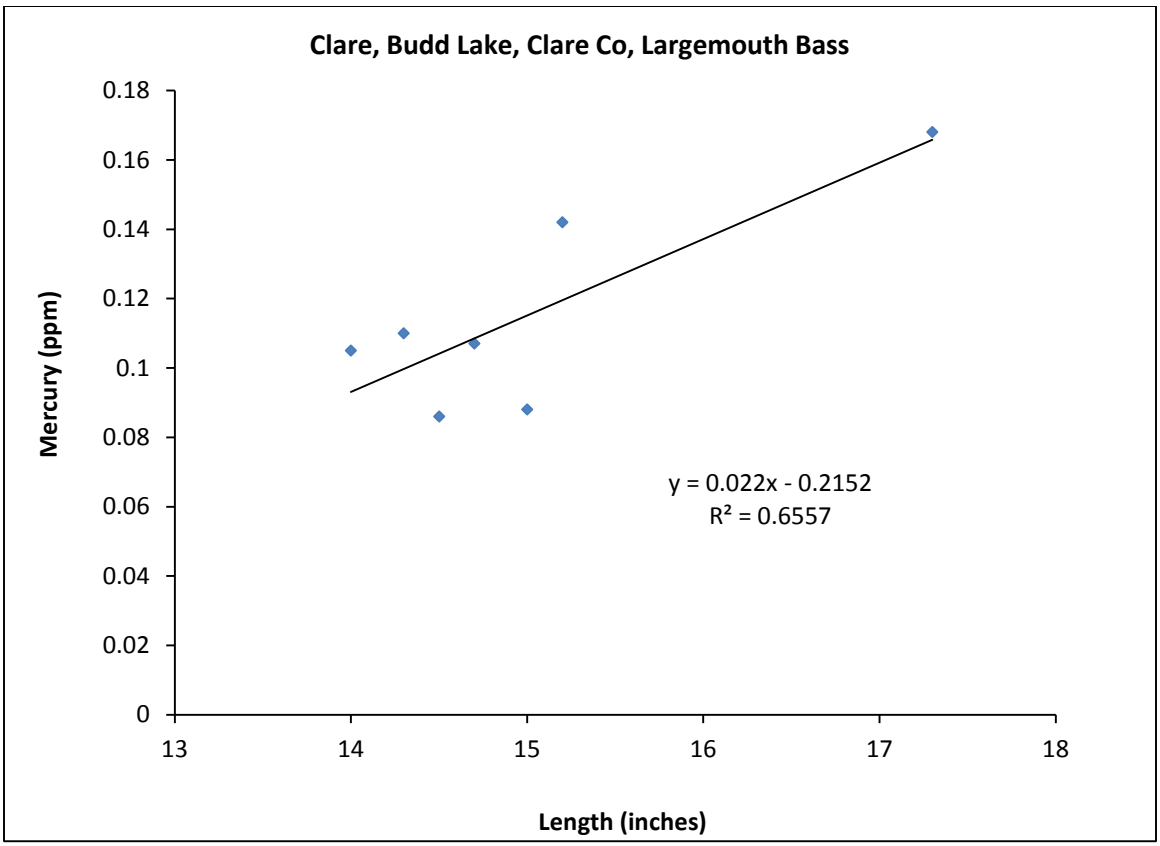
Final meal category based on UCL: 4

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

Recommendation: No one should eat more than 4 meals per month of Budd Lake largemouth or smallmouth bass smaller than 18 inches or more than 2 meals per month of those fish larger than 18 inches due to mercury. The statewide length break was applied as the size of the fish was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.093	8
15	0.115	8
16	0.137	4
17	0.159	4
18	0.181	4
19	0.203	4
20	0.225	4
21	0.247	4
22	0.269	4

Shaded area denotes extrapolated estimates


Clare, Budd Lake, Clare Co, Largemouth Bass
Mercury (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
13
14
15
16
17
18
Length (inches)
y = 0.022x - 0.2152
R² = 0.6557

Largemouth Bass **Cranberry Lake** **Clare 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	13.7	14	13.7	18.2

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.58	0.25	1.00	0.72	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.388	0.522

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: --

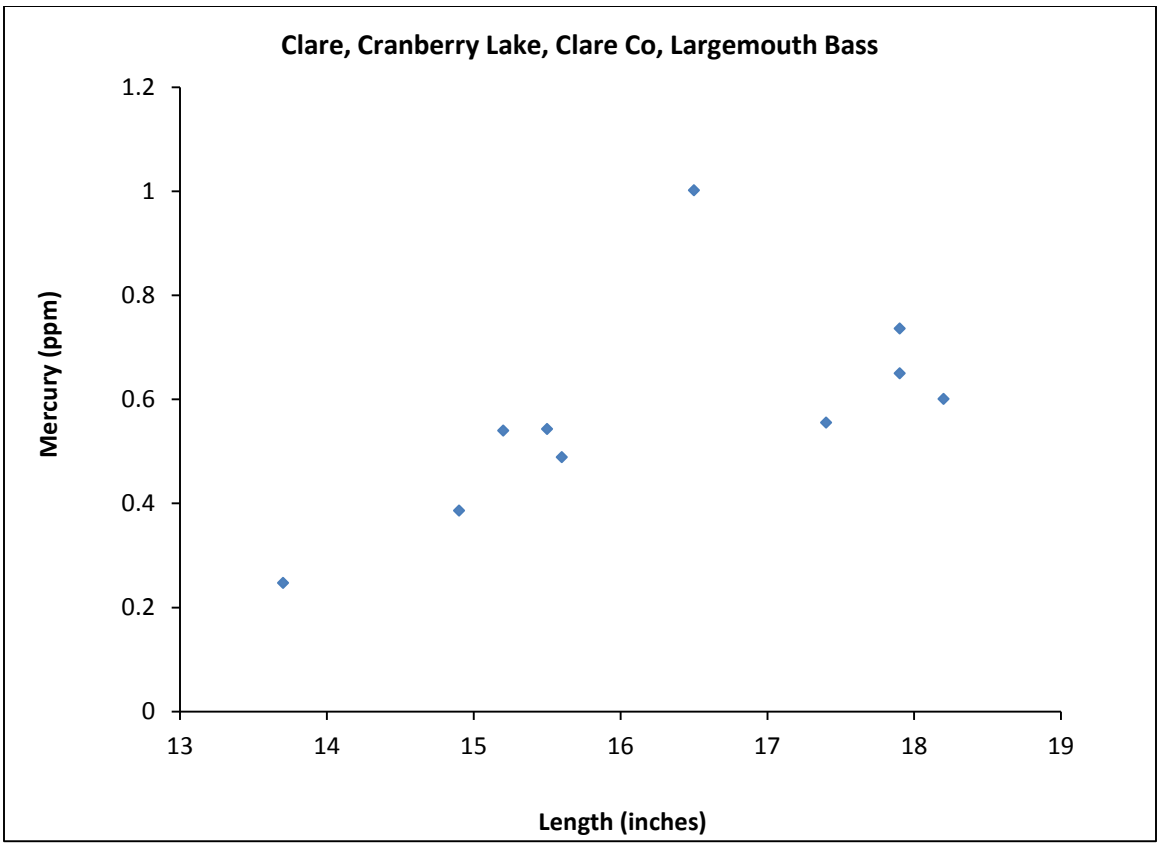
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Cranberry 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. The statewide length break was applied as the size of the fish was limited.


Clare, Cranberry Lake, Clare Co, Largemouth Bass
Mercury (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
13
14
15
16
17
18
19
Length (inches)

Largemouth Bass **Crooked Lake** **Clare 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	9	13.9	14	13.9	15.2

Datasets available: 2008

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.32	0.18	0.42	0.47	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.216	0.336

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: --

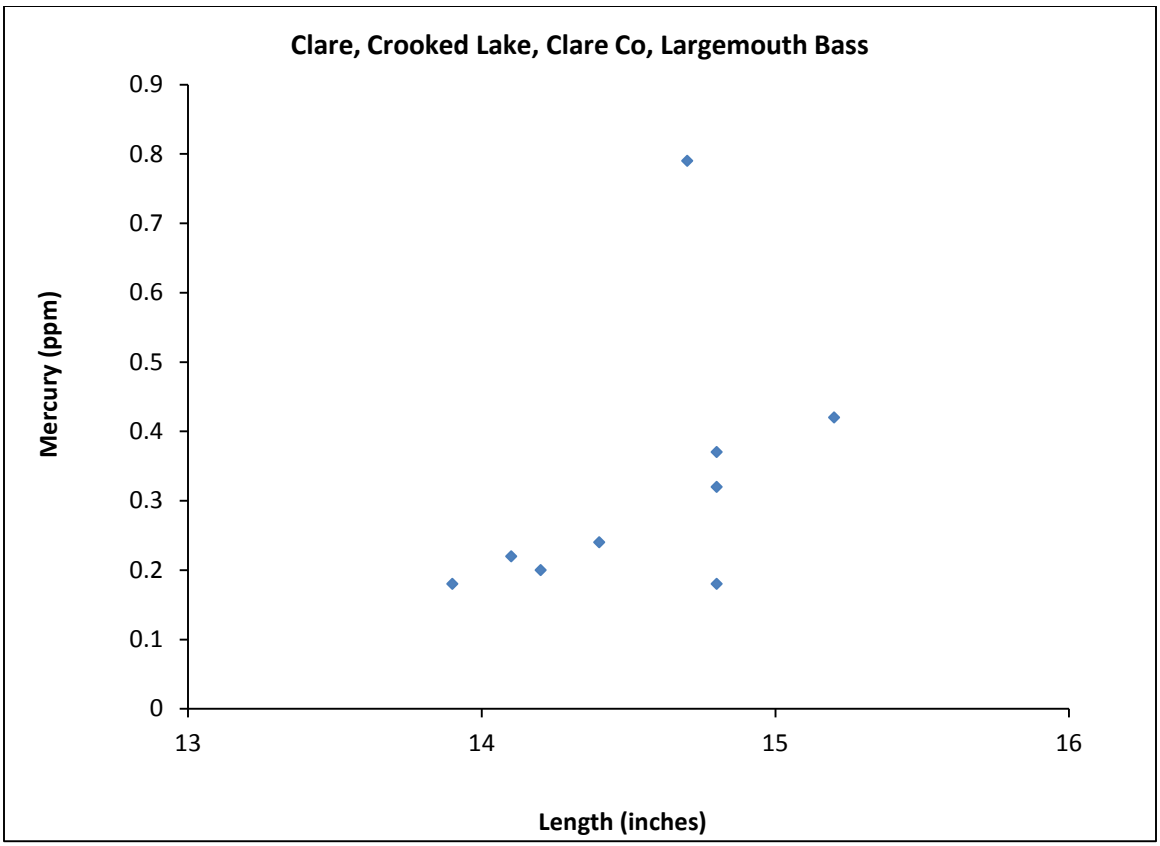
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of Crooked 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. The statewide length break was applied as the size of the fish was limited.


Clare, Crooked Lake, Clare Co, Largemouth Bass
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
13
14
15
16
Length (inches)

Largemouth Bass **Five Lakes** **Clare 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	2004	14	13.9	14	13.9	17

Datasets available: 1991, 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	14	0.354	0.23	0.63	0.41	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.076	0.106

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	14.6	14	14.6	16.5

Datasets available: 1991

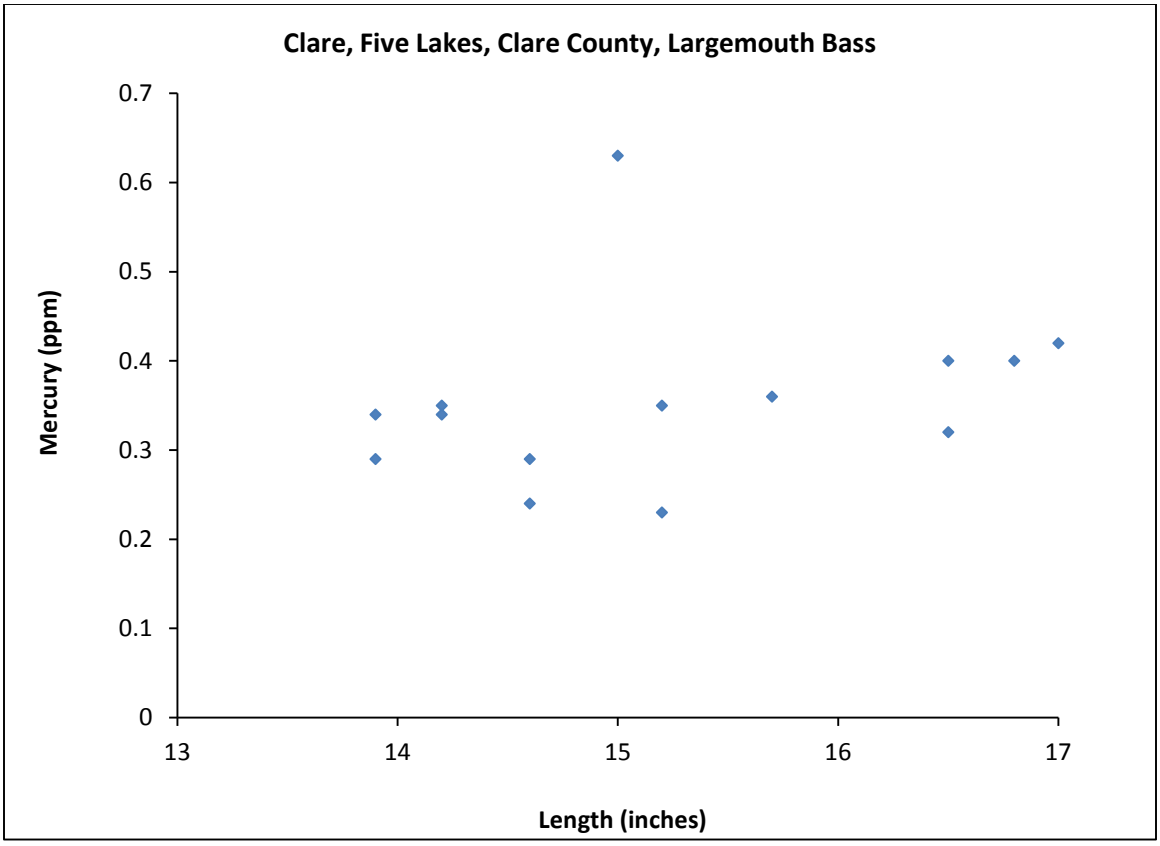
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.008	0.003	0.010	0.010	16
Chlordane	5	0.003	0.003	0.003	0.003	--
Toxaphene	5	ND	--	--	--	--

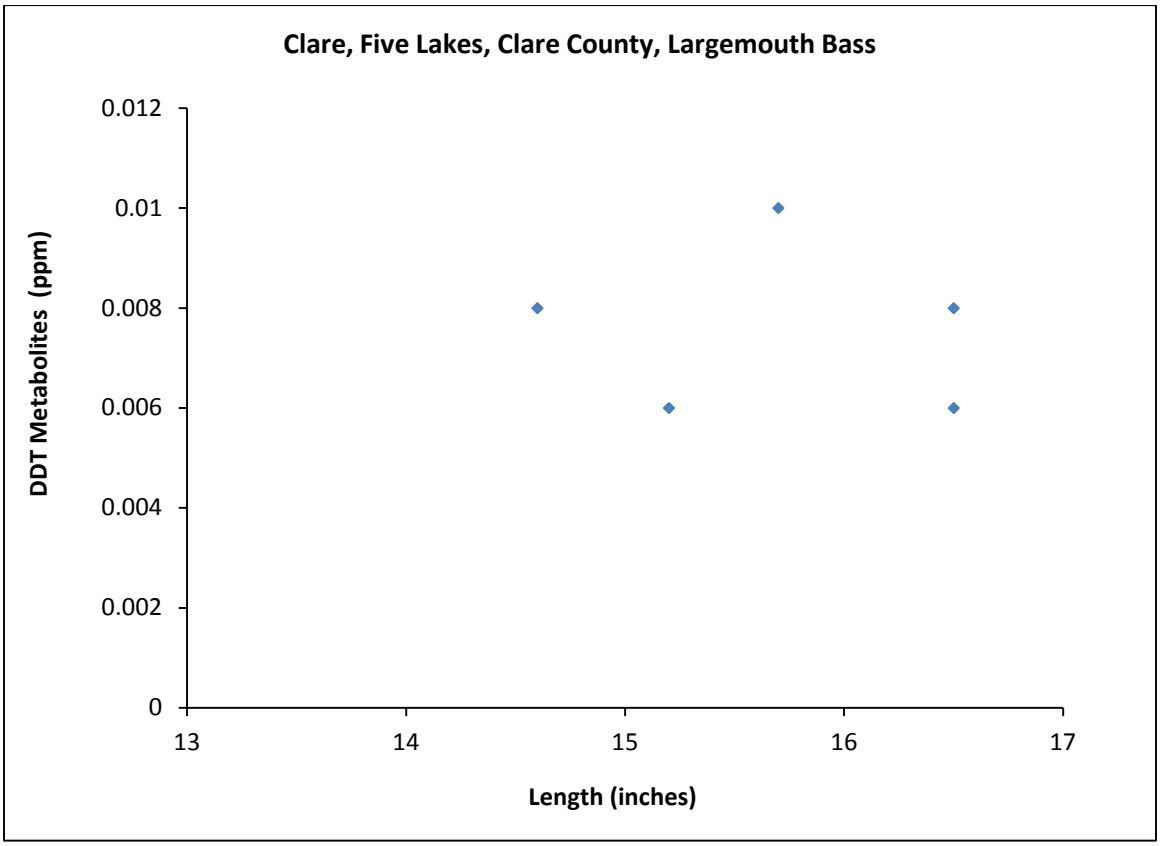
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.012	0.014
Chlordane	--	--
Toxaphene	--	--

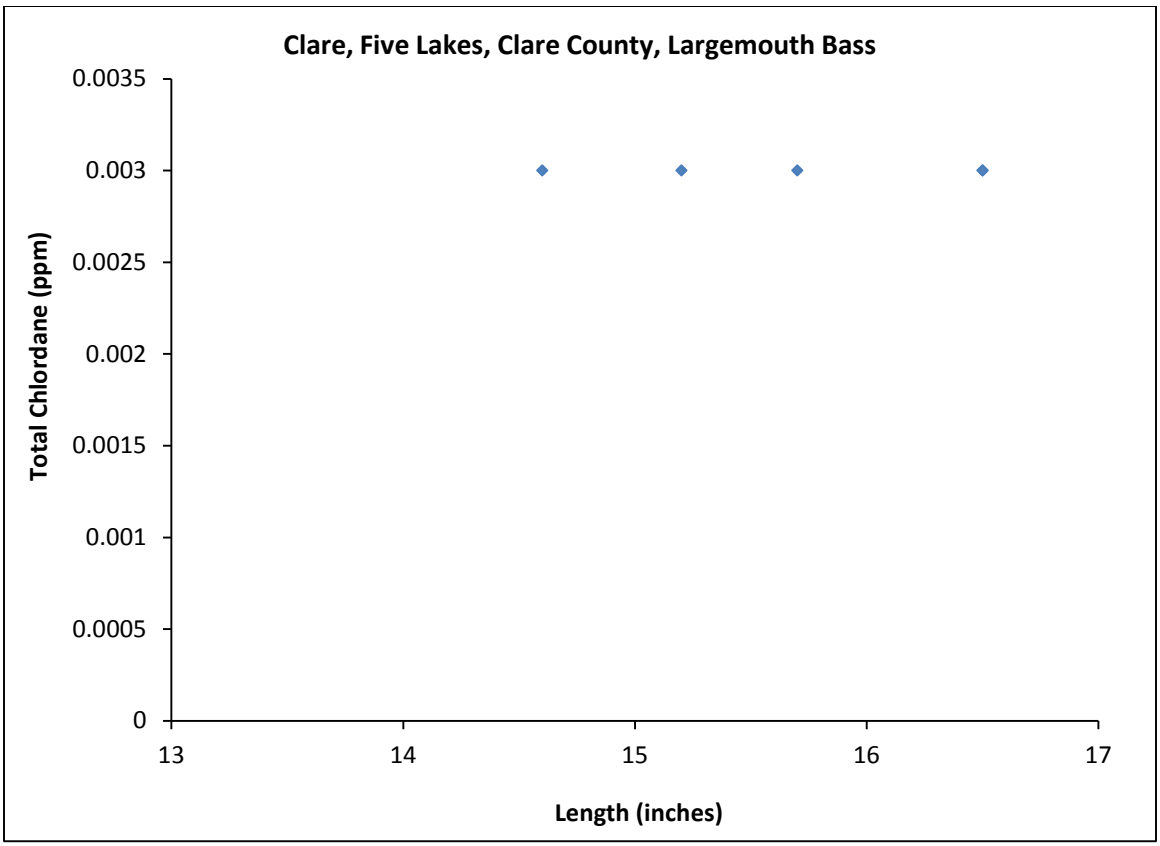
Final meal category based on UCL: 2

Existing Advisory: Five Lakes largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Five Lakes 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. The statewide length break was applied as the size of the fish was limited


Clare, Five Lakes, Clare County, Largemouth Bass
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
13
14
15
16
17
Length (inches)


Clare, Five Lakes, Clare County, Largemouth Bass
DDT Metabolites (ppm)
0.012
0.01
0.008
0.006
0.004
0.002
0
13
14
15
16
17
Length (inches)


Clare, Five Lakes, Clare County, Largemouth Bass
Total Chlordane (ppm)
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
13
14
15
16
17
Length (inches)

Northern Pike **Five Lakes** **Clare 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	10	20.7	24	26.4	29.1

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.42	0.39	0.45	0.46	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.390	0.410

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	10	20.7	24	26.4	29.1

Datasets available: 1991

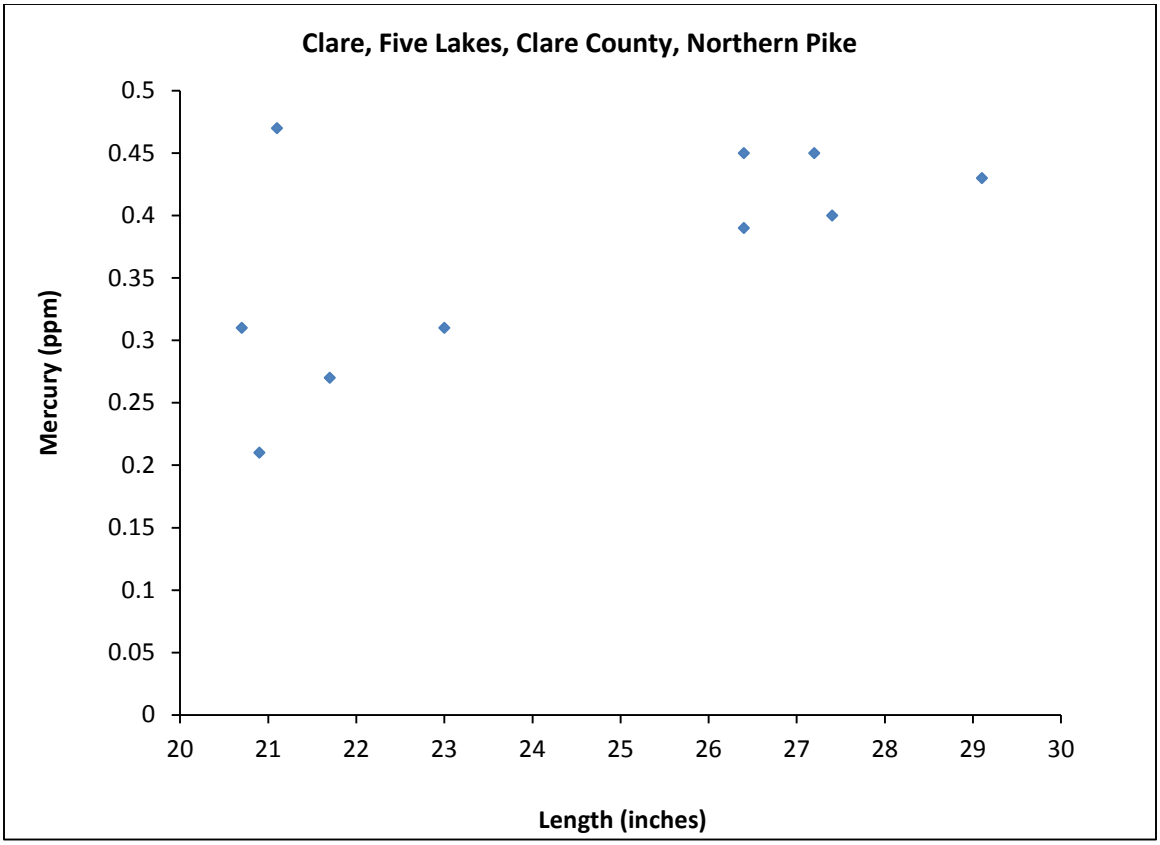
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.009	0.005	0.01	0.01	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--

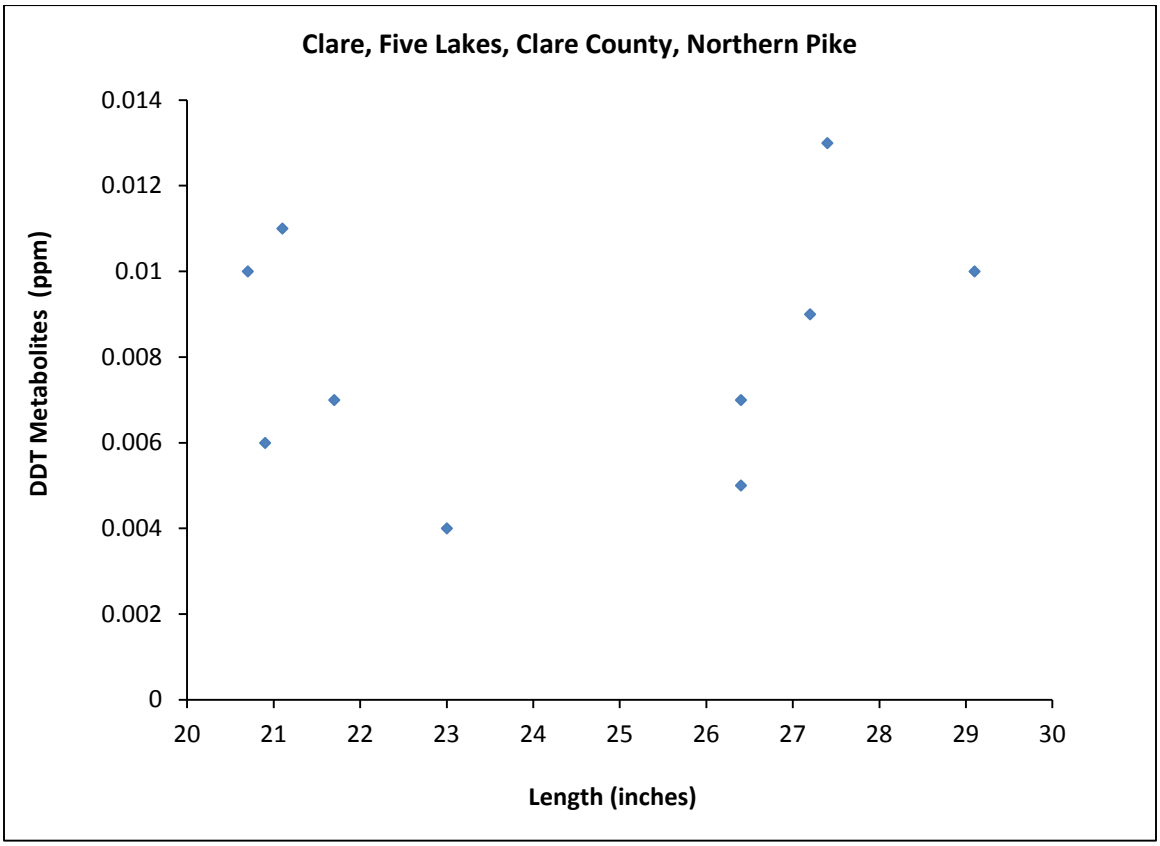
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.043	0.037
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

Existing Advisory: Five Lakes northern pike are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Five Lakes 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 of the fish was limited


Clare, Five Lakes, Clare County, Northern Pike
Mercury (ppm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
20
21
22
23
24
25
26
27
28
29
30
Length (inches)


Clare, Five Lakes, Clare County, Northern Pike
DDT Metabolites (ppm)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
20
21
22
23
24
25
26
27
28
29
30
Length (inches)

Largemouth Bass **Lily Lake** **Clare County**

Hg Analysis:

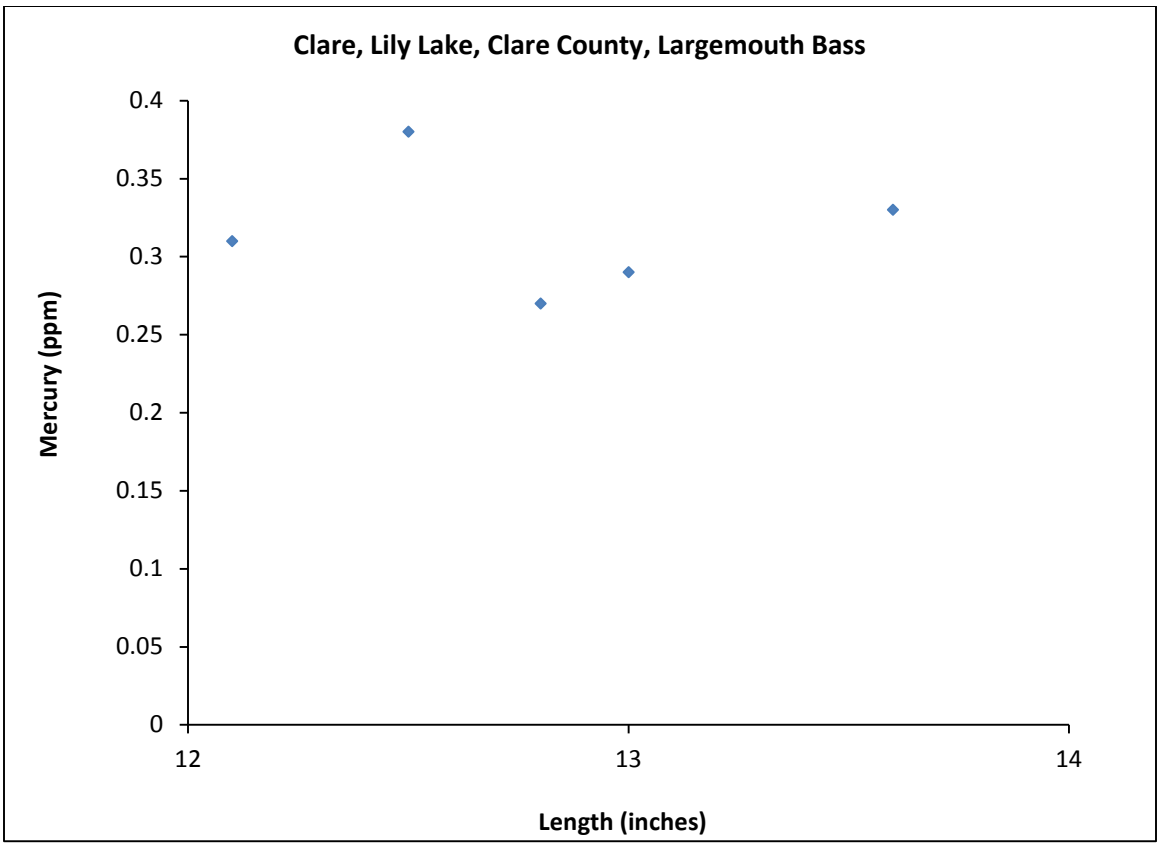
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples		
Earliest	Most Recent				Min	Max	
1990	1990	5	12.1	14	12.1	13.6	
Datasets available:	1990						
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	5	0.316		0.27	0.38	0.37	2*
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.009	0.007					

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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: Lily Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: *Size range of fish in this sample set is limited and all samples are sublegal in length, which are insufficient to recommend a waterbody-species specific guideline. Statewide guidelines apply: No one should eat more than 2 meals per month of Lily Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches.


Clare, Lily Lake, Clare County, Largemouth Bass
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
12
13
14
Length (inches)

Northern Pike **Lily Lake** **Clare 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
1990	1990	10	21.1	24	23.8	26.8

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.51	0.43	0.55	0.56	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.096	0.041

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
--	--	0				

Datasets available: --

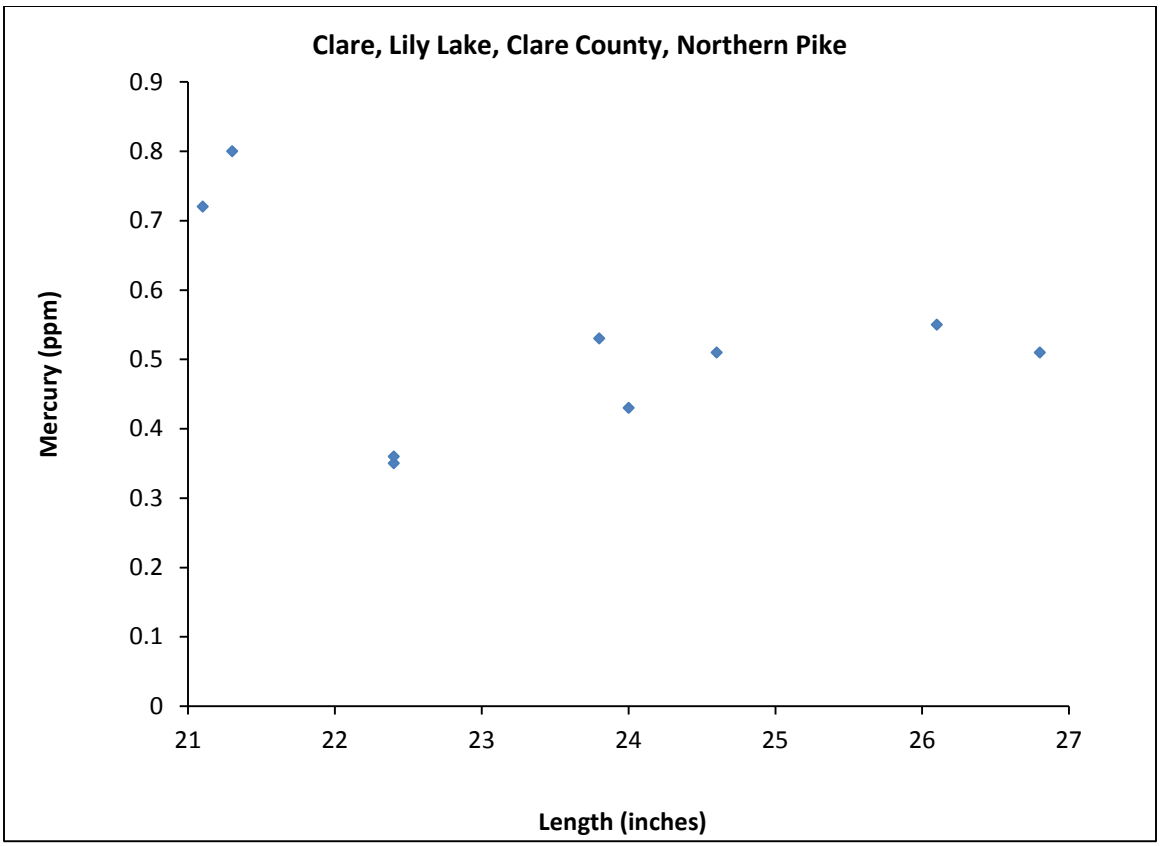
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Lily Lake northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches due to mercury. The statewide length break was applied as the size of the fish was limited.


Clare, Lily Lake, Clare County, Northern Pike
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
21
22
23
24
25
26
27
Length (inches)

Emmet County

Brown Trout **Bear River** **Emmet 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	
1998	1998	10	7.3	10	7.3	9.7	
Datasets available:	1998						
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	2*	0.06		0.05	0.06	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	--	--					

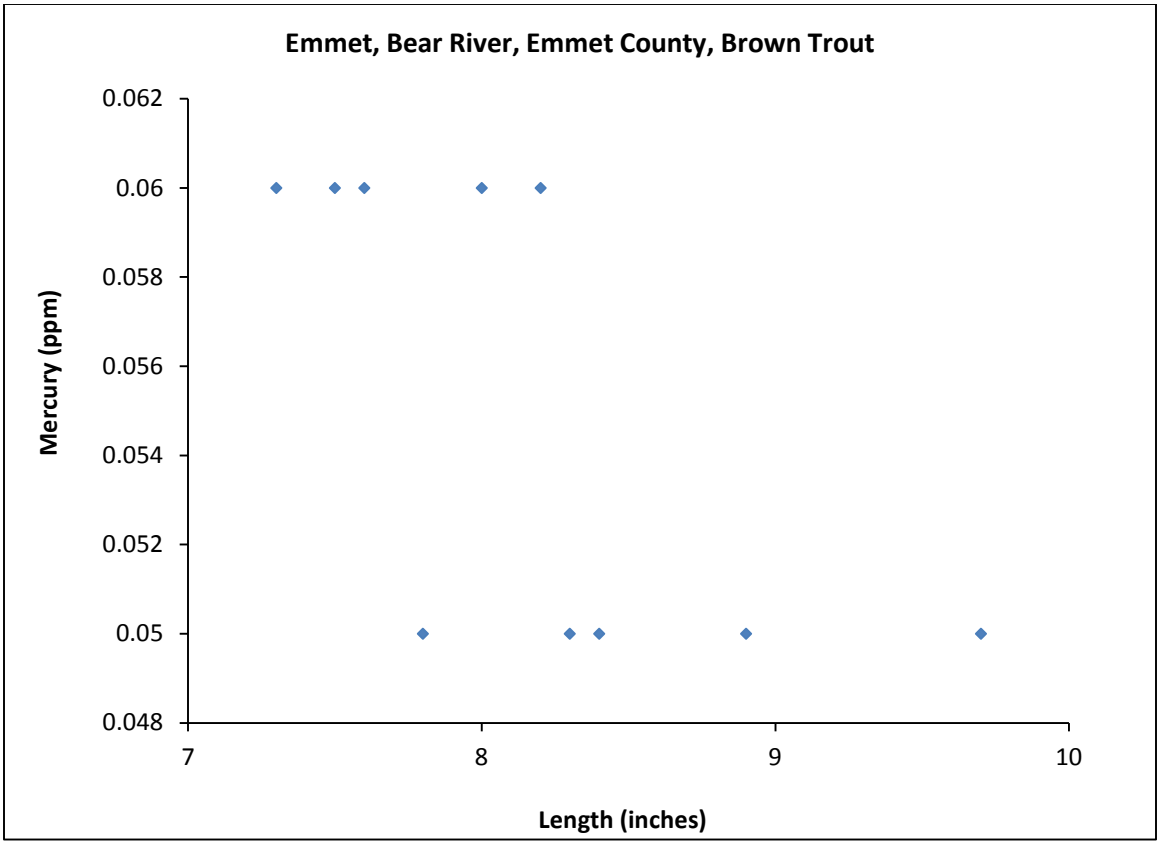
Organics Analysis:

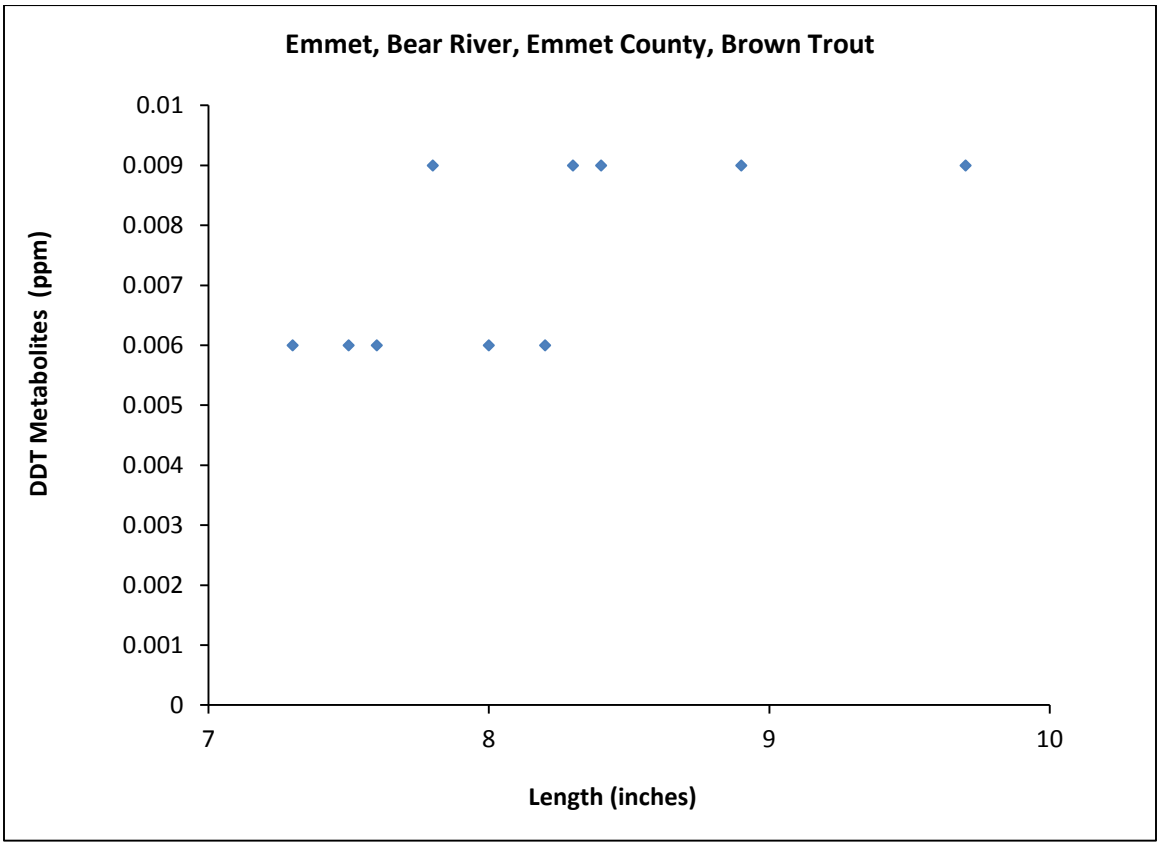
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples		
Earliest	Most Recent				Min	Max	
1998	1998	10	7.3	10	7.3	9.7	
Datasets available:	1998						
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	2*	ND		--	--	--	--
DDT	2*	0.008		0.006	0.009	--	--
Chlordane	2*	ND		--	--	--	--
Toxaphene	2*	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**--**

* - 10 fish analyzed as 2 composite samples

Existing Advisory: There are no current consumption advisories for Bear River brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.


Emmet, Bear River, Emmet County, Brown Trout
Mercury (ppm)
0.062
0.06
0.058
0.056
0.054
0.052
0.05
0.048
7
8
9
10
Length (inches)


Emmet, Bear River, Emmet County, Brown Trout
DDT Metabolites (ppm)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
7
8
9
10
Length (inches)

White Sucker **Bear River** **Emmet 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	5	7.9	na	7.9	10.9

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1*	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	5	7.9	na	7.9	10.9

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1*	ND	--	--	--	--
DDT	1*	ND	--	--	--	--
Chlordane	1*	ND	--	--	--	--
Toxaphene	1*	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 Bear River white sucker.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice applies: No one should eat more than 8 meals per month of sucker from inland waters.

Largemouth Bass **Crooked Lake** **Emmet 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	12	14	15.2	19.5

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.65	0.51	0.73	0.77	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.564	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
1989	1989	10	12	14	15.2	19.5

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.03	0.02	0.03	0.03	8
DDT	7	0.007	0.003	0.02	0.01	16
Chlordane	7	0.003	0.003	0.004	0.004	--
Toxaphene	7	ND	--	--	--	--

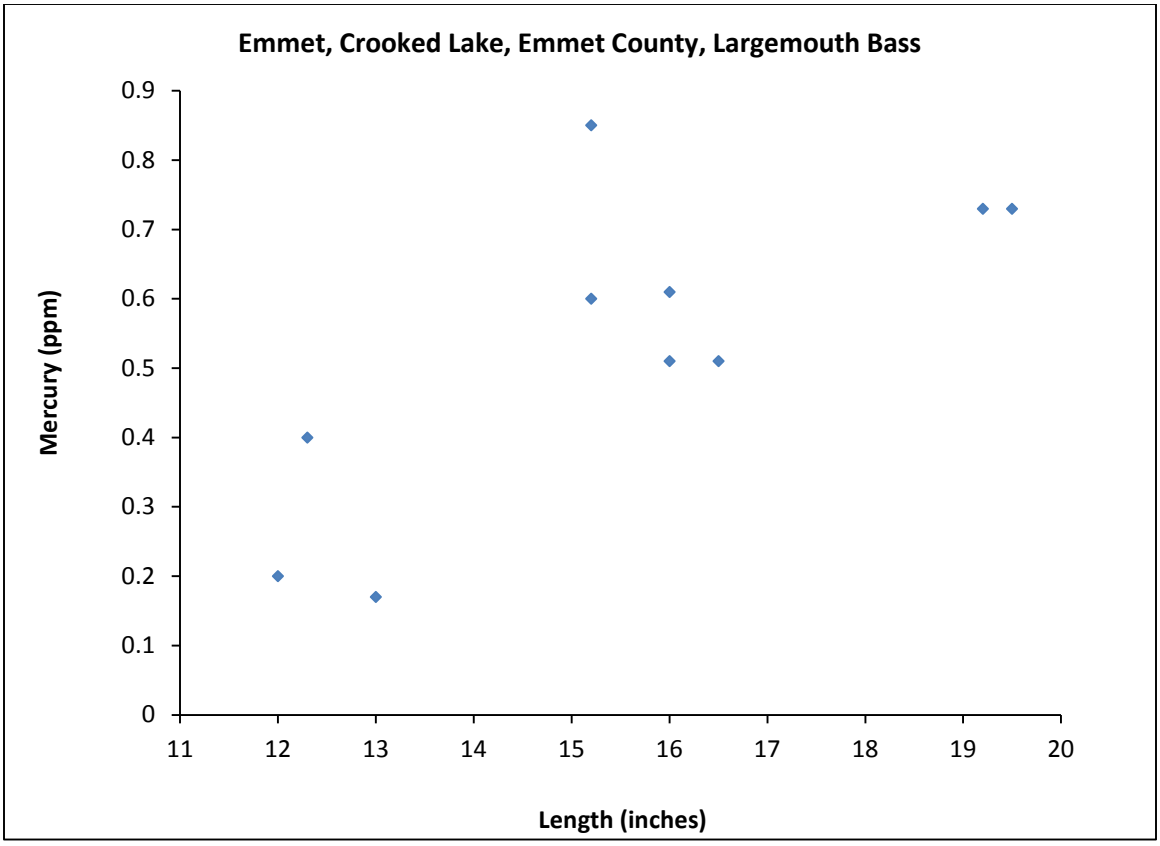
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.003	0.003
DDT	0.191	0.192
Chlordane	0.002	0.002
Toxaphene	--	--

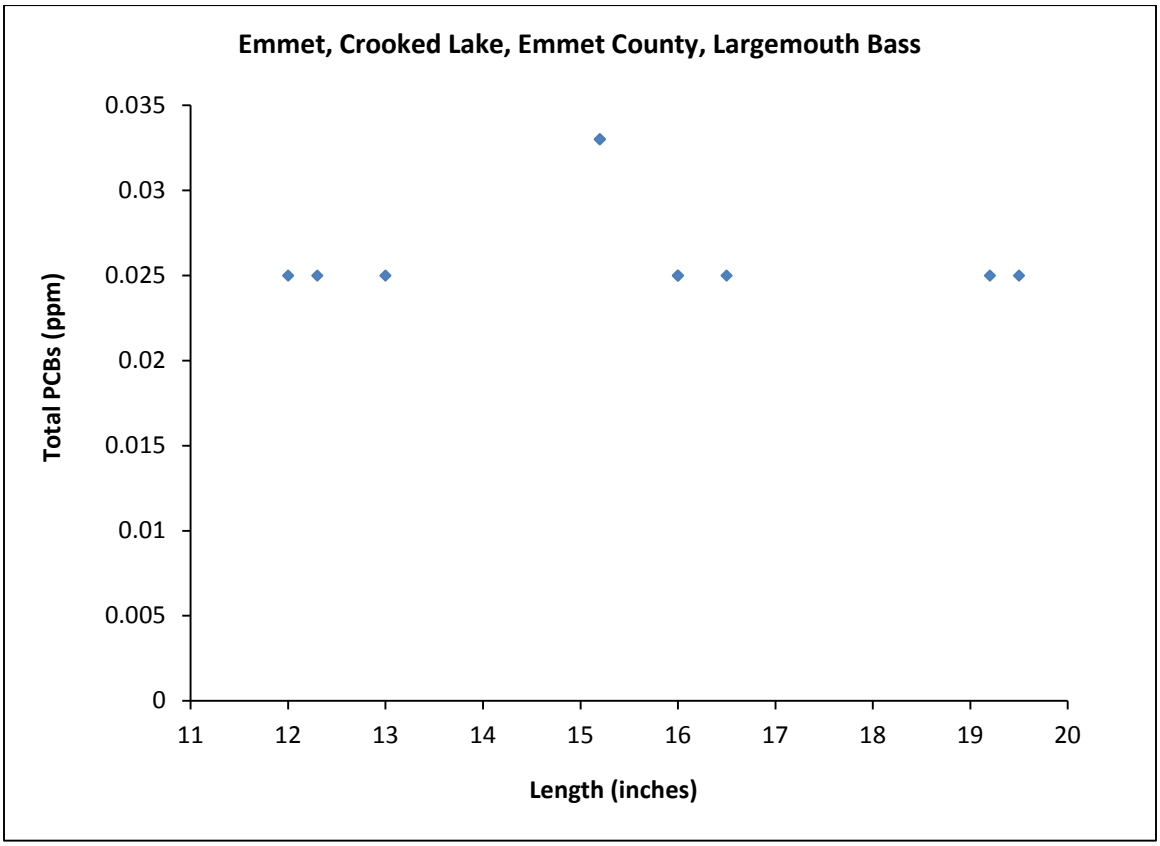
Final meal category based on UCL: 1

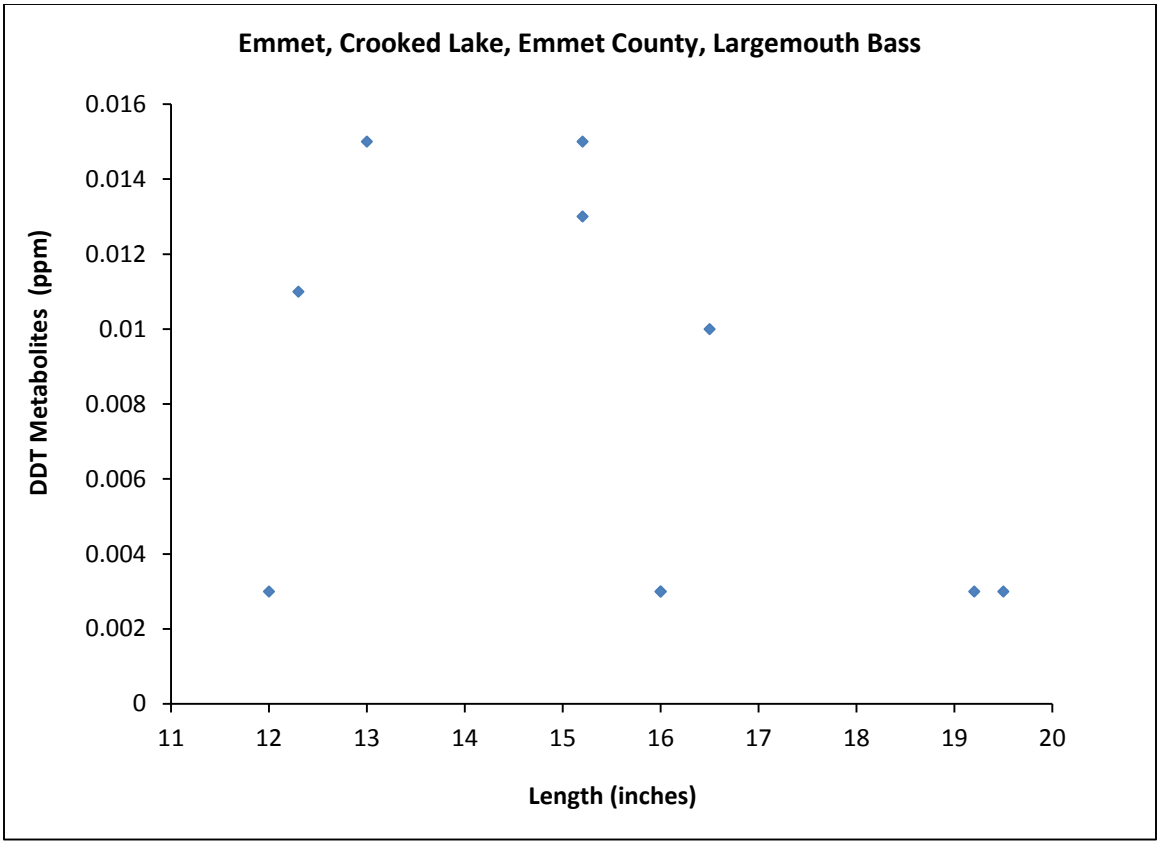
Existing Advisory: Crooked Lake largemouth bass are covered under the statewide mercury consumption advisory.

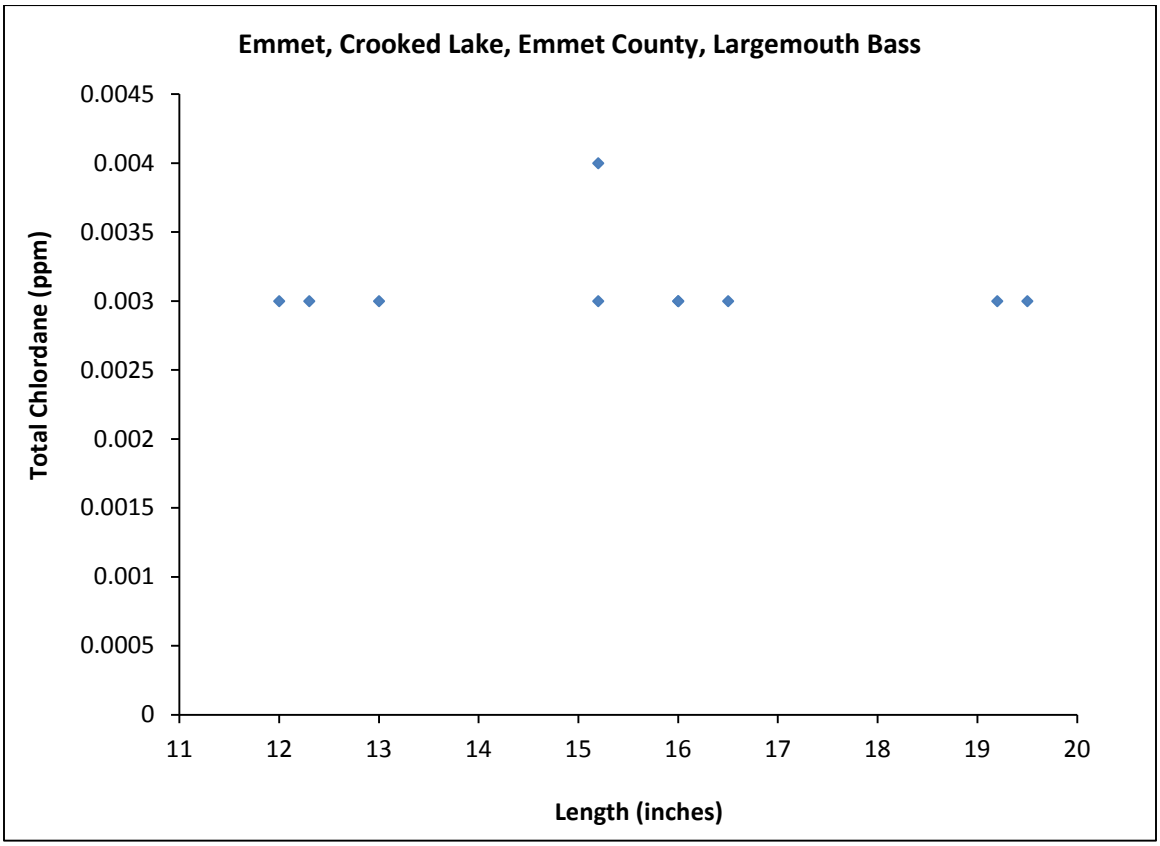
Recommendation: No one should eat more than 1 meal per month of Crooked Lake largemouth or smallmouth bass smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury. PCBs would cause an advisory. The statewide length break was applied as the size of the fish was limited.

Note: Most PCB results were at or below detection level of 0.025 ppm.


Emmet, Crooked Lake, Emmet County, Largemouth Bass
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
11
12
13
14
15
16
17
18
19
20
Length (inches)


Emmet, Crooked Lake, Emmet County, Largemouth Bass
Total PCBs (ppm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
11
12
13
14
15
16
17
18
19
20
Length (inches)


Emmet, Crooked Lake, Emmet County, Largemouth Bass
DDT Metabolites (ppm)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
11
12
13
14
15
16
17
18
19
20
Length (inches)


Emmet, Crooked Lake, Emmet County, Largemouth Bass
Total Chlordane (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
11
12
13
14
15
16
17
18
19
20
Length (inches)

Walleye **Crooked Lake** **Emmet 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	7	15.5	15	15.5	19.8

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.60	0.42	0.80	0.72	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.756	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
1989	1989	7	15.5	15	15.5	19.8

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.03	0.02	0.03	0.03	8
DDT	7	0.01	0.006	0.02	0.02	16
Chlordane	7	ND				
Toxaphene	7	ND				

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.045	0.045
DDT	0.001	0.004
Chlordane		
Toxaphene		

Final meal category based on UCL: 1

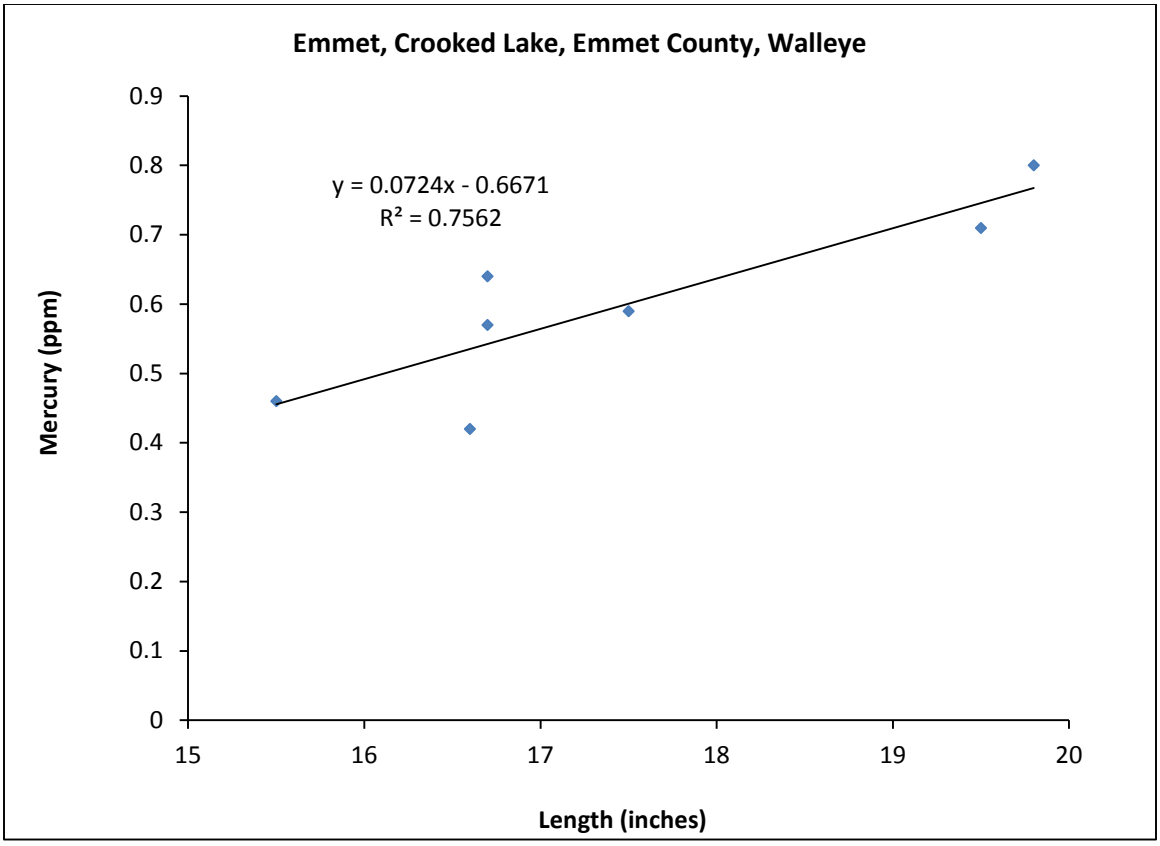
Existing Advisory: Crooked Lake walleye are covered under the statewide mercury consumption advisory.

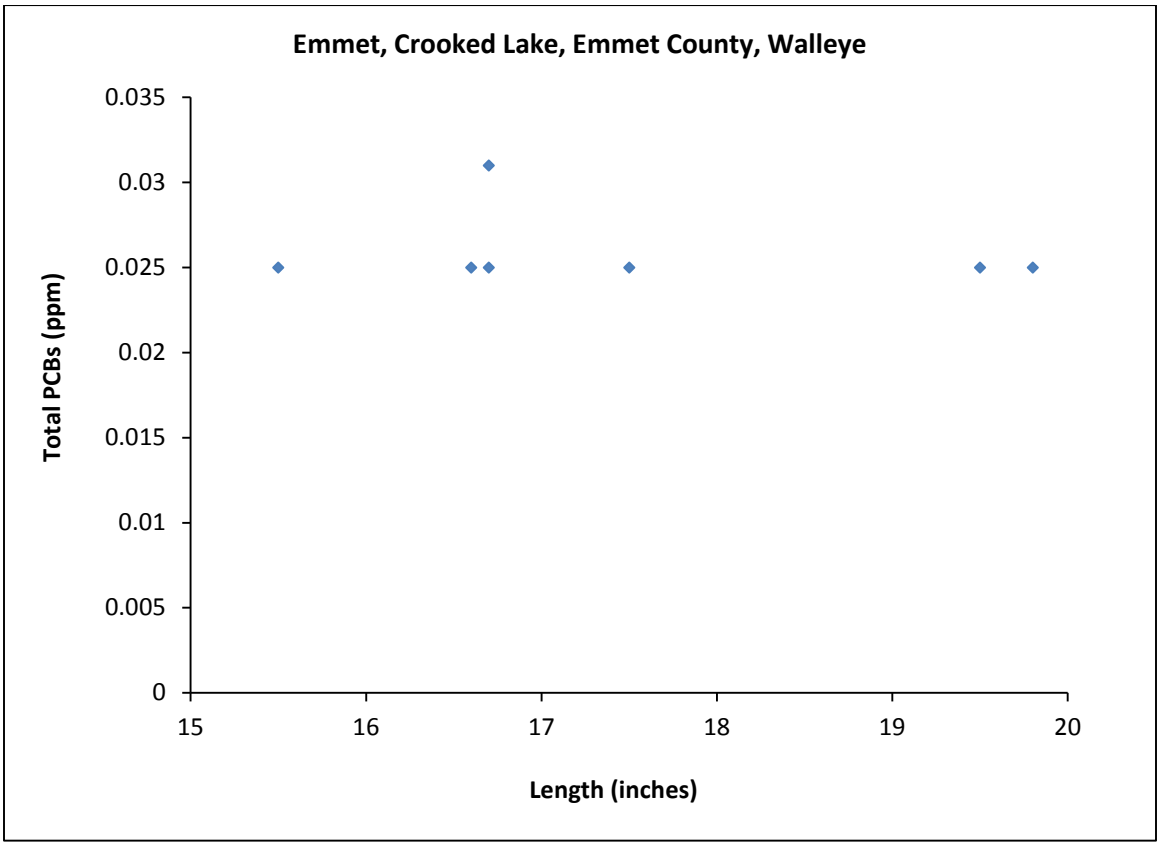
Recommendation: No one should eat more than 1 meal per month of Crooked Lake walleye smaller than 20 inches or more than 6 meals per year of those fish larger than 20 inches due to mercury. PCBs would cause an advisory. The statewide length break was applied as the size of the fish was limited.

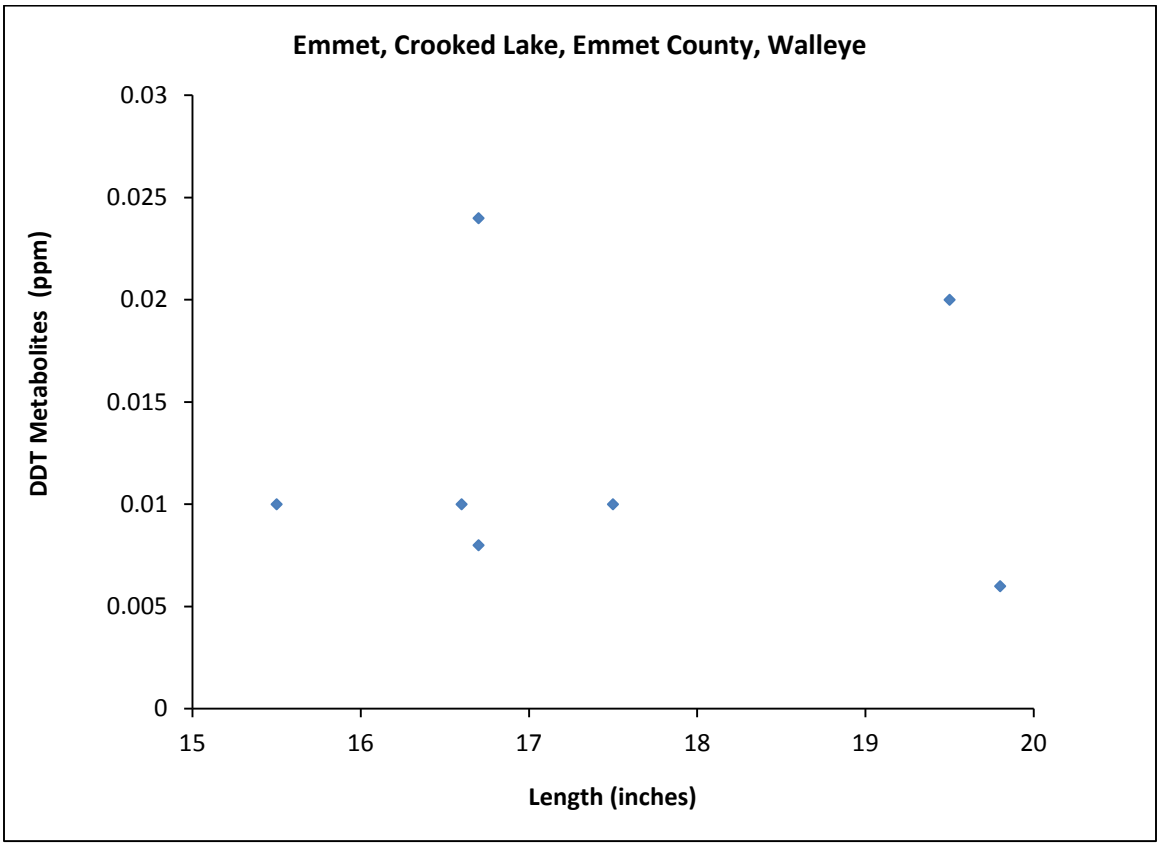
Note: Most PCB results were at or below detection level of 0.025 ppm.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.35	2
16	0.49	2
18	0.64	1
20	0.78	1
22	0.93	1
24	1.07	1
26	1.22	0.5
28	1.36	0.5
30	1.50	0.5

Shaded area denotes extrapolated estimates


Emmet, Crooked Lake, Emmet County, Walleye
y = 0.0724x - 0.6671
R² = 0.7562
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
15
16
17
18
19
20
Length (inches)


Emmet, Crooked Lake, Emmet County, Walleye
Total PCBs (ppm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
15
16
17
18
19
20
Length (inches)


Emmet, Crooked Lake, Emmet County, Walleye
DDT Metabolites (ppm)
0.03
0.025
0.02
0.015
0.01
0.005
0
15
16
17
18
19
20
Length (inches)

Largemouth Bass & Smallmouth Bass | **Lake Paradise** | **Emmet 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	13.5	14	13.5	17.5

Datasets available: 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.25	0.11	0.45	0.35	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.756	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
2001	2001	10	13.5	14	13.5	17.5

Datasets available: 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.003	0.001	0.007	0.005	16
DDT	10	0.003	0.001	0.007	0.005	16
Chlordane	10	0.001	0.001	0.005	0.002	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.231	0.353
DDT	0.555	0.533
Chlordane	0.008	0.008
Toxaphene	--	--

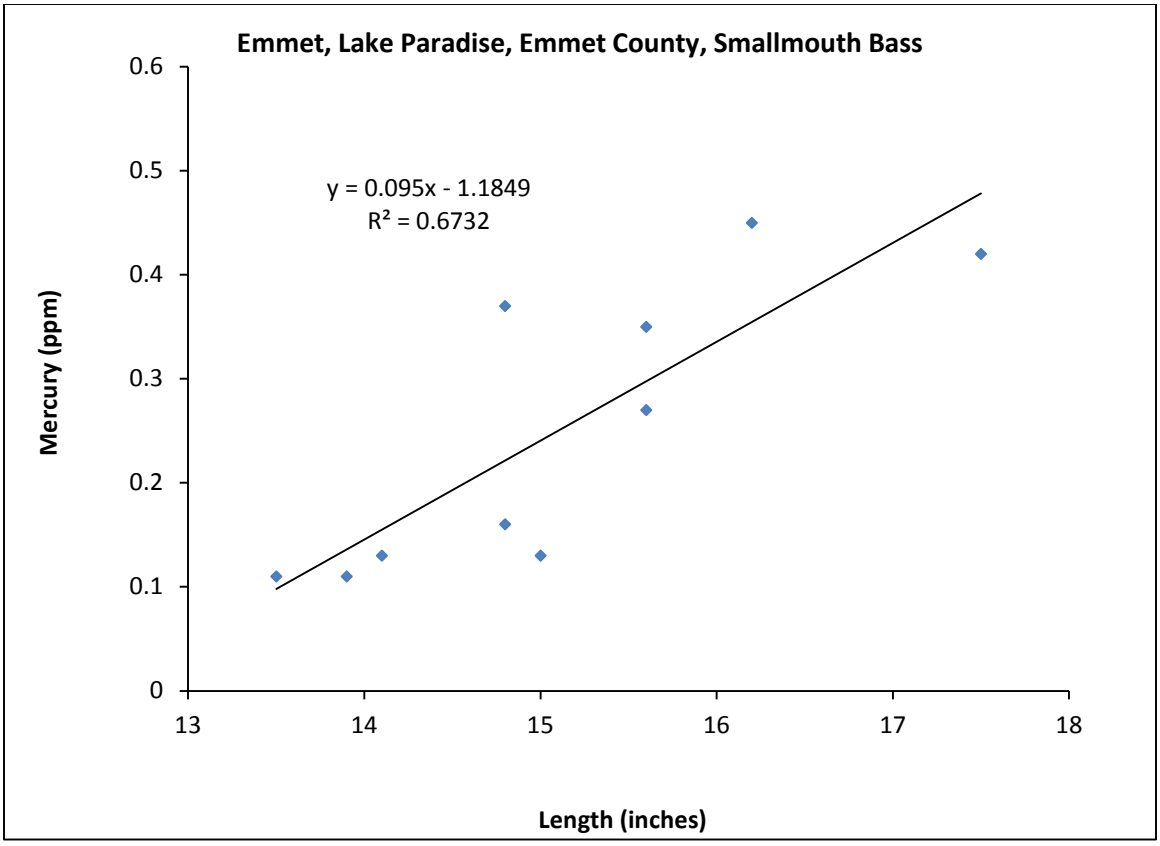
Final meal category based on UCL: 2

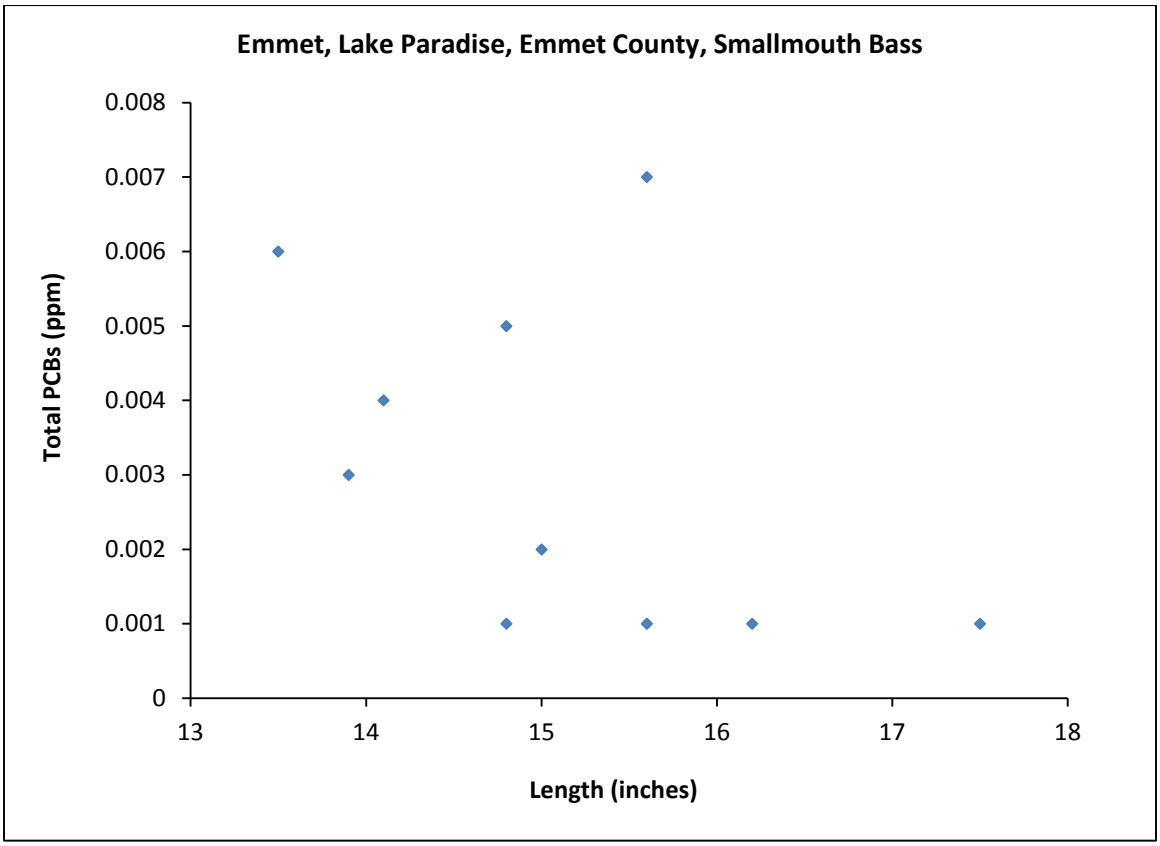
Existing Advisory: Women and children should not eat more than one meal per month of Lake Paradise largemouth or smallmouth bass larger than 18 inches due to mercury.

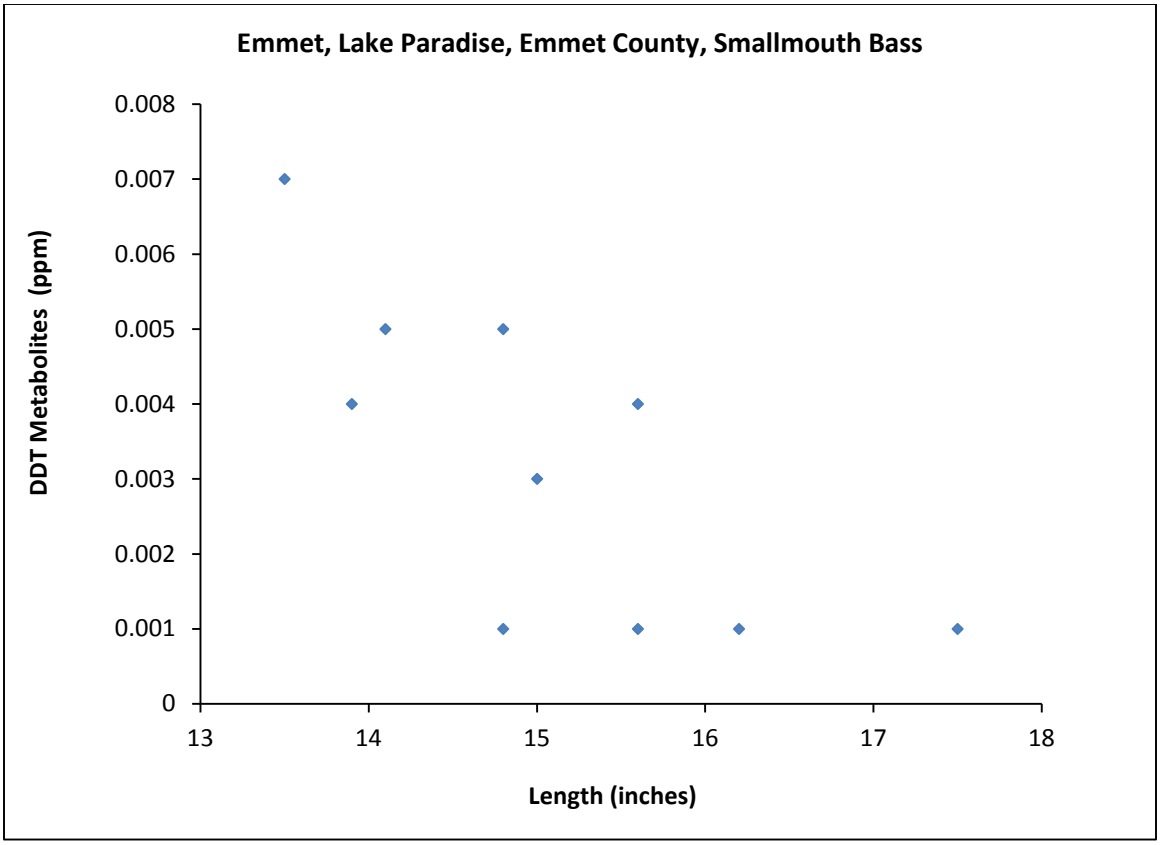
Recommendation: No one should eat more than 2 meals per month of Lake Paradise largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury. The statewide length break was applied as the size of the fish was limited.

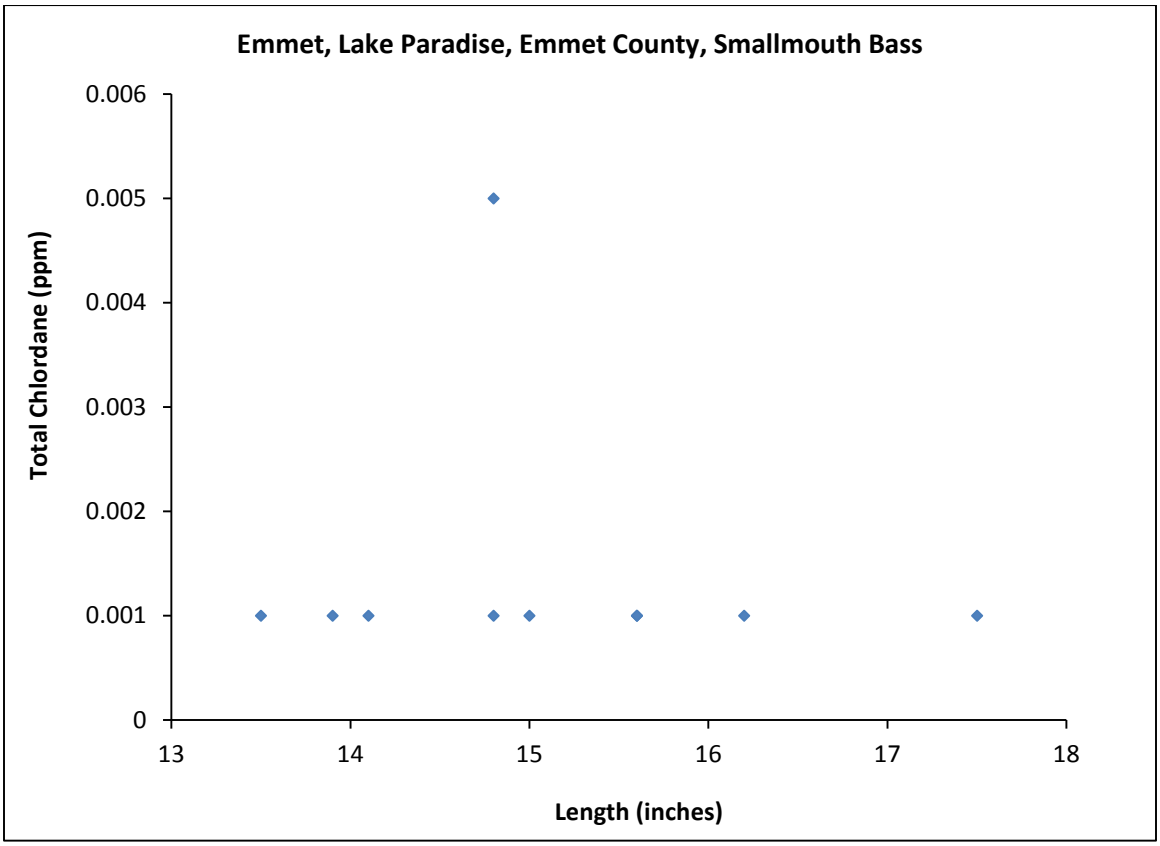
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.15	4
15	0.24	4
16	0.34	2
17	0.43	2
18	0.53	2
19	0.62	1
20	0.72	1
21	0.81	1
22	0.91	1

Shaded area denotes extrapolated estimates


Emmet, Lake Paradise, Emmet County, Smallmouth Bass
y = 0.095x - 1.1849
R² = 0.6732
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
13
14
15
16
17
18
Length (inches)


Emmet, Lake Paradise, Emmet County, Smallmouth Bass
Total PCBs (ppm)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
13
14
15
16
17
18
Length (inches)


Emmet, Lake Paradise, Emmet County, Smallmouth Bass
DDT Metabolites (ppm)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
13
14
15
16
17
18
Length (inches)


Emmet, Lake Paradise, Emmet County, Smallmouth Bass
Total Chlordane (ppm)
0.006
0.005
0.004
0.003
0.002
0.001
0
13
14
15
16
17
18
Length (inches)

White Sucker **Lake Paradise** **Emmet 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	6	16.4	na	16.4	20.6

Datasets available: 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.06	0.04	0.10	0.08	12

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.805*	0.696*

* - regression driven by 1 point

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	6	16.4	na	16.4	20.6

Datasets available: 2001

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	0.003	0.001	0.007	0.010	16
DDT	6	0.004	0.001	0.010	0.010	16
Chlordane	6	ND	--	--	--	--
Toxaphene	6	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.019	0.084
DDT	0.002	0.004
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 12

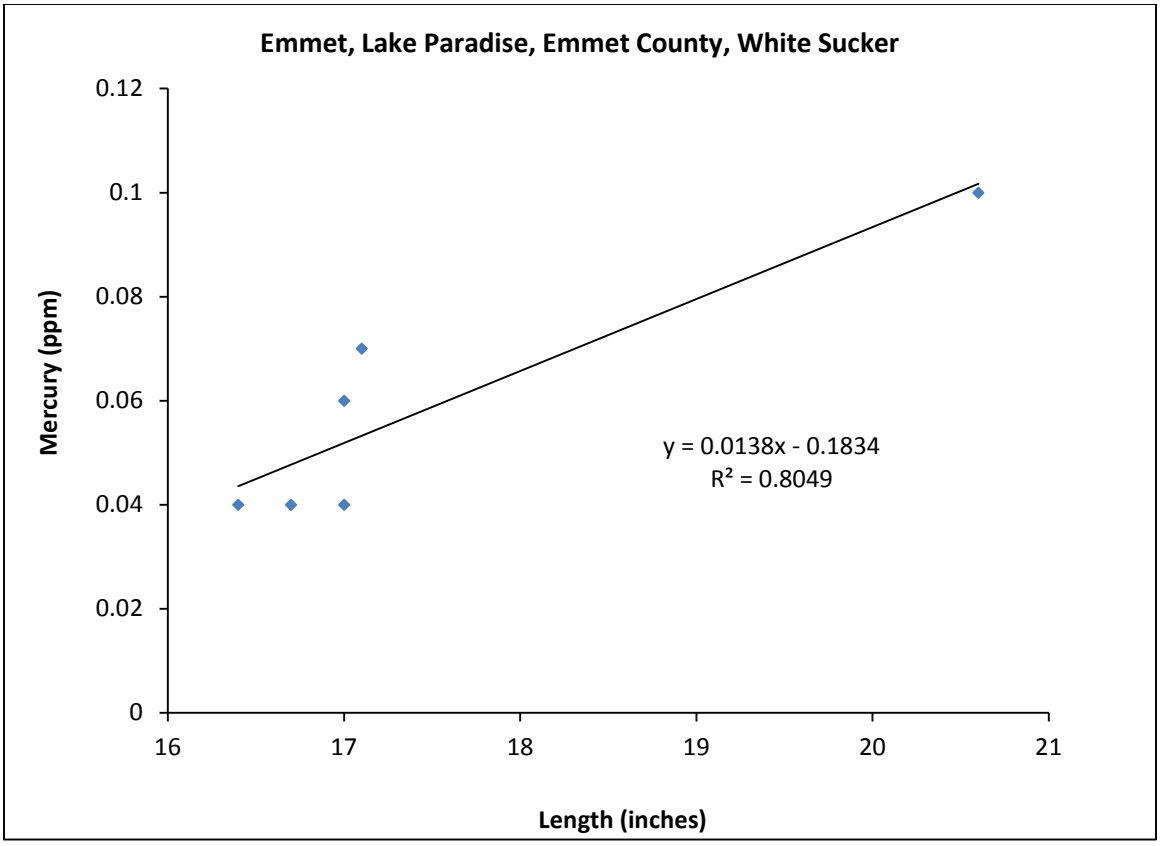
Existing Advisory: There are no current consumption advisories for Lake Paradise white sucker.

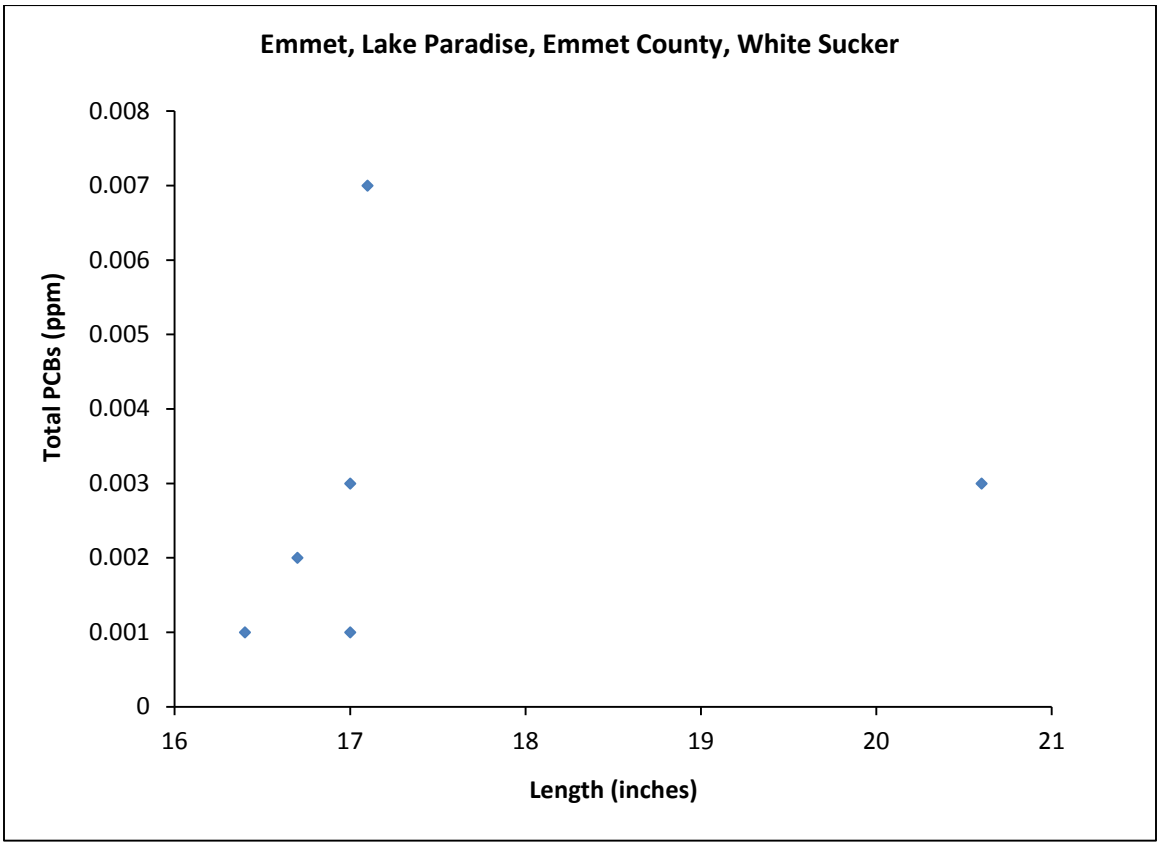
Recommendation: No one should eat more than 12 meals per month of Lake Paradise sucker due to mercury. The regression is driven by one point and was not used.

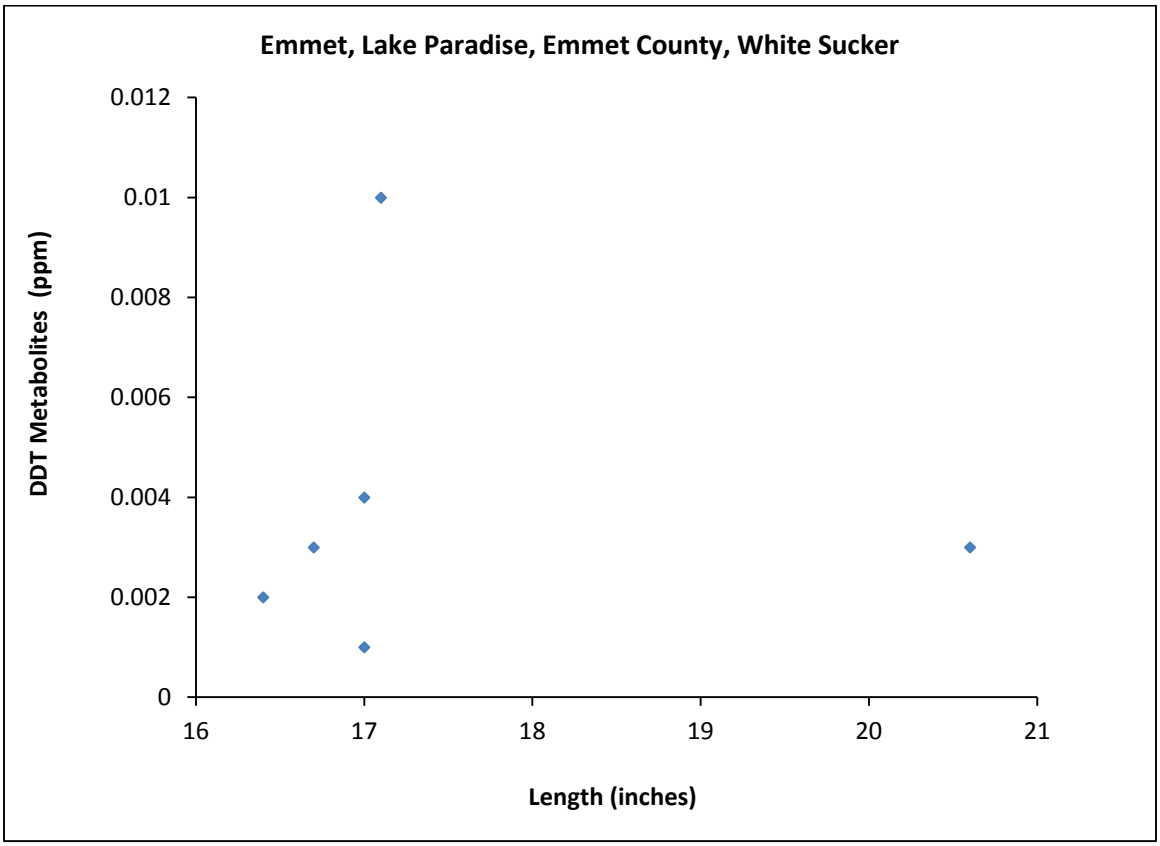
Note: 95% UCL for Hg without 20-inch fish is 0.07 ppm.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.01	16
15	0.02	16
16	0.04	16
17	0.05	16
18	0.07	16
19	0.08	12
20	0.09	8
21	0.11	8
22	0.12	8

Shaded area denotes extrapolated estimates


Emmet, Lake Paradise, Emmet County, White Sucker
Mercury (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
16
17
18
19
20
21
Length (inches)
y = 0.0138x - 0.1834
R² = 0.8049


Emmet, Lake Paradise, Emmet County, White Sucker
Total PCBs (ppm)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
16
17
18
19
20
21
Length (inches)


Emmet, Lake Paradise, Emmet County, White Sucker
DDT Metabolites (ppm)
0.012
0.01
0.008
0.006
0.004
0.002
0
16
17
18
19
20
21
Length (inches)

Largemouth Bass & Smallmouth Bass | **Pickerel Lake** | **Emmet 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	13.3	14	13.8	17.8

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.33	0.22	0.47	0.39	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.066	0.108

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: --

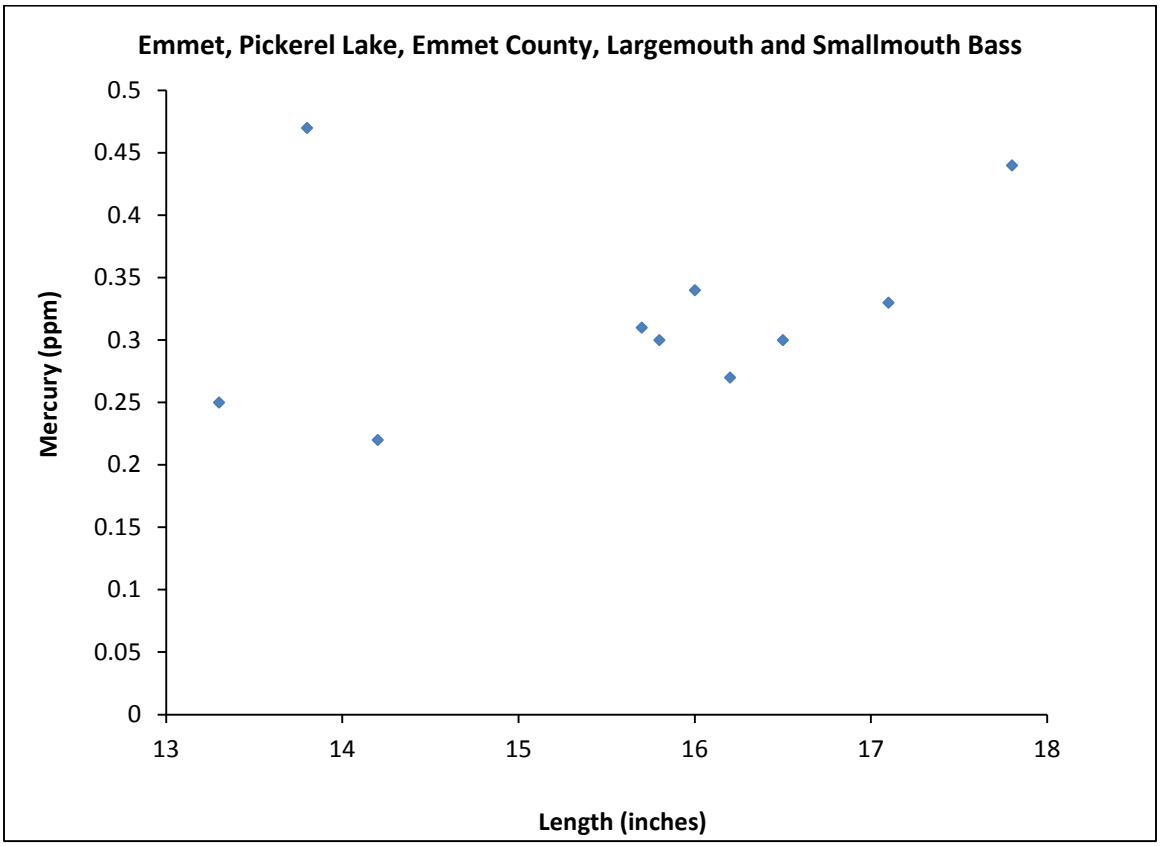
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

Existing Advisory: Pickerel Lake largemouth and smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Pickerel Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches. The statewide length break was applied as the size of the fish was limited.


Emmet, Pickerel Lake, Emmet County, Largemouth and Smallmouth Bass
Mercury (ppm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
13
14
15
16
17
18
Length (inches)

Walleye **Pickerel Lake** **Emmet 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	15.5	15	15.5	22

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.73	0.55	1.08	1.01	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.672*	0.612*

* - regression driven by 1 point

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	--	--

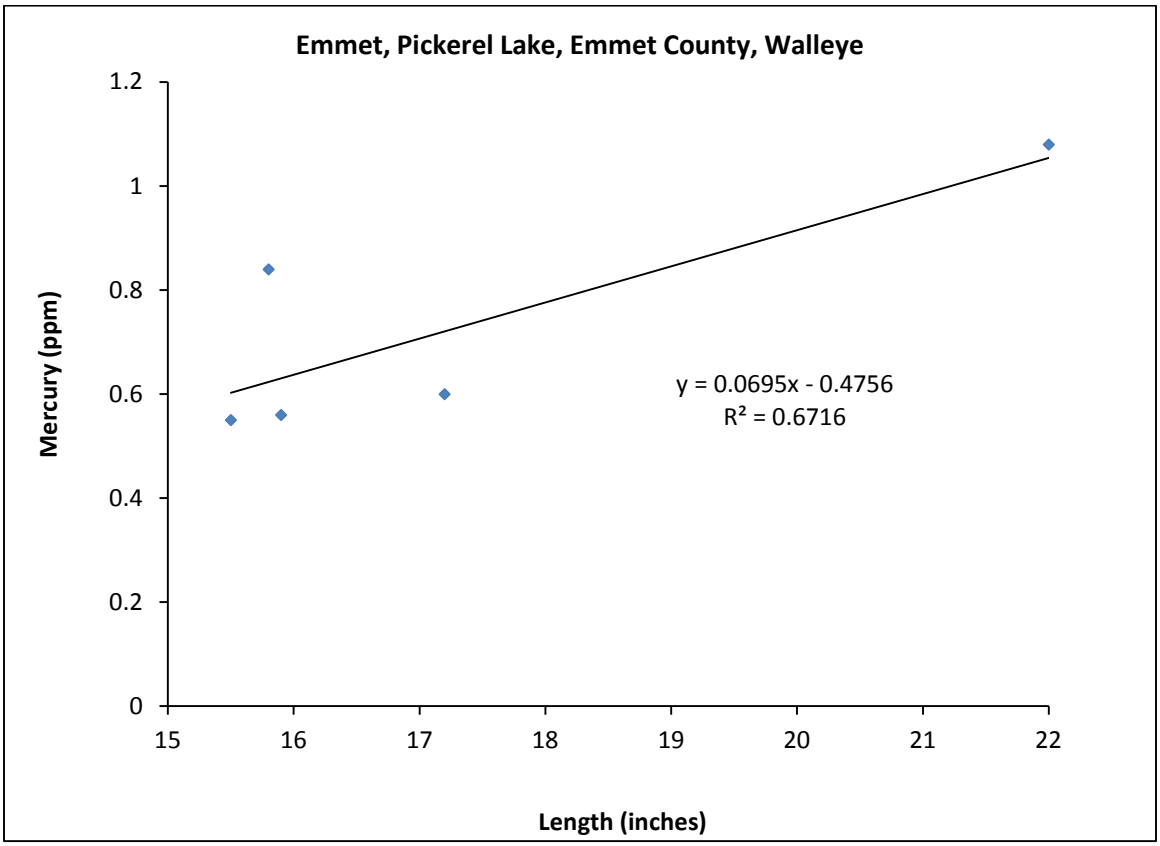
Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Pickerel Lake walleye smaller than 20 inches or more than 6 meals per year of those fish larger than 20 inches due to mercury. The statewide length break was applied as the size of the fish was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.57	1
16	0.64	1
17	0.71	1
18	0.78	1
19	0.84	1
20	0.91	1
21	0.98	1
22	1.05	1
23	1.12	0.5

Shaded area denotes extrapolated estimates


Emmet, Pickerel Lake, Emmet County, Walleye
Mercury (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
15
16
17
18
19
20
21
22
Length (inches)
y = 0.0695x - 0.4756
R² = 0.6716

Brook Trout **Tannery Creek** **Emmet 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	7	6.3	8	6.3	10.2	
Datasets available: 1987							
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	7	0.17		0.11	0.27	0.23	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.583	0.487					

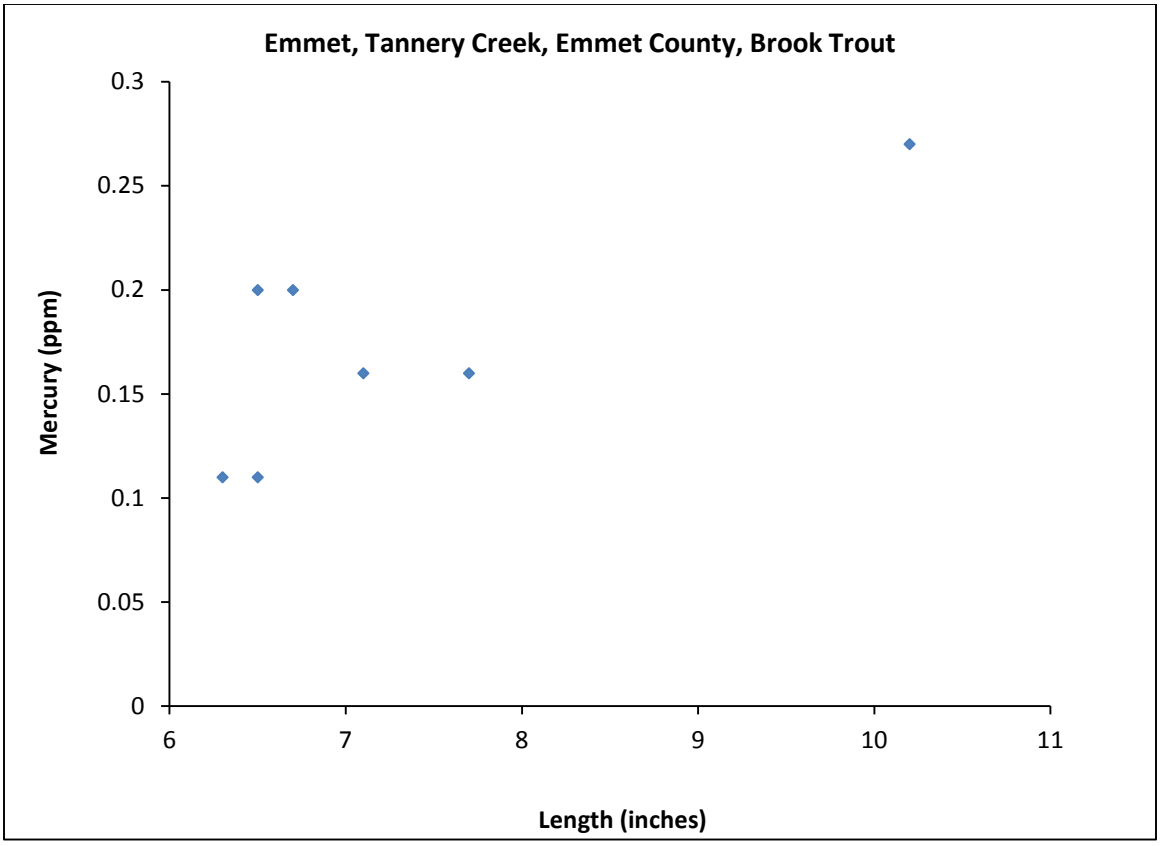
Organics Analysis:

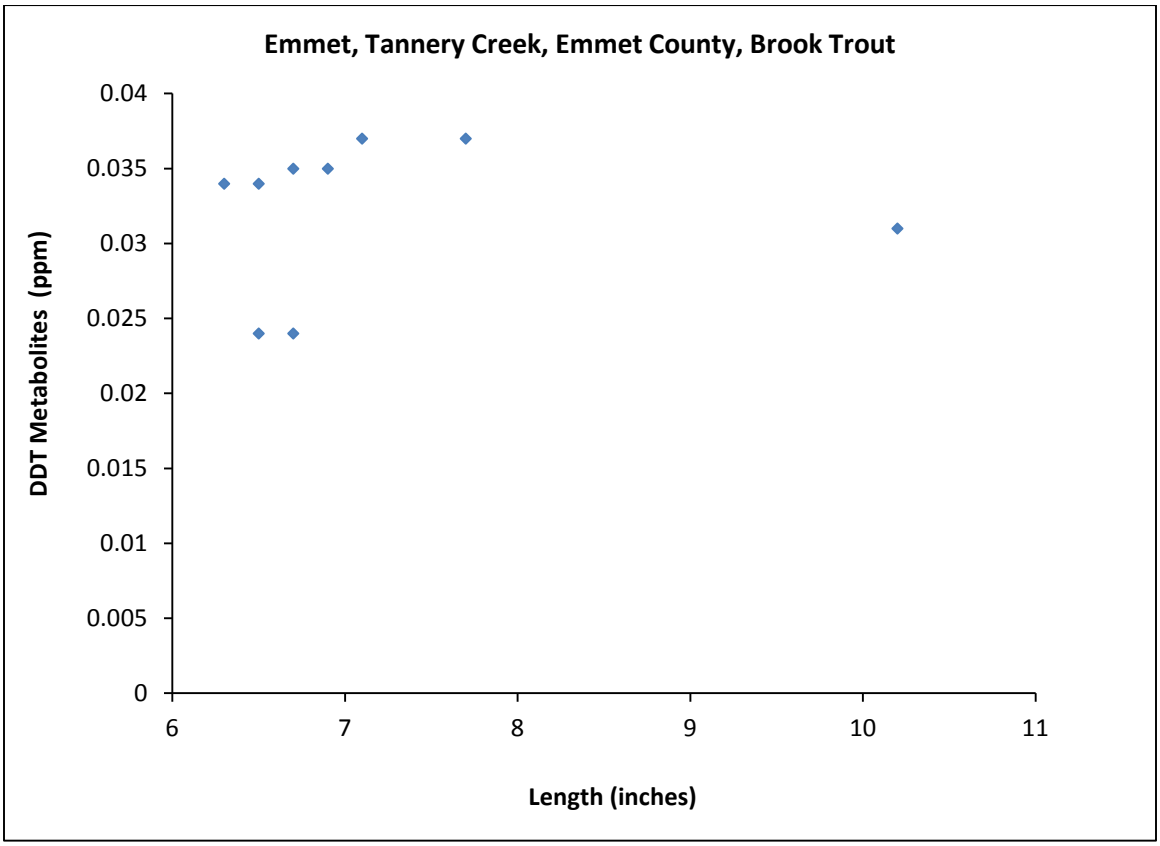
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples		
Earliest	Most Recent				Min	Max	
1987	1987	7	6.3	8	6.3	10.2	
Datasets available: 1987							
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	9	ND		--	--	--	--
DDT	9	0.03		0.02	0.04	0.04	16
Chlordane	9	0.01		0.01	0.02	0.01	--
Toxaphene	9	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	--	--					
DDT	0.004	0.007					
Chlordane	0.223	0.193					
Toxaphene	--	--		**Final meal category based on UCL:**			**4**

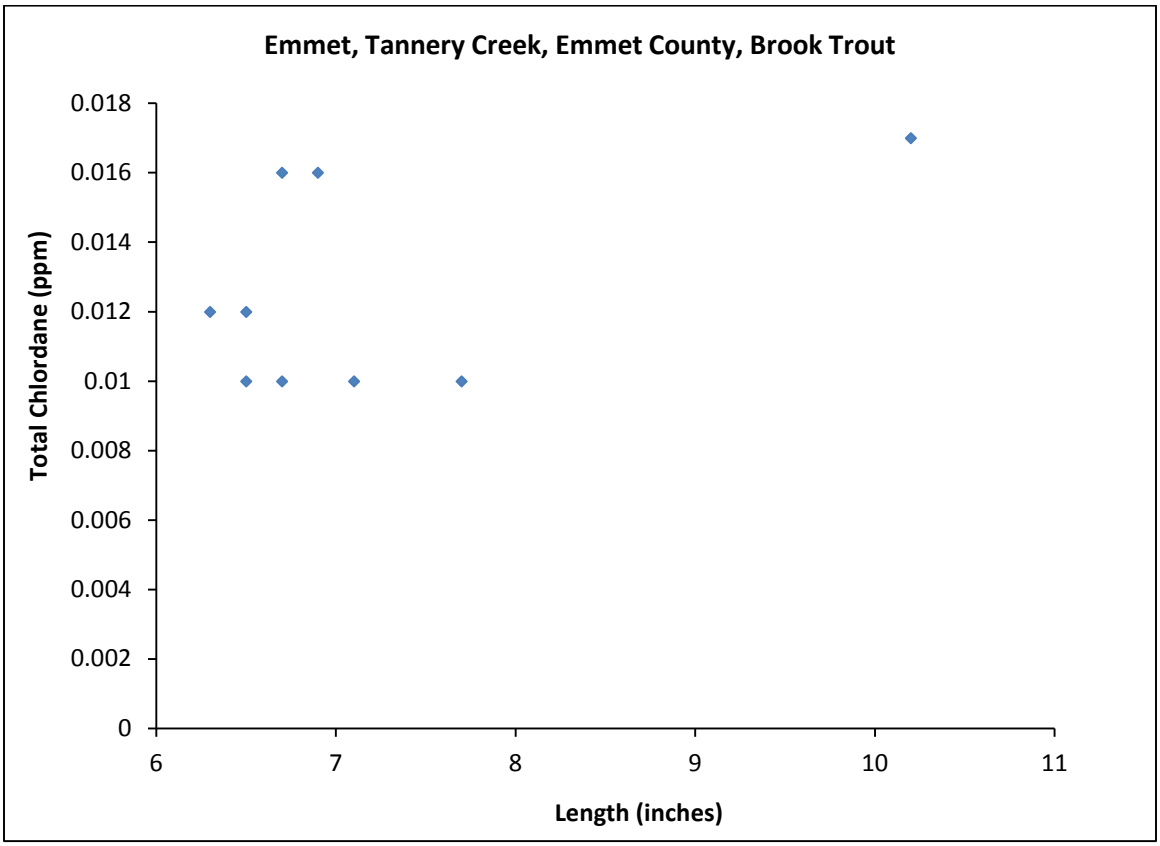
Existing Advisory: There are no current consumption advisories for Tannery Creek brook trout.

Recommendation: No one should eat more than 4 meals per month of Tannery Creek brook trout due to mercury.

Note: All but 2 fish were sub-legal; largest fish had a Hg concentration of 0.27 ppm, next largest 0.16 ppm (both in 4/month range).


Emmet, Tannery Creek, Emmet County, Brook Trout
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
6
7
8
9
10
11
Length (inches)


Emmet, Tannery Creek, Emmet County, Brook Trout
DDT Metabolites (ppm)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
6
7
8
9
10
11
Length (inches)


Emmet, Tannery Creek, Emmet County, Brook Trout
Total Chlordane (ppm)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
6
7
8
9
10
11
Length (inches)

Brown Trout **West Branch Maple River** **Emmet 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	4	10.1	10	10.1	20.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1*	0.18	--	--	--	--

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	4	10.1	10	10.1	20.7

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1*	ND	--	--	--	--
DDT	1*	ND	--	--	--	--
Chlordane	1*	ND	--	--	--	--
Toxaphene	1*	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 4 fish analyzed as 1 composite sample

Existing Advisory: There are no current consumption advisories for West Branch Maple River brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

White Sucker **West Branch Maple River** **Emmet 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*	9.8	na	9.8	11.5

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.17	0.17	0.17	--	--

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	9.8	na	9.8	11.5

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	ND	--	--	--	--
Chlordane	2*	ND	--	--	--	--
Toxaphene	2*	ND	--	--	--	--

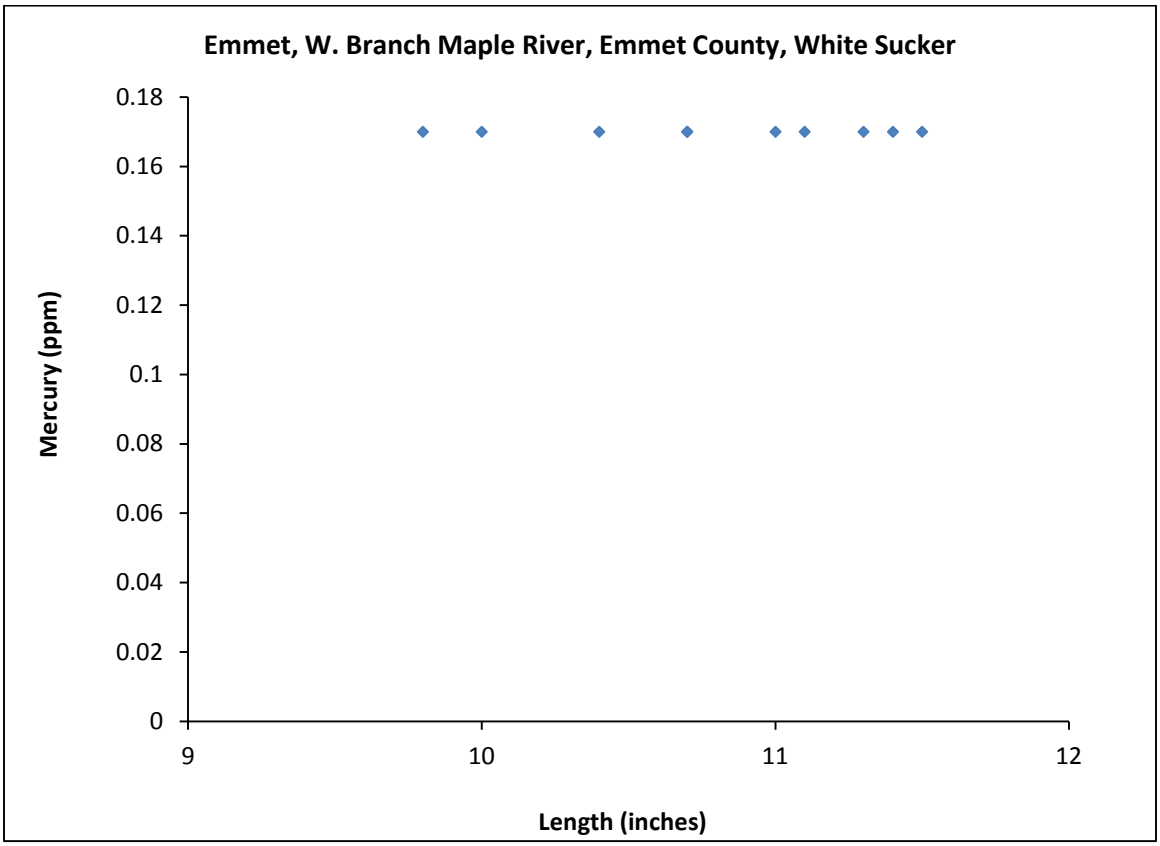
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

* - 10 fish analyzed as 2 composite samples

Existing Advisory: There are no current consumption advisories for West Branch Maple River white sucker.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice applies: No one should eat more than 8 meals per month of sucker from inland waters.


Emmet, W. Branch Maple River, Emmet County, White Sucker
Mercury (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
9
10
11
12
Length (inches)

Grand Traverse County

Northern Pike **Arbutus Lake** **Grand Traverse 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
1993	1993	6	19.3	24	26.4	28.7

Datasets available: 1993

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.96	0.62	1.41	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.699	0.799

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
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	--	--

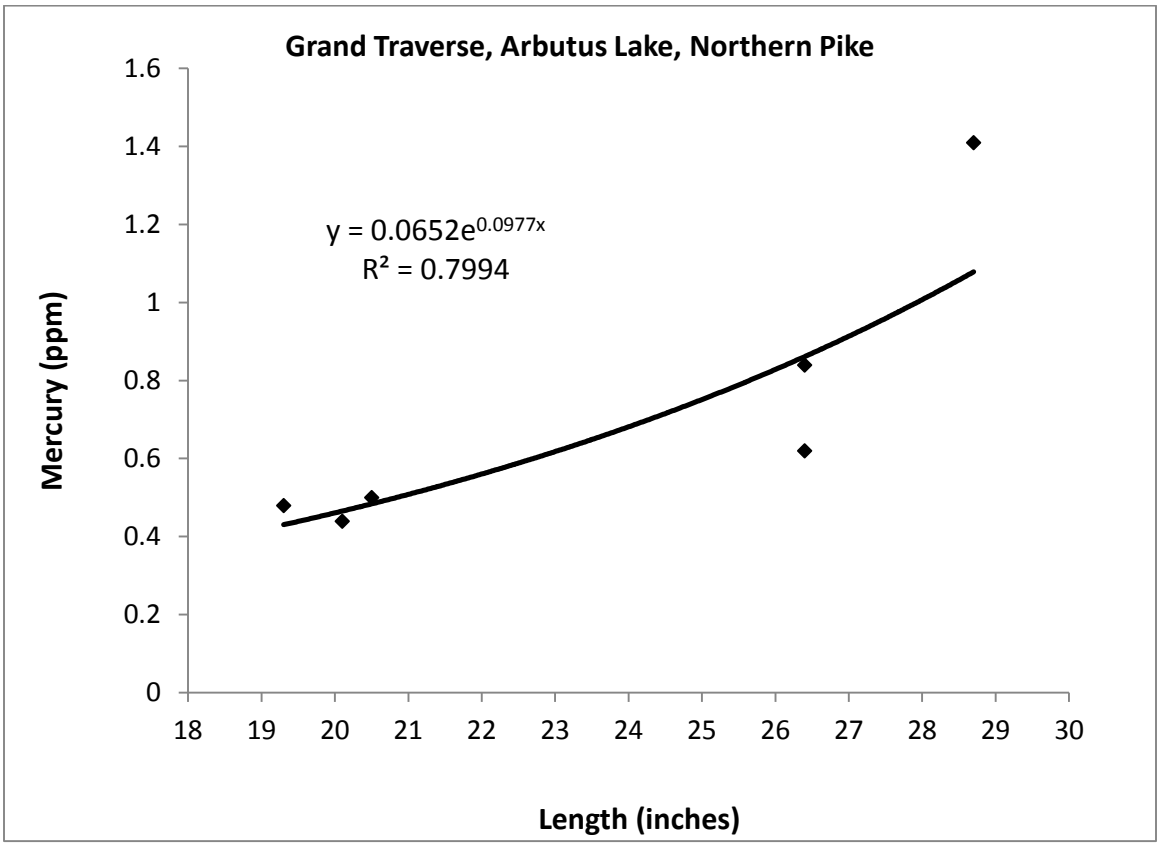
Final meal category based on UCL: --

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

Recommendation: No one should eat more than 1 meal per month of Arbutus Lake northern pike smaller than 28 inches or more than 6 meals per month of those fish larger than 28 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.680	1
25	0.750	1
26	0.827	1
27	0.912	1
28	1.005	1
29	1.108	0.5
30	1.222	0.5
31	1.348	0.5
32	1.486	0.5

Shaded area denotes extrapolated estimates


Grand Traverse, Arbutus Lake, Northern Pike
y = 0.0652e^0.0977x
R² = 0.7994
Mercury (ppm)
Length (inches)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
18
19
20
21
22
23
24
25
26
27
28
29
30

Bluegill **Bass Lake** **Grand Traverse 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	8.1	na	8.1	10.6

Datasets available: 1995

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.16	0.07	0.24	0.19	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.506	0.610

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 (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	--	--

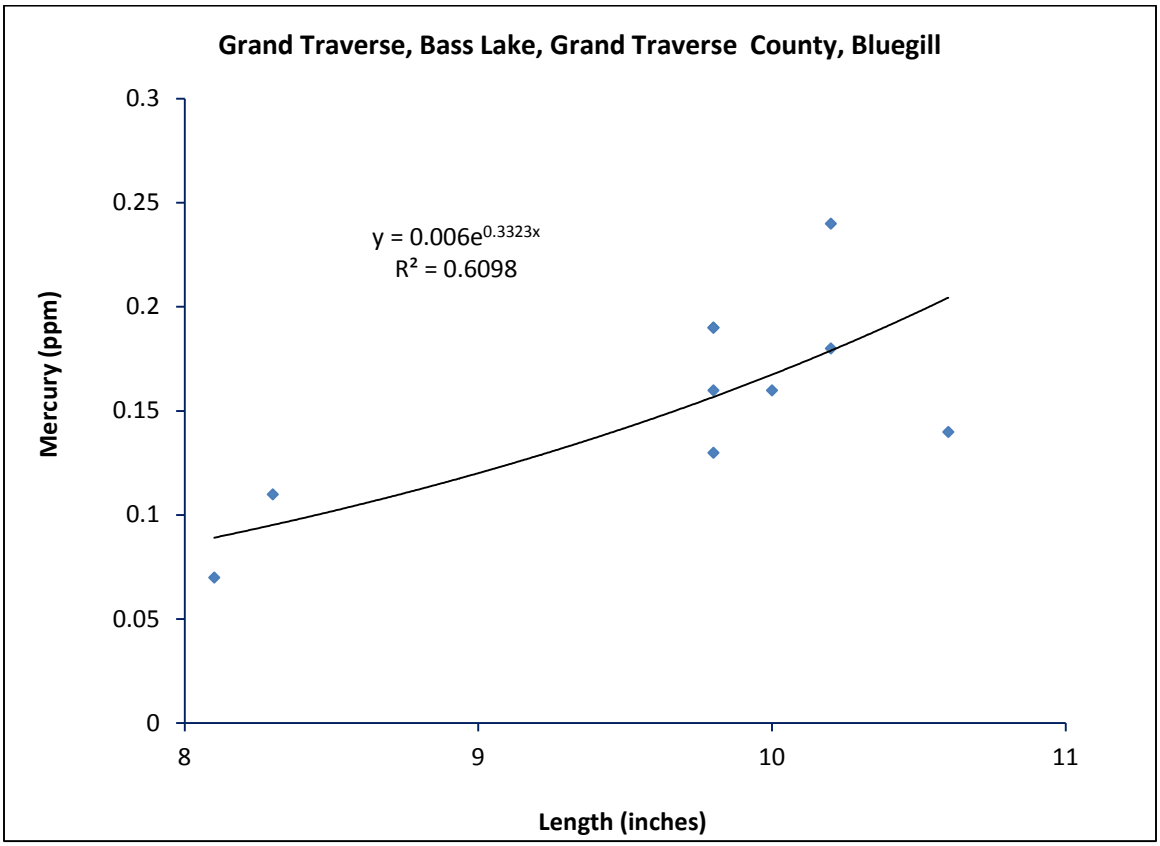
Final meal category based on UCL: 4

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

Recommendation: No one should eat more than 8 meals per month of Bass Lake bluegill or other sunfish smaller than 9 inches or more than 4 meals per month of bluegill or other sunfish larger than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
5	0.03	16
6	0.04	16
7	0.06	16
8	0.09	12
9	0.12	8
10	0.17	4
11	0.23	4
12	0.32	2
13	0.45	2

Shaded area denotes extrapolated estimates


Grand Traverse, Bass Lake, Grand Traverse County, Bluegill
y = 0.006e^0.3323x
R² = 0.6098
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
Length (inches)

Northern Pike **Bass Lake** **Grand Traverse 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	9	23.8	24	23.8	34.6

Datasets available: 1995

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.57	0.45	0.90	0.70	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.503	0.525

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: --

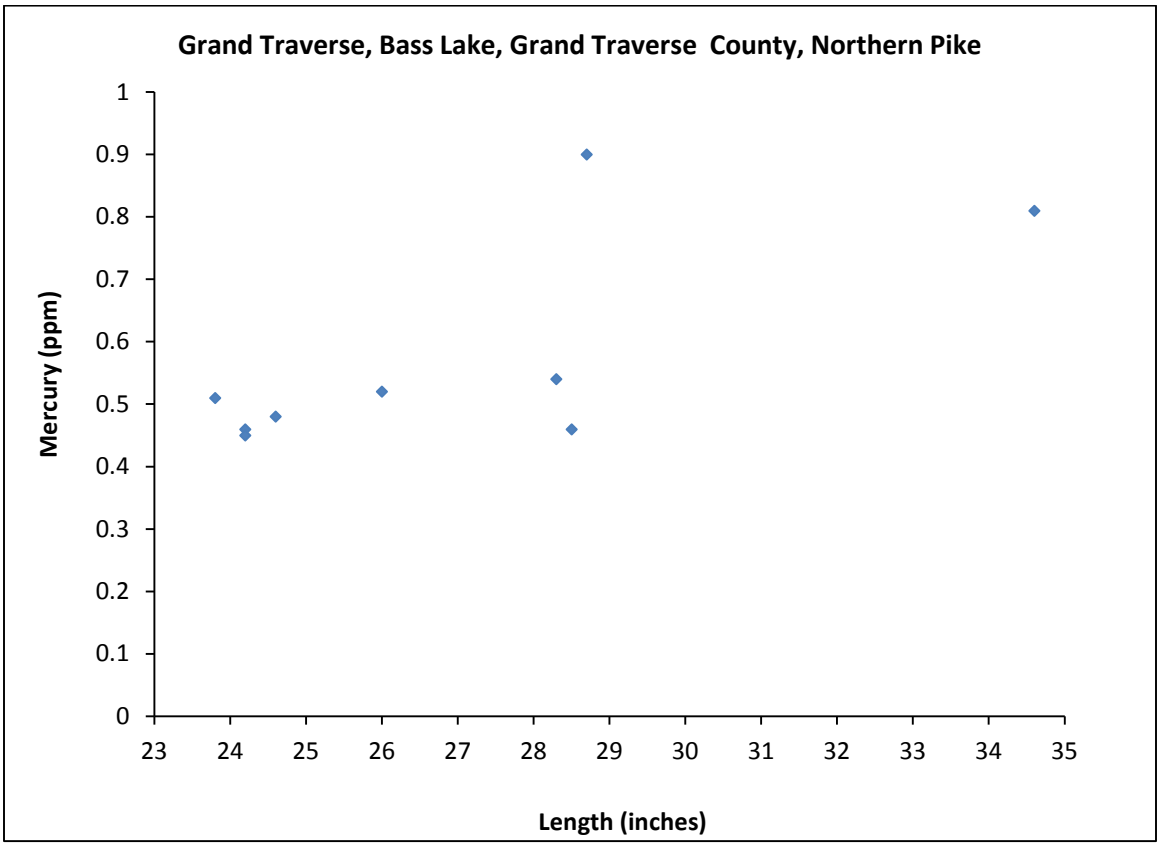
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Bass Lake northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches due to mercury. The statewide length break was applied as the size range of fish was limited.


Grand Traverse, Bass Lake, Grand Traverse County, Northern Pike
Mercury (ppm)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
23
24
25
26
27
28
29
30
31
32
33
34
35
Length (inches)

Yellow Perch **Bass Lake** **Grand Traverse 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	2	9.8	na	9.8	11

Datasets available: 1995

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2	0.215	0.200	0.230	--	--

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 (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: Bass Lake yellow perch are covered under the statewide mercury consumption advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies: No one should eat more than 4 meals per month of yellow perch from inland waters.

Northern Pike	Boardman River Boardman Lake & Brown Bridge Pond	Grand Traverse 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	2007	10	18.2	na*	18.2	24.6	
Datasets available: 1991, 2007							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.39		0.25	0.60	0.48	2
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.117	0.167					

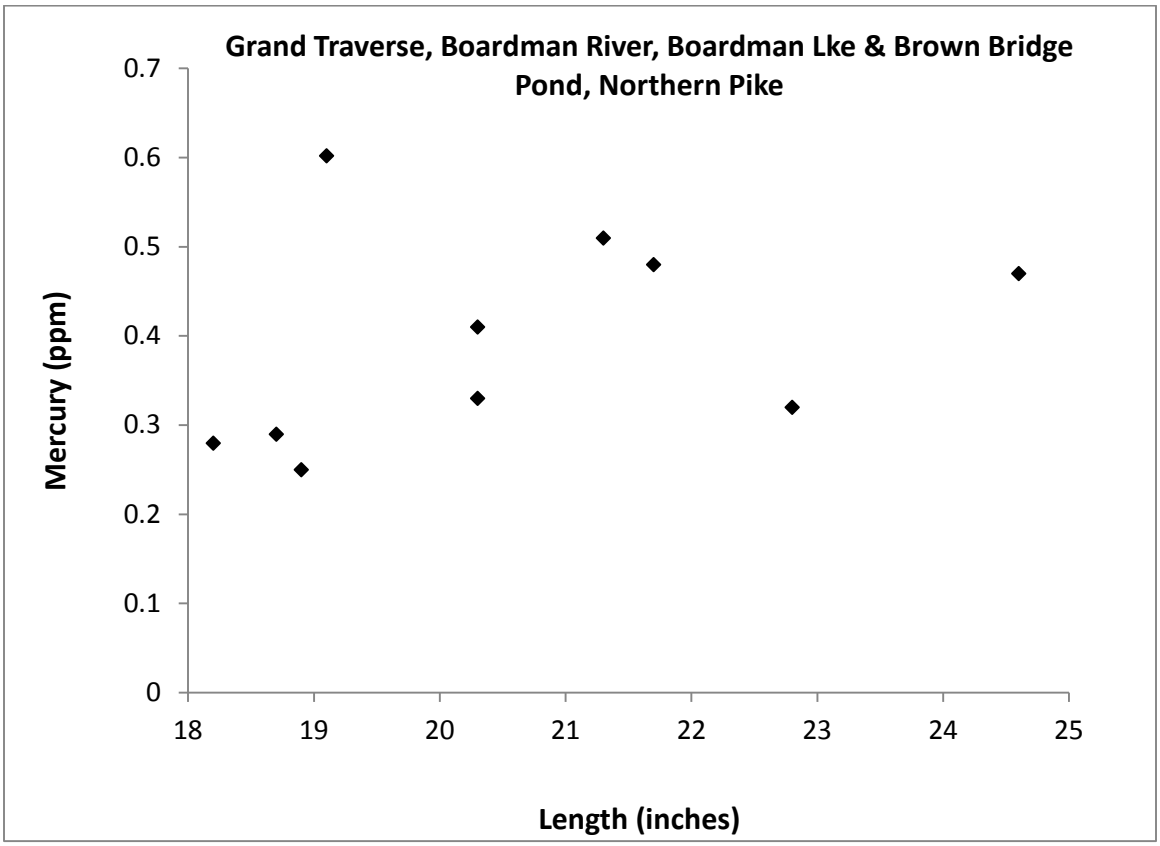
Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2007	2007	6	18.2	na*	18.2	24.6	
Datasets available: 1991, 2007							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	6	ND		--	--	--	--
DDT	6	ND		--	--	--	--
Chlordane	6	ND		--	--	--	--
Toxaphene	6	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**2**

* - there is no minimum size limit on these fish

Existing Advisory: Northern pike from Boardman River impoundments are covered by the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of northern pike from the Boardman River or its impoundments upstream of the Sixth Street Dam 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 fish was limited.


Grand Traverse, Boardman River, Boardman Lke & Brown Bridge Pond, Northern Pike
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
18
19
20
21
22
23
24
25
Length (inches)

Walleye | **Boardman River Boardman Lake** | **Grand Traverse 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	10	13	15	15	20.3	
Datasets available:	1991						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	9	0.28		0.13	0.65	0.39	2
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.554	0.581					

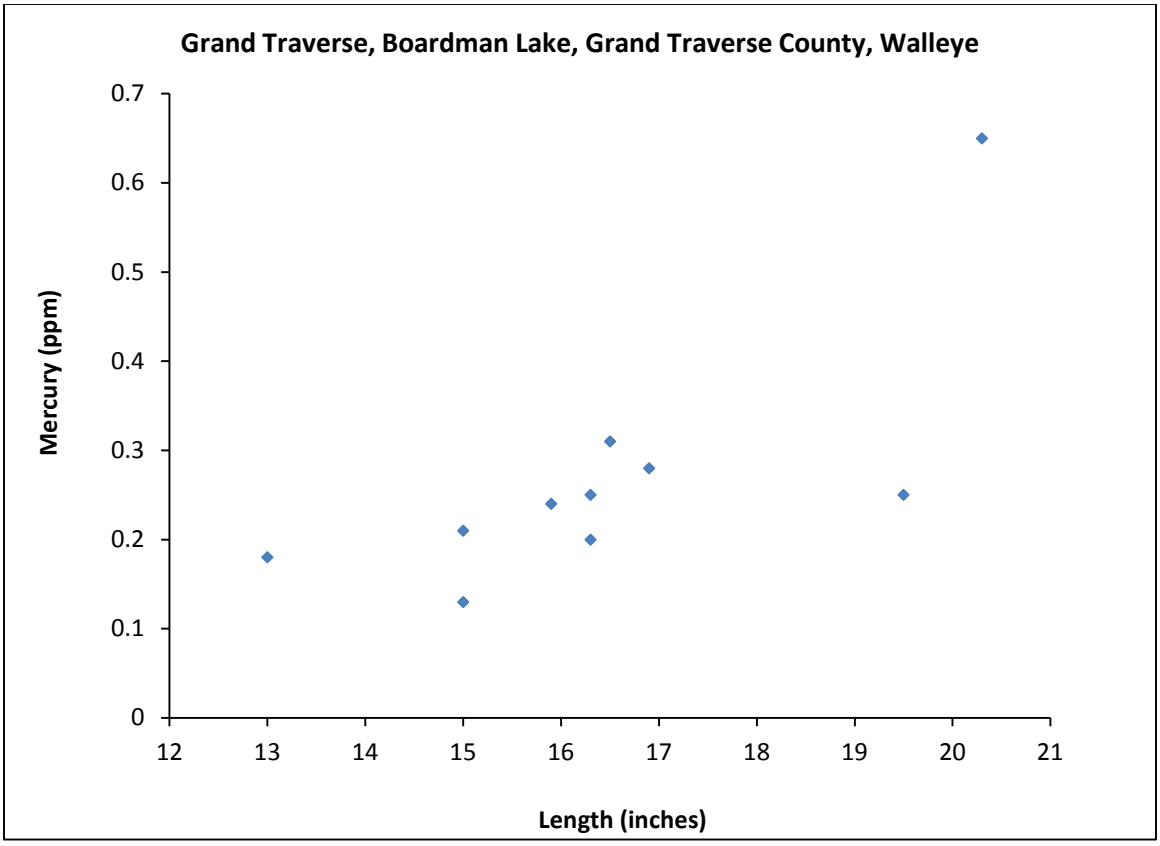
Organics Analysis:

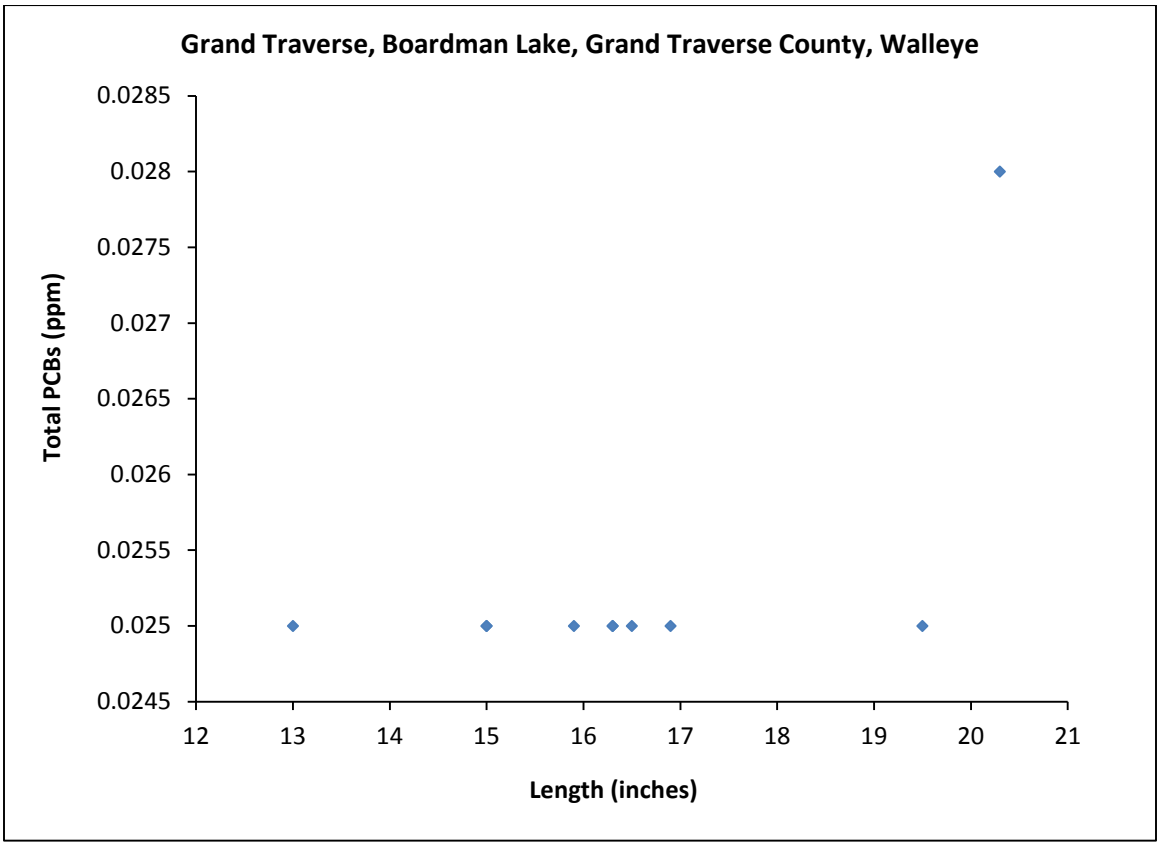
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1991	1991	10	13	15	15	20.3	
Datasets available:	1991						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	9	0.02*		0.02	0.03	0.03	8*
DDT	9	0.007		0.003	0.007	0.01	16
Chlordane	9	ND		--	--	--	--
Toxaphene	9	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.400	0.400					
DDT	0.478	0.468					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**2**

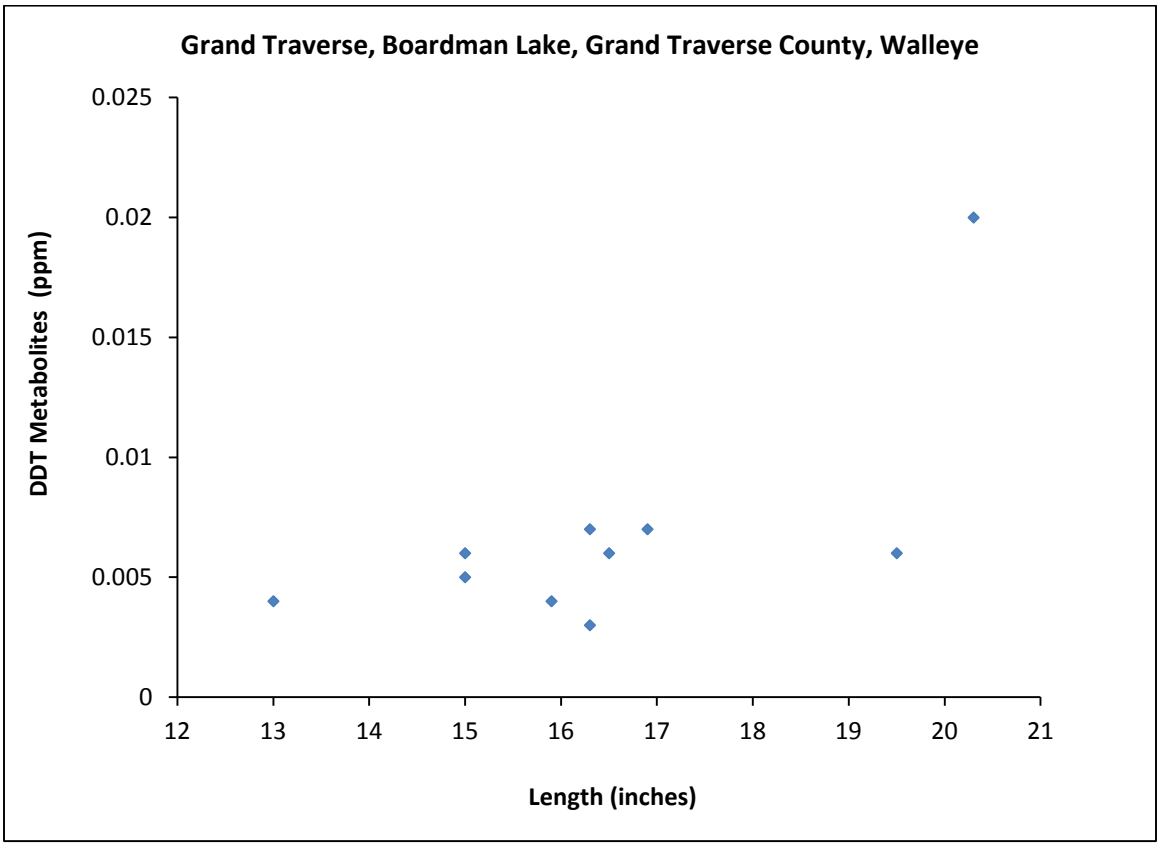
* - PCB concentrations were at or near the detection level of 0.025 ppm

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

Recommendation: No one should eat more than 2 meals per month of walleye smaller than 20 inches from the Boardman River or its impoundments upstream of the Sixth Street Dam or more than 1 meal per month of those fish larger than 20 inches due to mercury. The statewide length break applied as the size range of the fish was limited. PCBs would cause an advisory. *However, based on the MDEQ Fish Contaminant Monitoring Program, PCB, DDT, and Toxaphene concentrations ≥15 years old are expected to have declined.


Grand Traverse, Boardman Lake, Grand Traverse County, Walleye
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
12
13
14
15
16
17
18
19
20
21
Length (inches)


Grand Traverse, Boardman Lake, Grand Traverse County, Walleye
Total PCBs (ppm)
0.0285
0.028
0.0275
0.027
0.0265
0.026
0.0255
0.025
0.0245
12
13
14
15
16
17
18
19
20
21
Length (inches)


Grand Traverse, Boardman Lake, Grand Traverse County, Walleye
DDT Metabolites (ppm)
0.025
0.02
0.015
0.01
0.005
0
12
13
14
15
16
17
18
19
20
21
Length (inches)

White Sucker | **Boardman River** | **Grand Traverse County**

Boardman Lake, Sabin Pond, Brown Bridge Pond

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	2007	40	16.9	na	16.9	22.8

Datasets available: 1991, 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	40	0.26	0.05	0.40	0.28	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.153	0.223

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	18.5	na	17.2	21.4

Datasets available: 1991, 2007

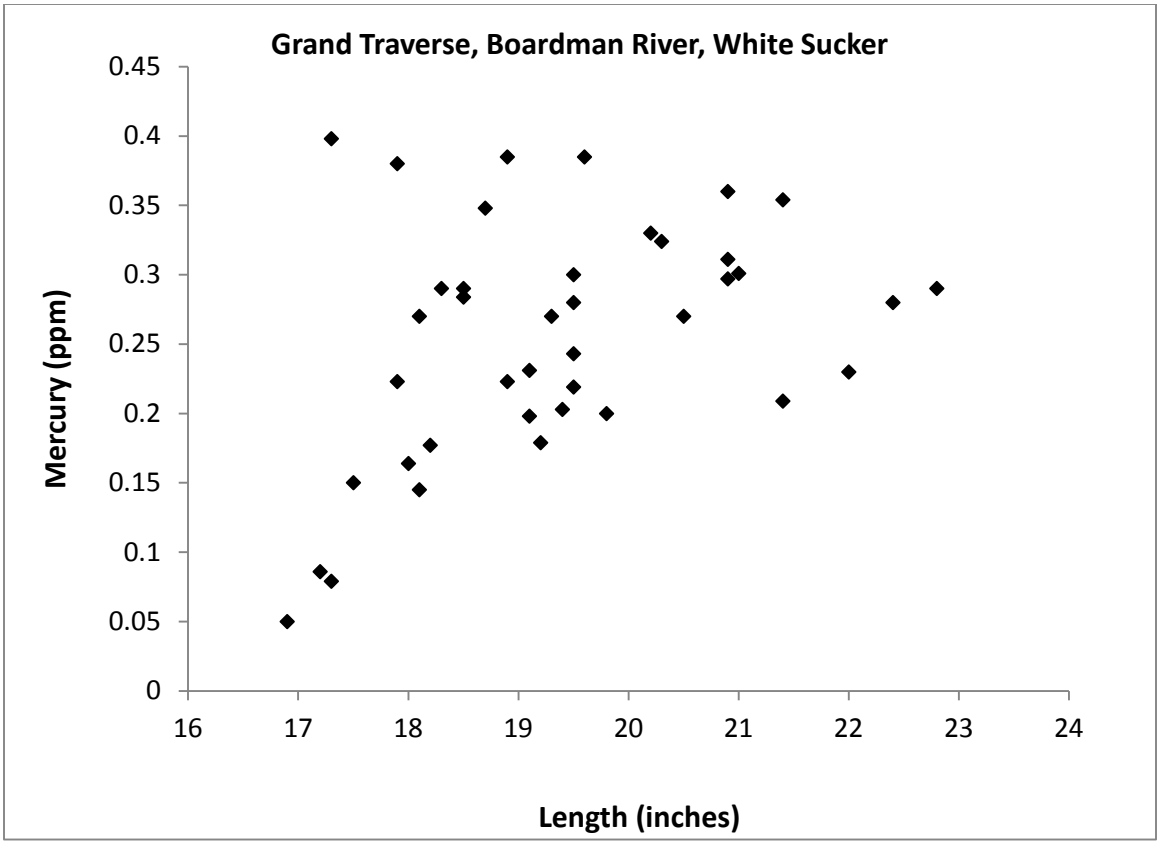
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	30	ND	--	--	--	--
DDT	30	0.002	0.001	0.005	0.002	16
Chlordane	30	ND	--	--	--	--
Toxaphene	30	ND	--	--	--	--

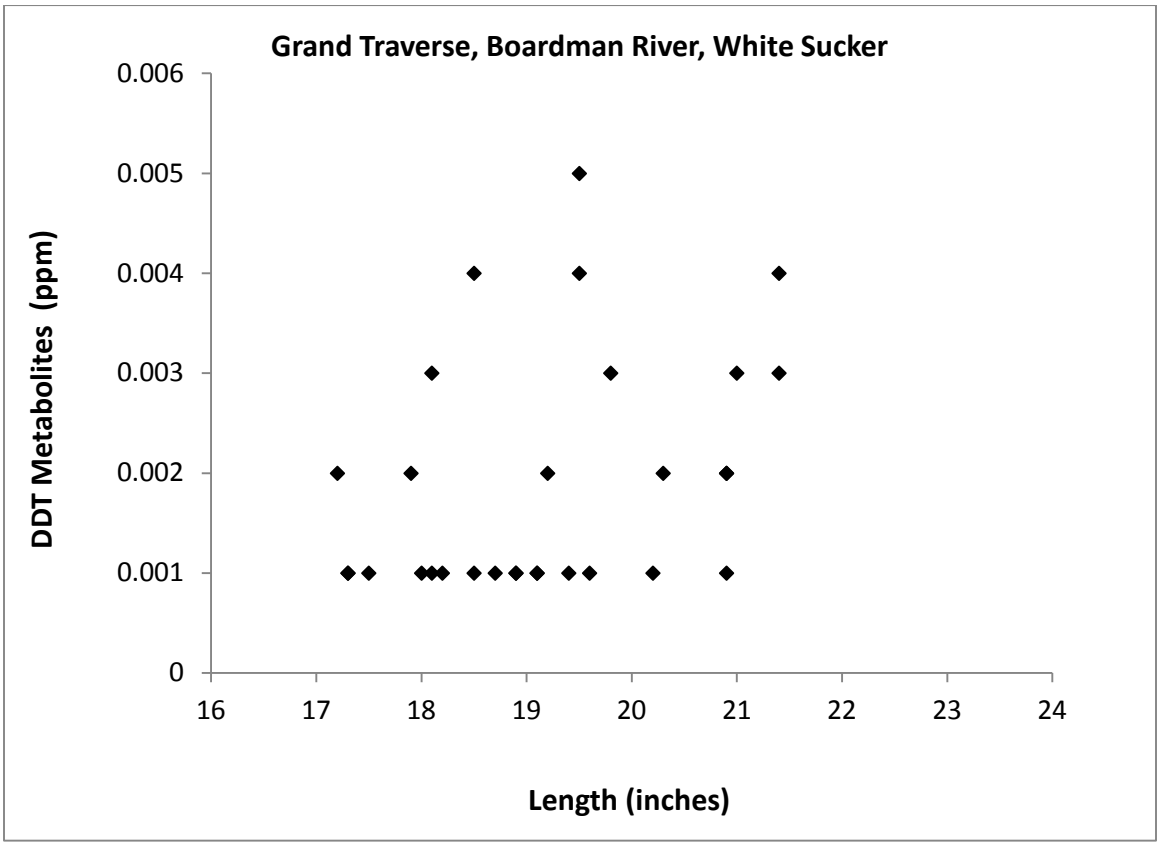
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.125	0.148
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of sucker from the Boardman River or its impoundments upstream of the Sixth Street Dam due to mercury.


Grand Traverse, Boardman River, White Sucker
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
16
17
18
19
20
21
22
23
24
Length (inches)


Grand Traverse, Boardman River, White Sucker
DDT Metabolites (ppm)
0.006
0.005
0.004
0.003
0.002
0.001
0
16
17
18
19
20
21
22
23
24
Length (inches)

Brown Trout **Elk Lake** **Grand Traverse & Antrim 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	2006	3	18.8	15	18.8	35

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	3	0.46	0.15	0.73	--	--

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
2006	2006	3	18.8	15	18.8	35

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	3	0.06	0.01	0.09	--	--
DDT	3	0.12	0.03	0.20	--	--
Chlordane	3	0.008	0.002	0.01	--	--
Toxaphene	3	ND	--	--	--	--

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 more than one meal per month of Elk Lake brown trout greater than 26 inches due to PCBs and mercury.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

Lake Trout **Elk Lake** **Grand Traverse & Antrim 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	2006	27	17.7	15	17.7	35.7

Datasets available: 1990, 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	27	0.36	0.14	0.77	0.43	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.536	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
2006	2006	9	27	15	27	35.7

Datasets available: 1990, 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.12	0.04	0.31	0.19	1
DDT	9	0.18	0.11	0.31	0.24	4
Chlordane	9	0.02	0.009	0.03	0.02	--
Toxaphene	9	ND				

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.691	0.591
DDT	0.398	0.343
Chlordane	0.630	0.548
Toxaphene	--	--

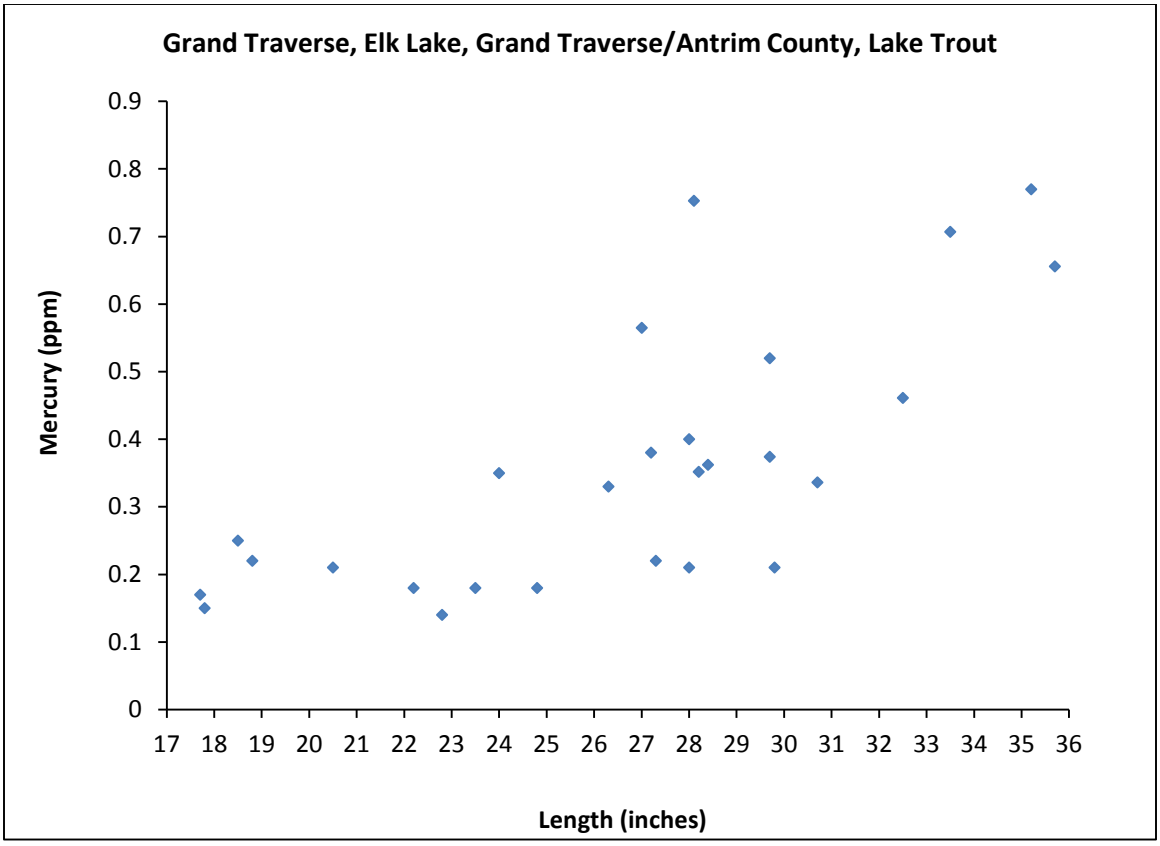
Final meal category based on UCL: 1

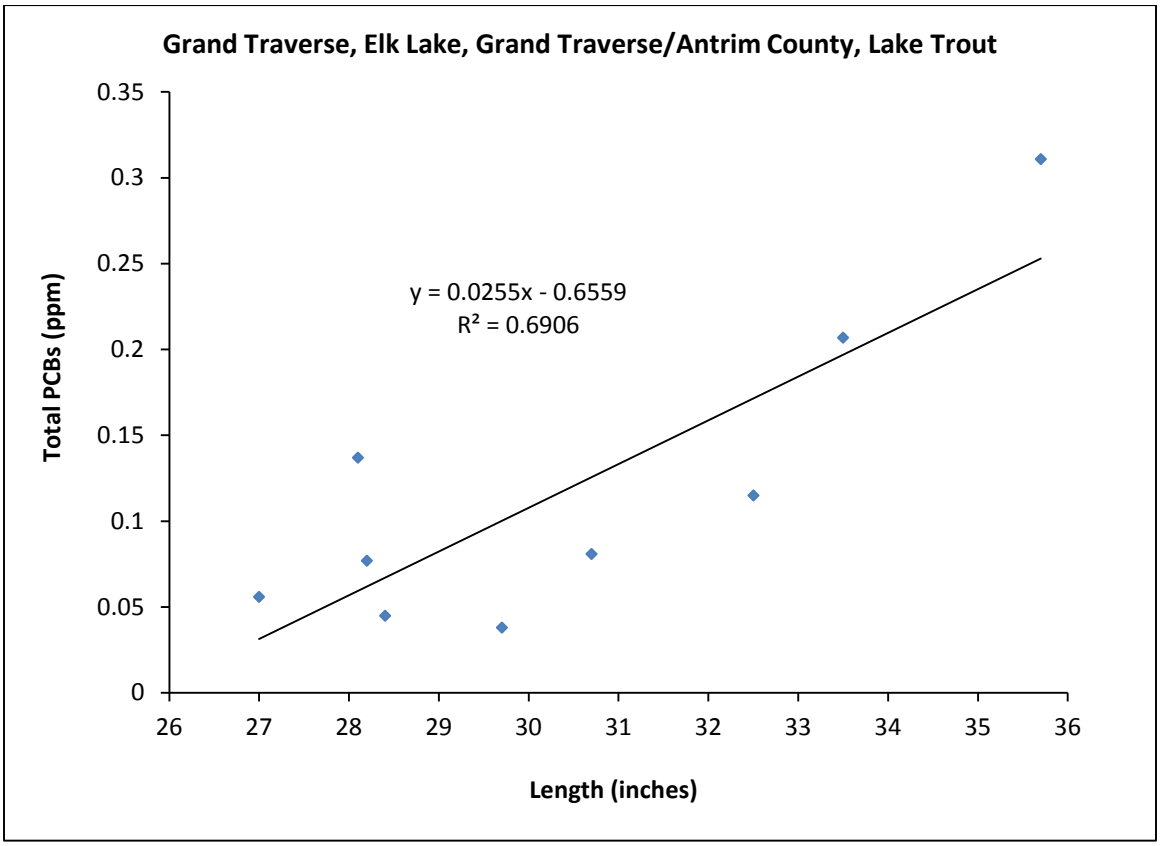
Existing Advisory: Women and children should not eat more than one meal per week of Elk Lake lake trout smaller than 22 inches or more than one meal per month of those fish larger than 22 inches due to PCBs and mercury.

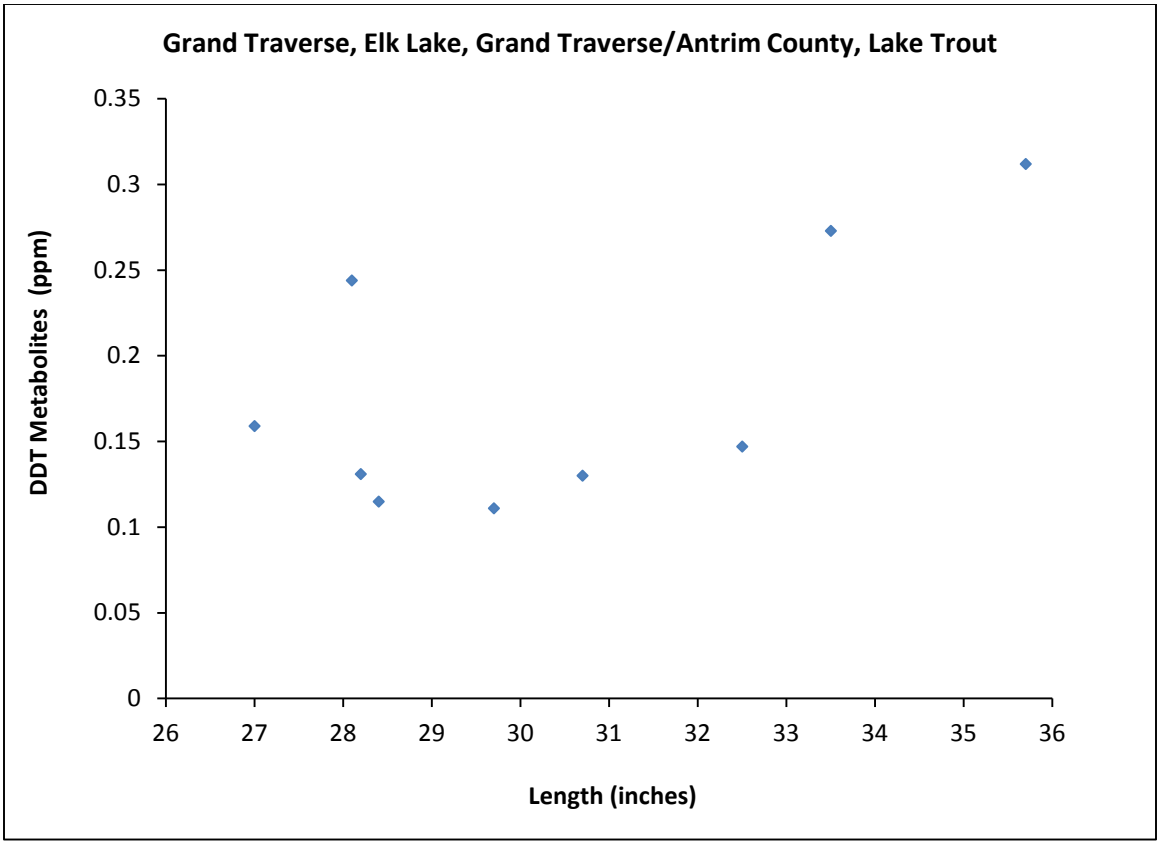
Recommendation: No one should eat more than 2 meals per month of Elk Lake lake trout smaller than 30 inches due to mercury or more than 1 meal per month of those fish larger than 30 inches due to PCBs. DDT would cause an advisory.

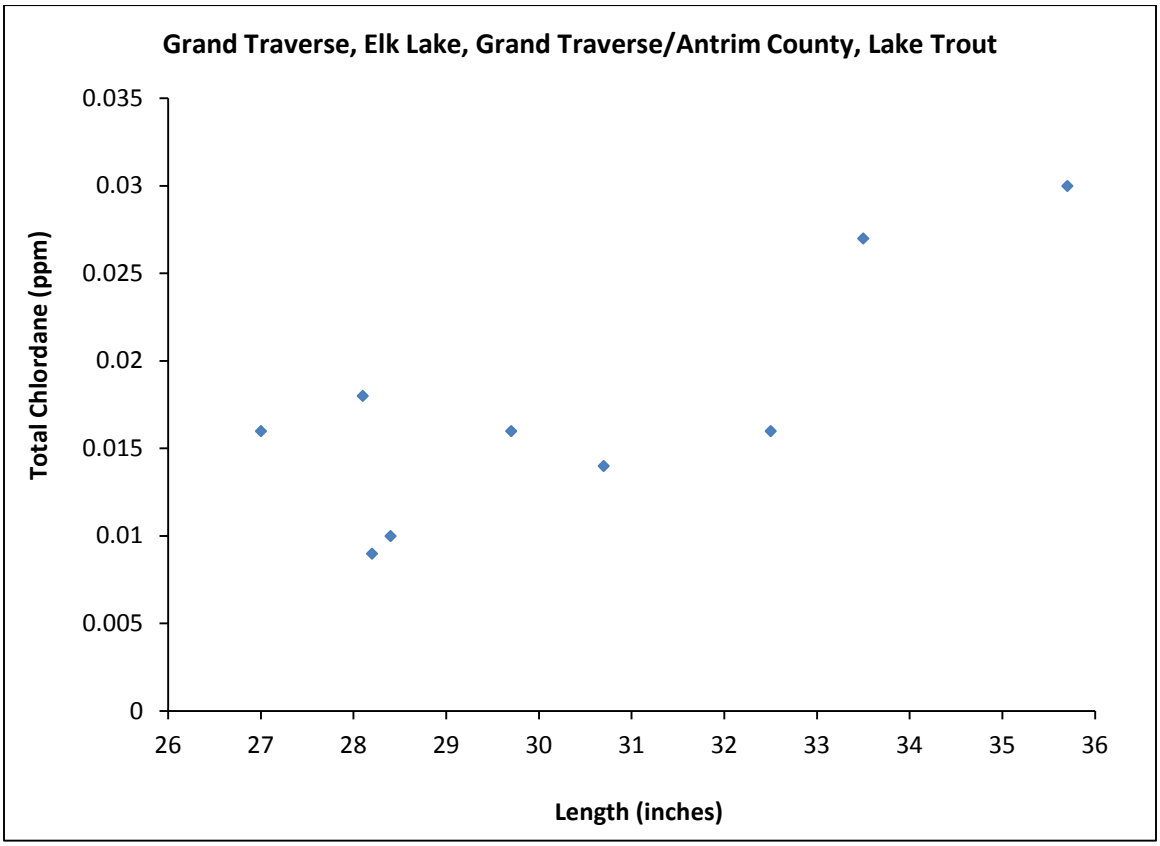
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
15	-0.273	16
18	-0.197	16
20	-0.146	16
22	-0.095	16
24	-0.044	16
26	0.007	16
28	0.058	2
30	0.109	2
32	0.160	1

Shaded area denotes extrapolated estimates


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Lake Trout
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Length (inches)


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Lake Trout
Total PCBs (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
y = 0.0255x - 0.6559
R² = 0.6906
26 27 28 29 30 31 32 33 34 35 36
Length (inches)


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Lake Trout
DDT Metabolites (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
26
27
28
29
30
31
32
33
34
35
36
Length (inches)


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Lake Trout
Total Chlordane (ppm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
26
27
28
29
30
31
32
33
34
35
36
Length (inches)

Northern Pike **Elk Lake** **Grand Traverse & Antrim 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	2006	5	26	24	26	39

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.68	0.41	0.88	0.96	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.859	0.869

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 (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	--	--

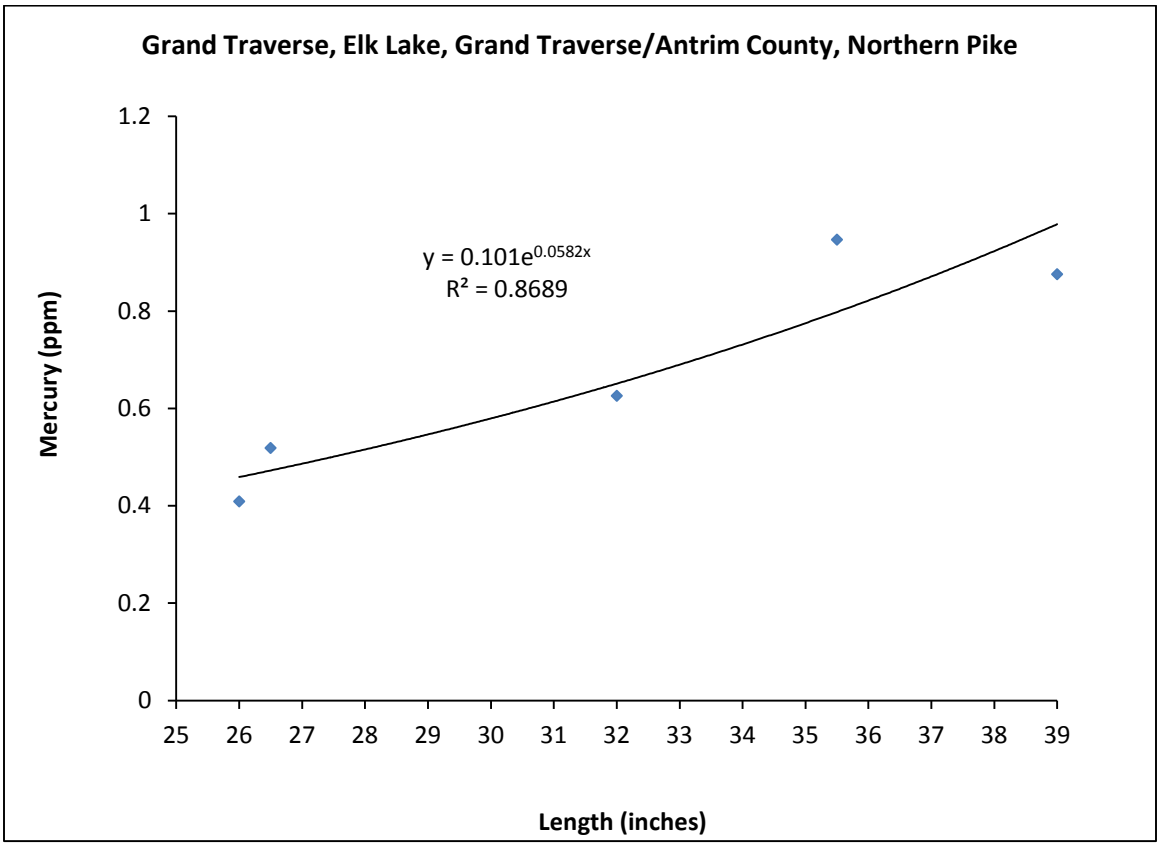
Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 2 meals per month of Elk Lake northern pike smaller than 28 inches or more than 1 meal per month of those fish larger than 28 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
24	0.408	2
25	0.433	2
26	0.459	2
27	0.486	2
28	0.515	2
29	0.546	1
30	0.579	1
31	0.614	1
32	0.650	1

Shaded area denotes extrapolated estimates


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Northern Pike
y = 0.101e^0.0582x
R² = 0.8689
Mercury (ppm)
Length (inches)
1.2
1
0.8
0.6
0.4
0.2
0
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39

Walleye | **Elk Lake** | **Grand Traverse & Antrim 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	2006	5	22.8	15	22.8	25.6

Datasets available: 2006

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.87	0.65	1.25	1.15	0.5

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.725	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
--	--	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	--	--

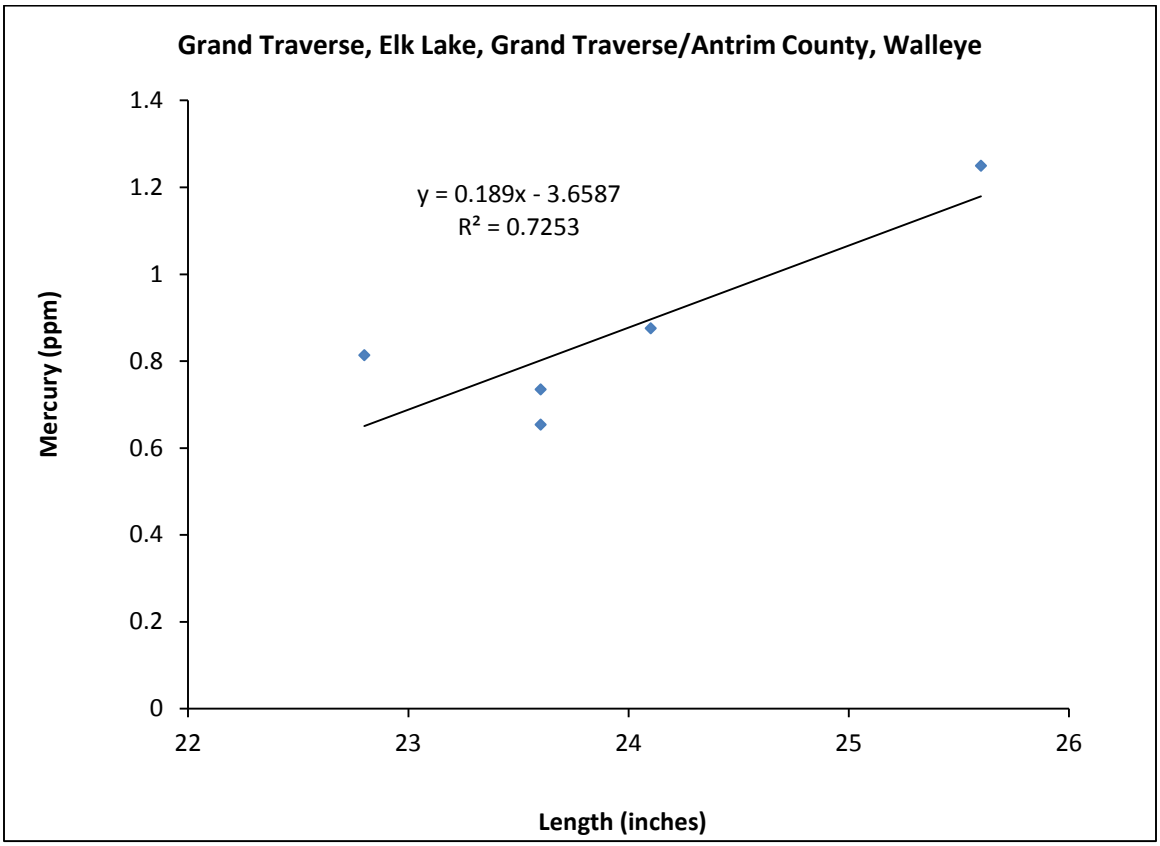
Final meal category based on UCL: 0.5

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

Recommendation: No one should eat more than 1 meal per month of Elk Lake walleye smaller than 24 inches or more than 6 meals per year of those fish larger than 24 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	-0.82	16
16	-0.63	16
18	-0.26	16
20	0.12	8
22	0.50	2
24	0.88	1
26	1.26	0.5
28	1.63	0.5
30	2.01	0.5

Shaded area denotes extrapolated estimates


Grand Traverse, Elk Lake, Grand Traverse/Antrim County, Walleye
y = 0.189x - 3.6587
R² = 0.7253
Mercury (ppm)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
22
23
24
25
26
Length (inches)

Largemouth and Smallmouth Bass | **Fife Lake** | **Grand Traverse 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	13.7	14	13.7	15.8

Datasets available: 2013

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.32	0.22	0.40	0.36	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.654	0.621

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	--	--

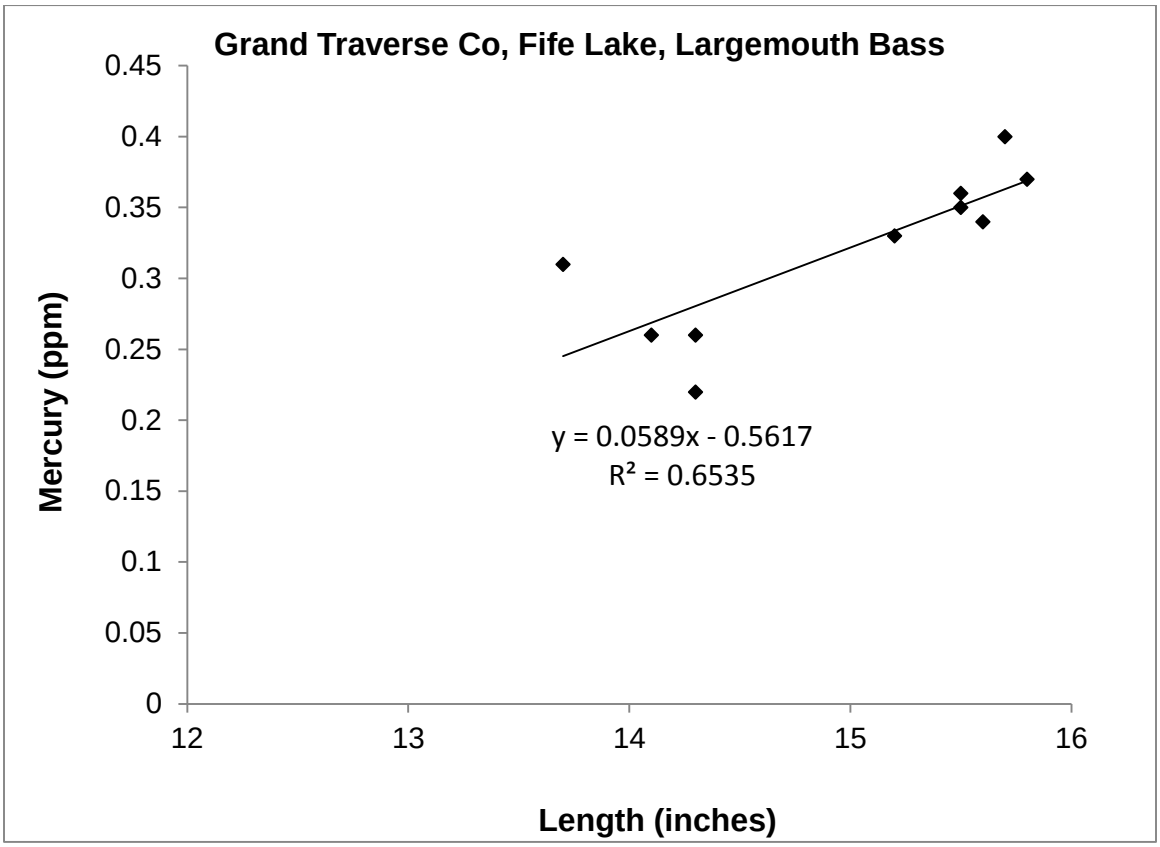
Final meal category based on UCL: 2

Existing Advisory: Fife Lake largemouth bass are covered by the statewide advisory: No one should eat more than 2 meals of 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 due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
12	0.15	4
14	0.26	4
16	0.38	2
18	0.5	2
20	0.62	1

Shaded area denotes extrapolated estimates

Recommendation:
No one should eat more than 2 meals of 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 due to mercury. The statewide length break was applied as the size range of fish was limited.


Grand Traverse Co, Fife Lake, Largemouth Bass
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
12
13
14
15
16
Length (inches)
y = 0.0589x - 0.5617
R² = 0.6535

Lake Trout **Green Lake** **Grand Traverse 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	2013	20	22	15	22	32

Datasets available: 2003, 2013

Chemical	Sample Size (Legal)	Mean	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.69	0.54	1.1	0.77	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.074	0.072

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	2013	20	22	15	22	32

Datasets available: 2003, 2013

Chemical	Sample Size (Legal)	Mean	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	20	0.122	0.036	0.366	0.162	1
DDT	20	0.249	0.07	0.722	0.317	4
Chlordane	20	0.028	0.007	0.098	0.037	--
Toxaphene	20	ND	--	--	--	--
TEQ*	10	7.8 ppt	3.5 ppt	11.1 ppt	9.6 ppt	0.5

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.125	0.117
DDT	0.212	0.348
Chlordane	0.217	0.412
Toxaphene	--	--
TEQ*	0.628	0.759

Final meal category based on UCL: 0.5

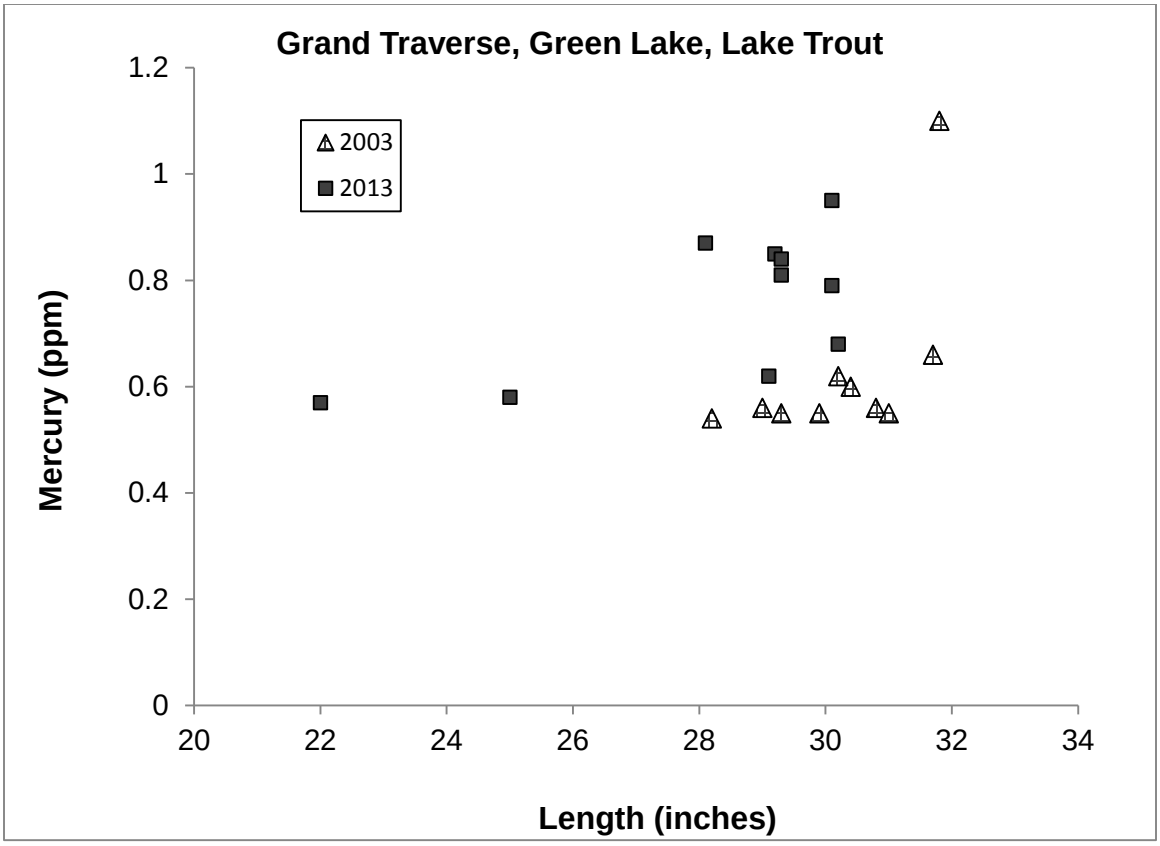
* - WHO 2005 TEFs; dlPCBs included

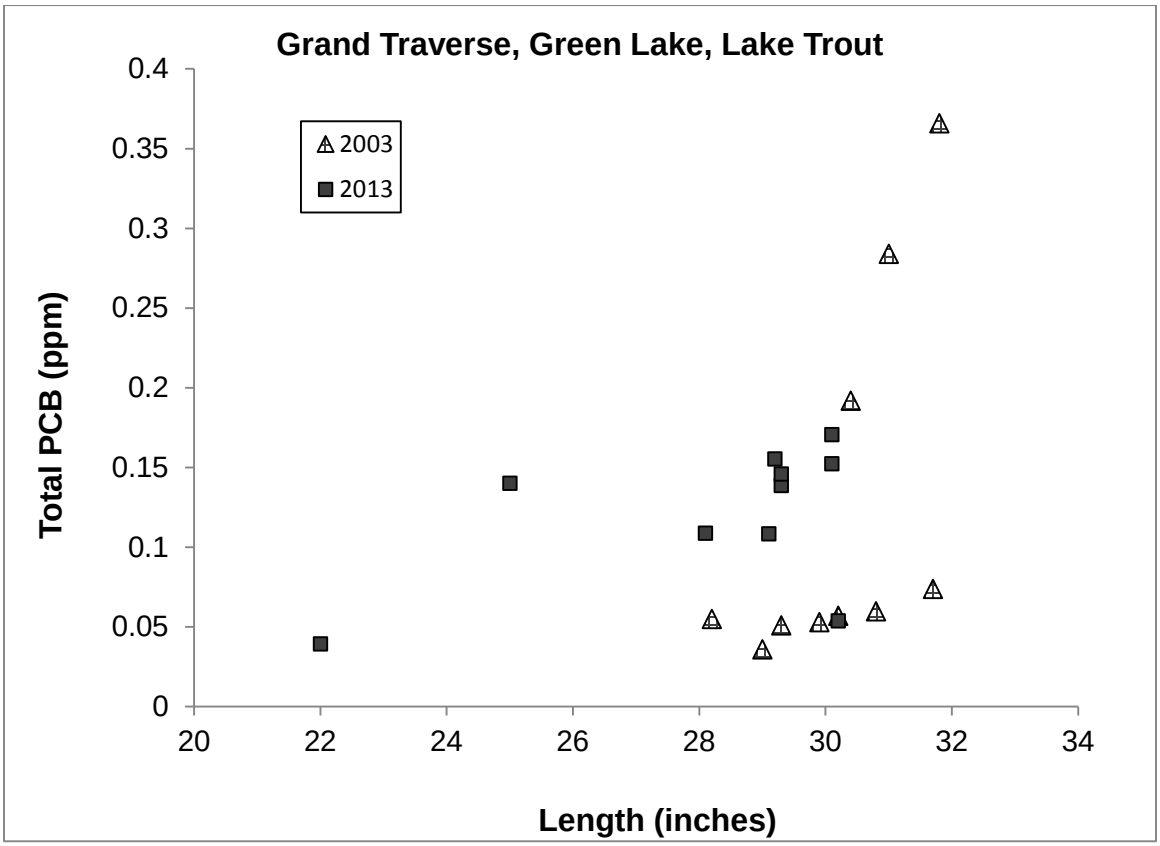
Existing Advisory: No one should eat more than 1 meal per month of Green Lake lake trout due to dioxins, PCBs, and mercury. DDT would cause an advisory.

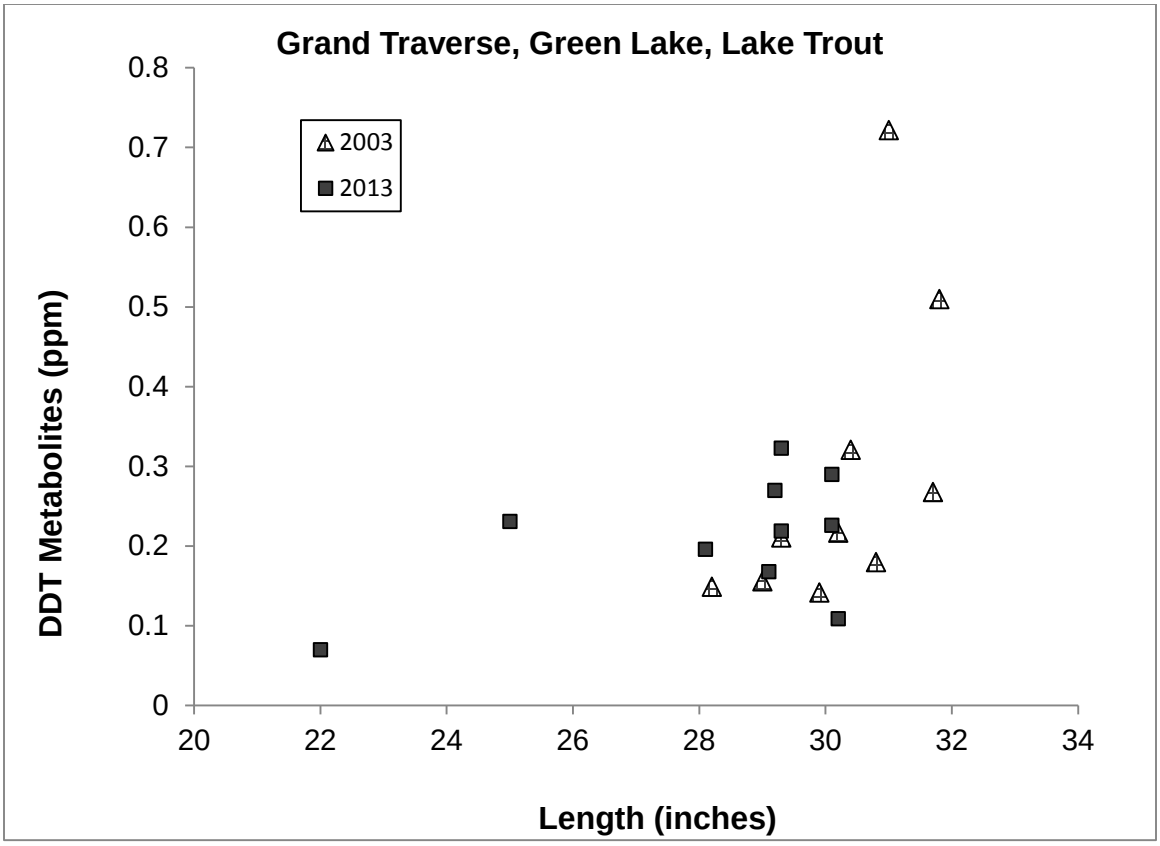
Recommendation: No one should eat more than 1 meal per month of Green Lake lake trout smaller than 28 inches or more than 6 meals per year of those fish larger than 28 inches due to dioxins. PCBs, mercury, and DDT would cause advisories.

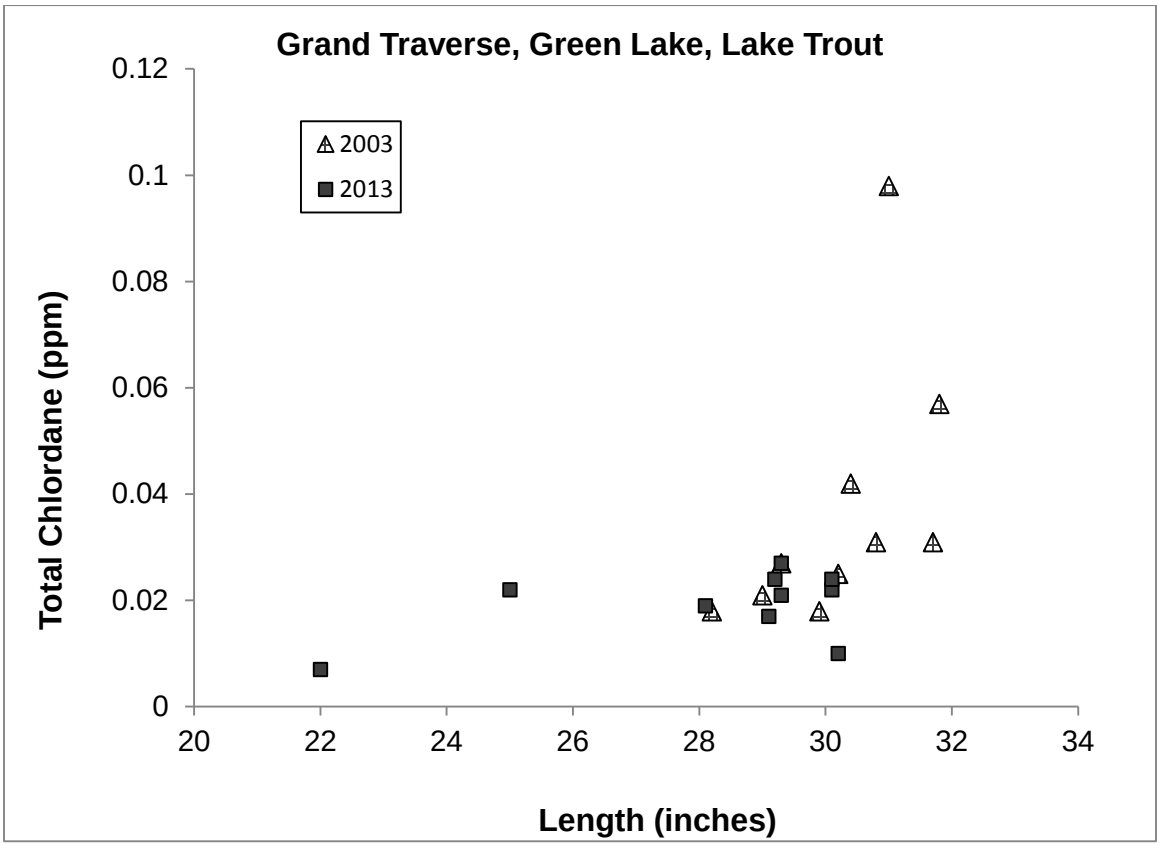
Length (Inches)	TEQ Regression Equation Estimate (ppt)	Meal Category
20	2.6	2
22	3.4	2
24	4.3	1
26	5.6	1
28	7.1	1
30	9.2	0.5
32	11.7	0.5
34	15.1	Limited

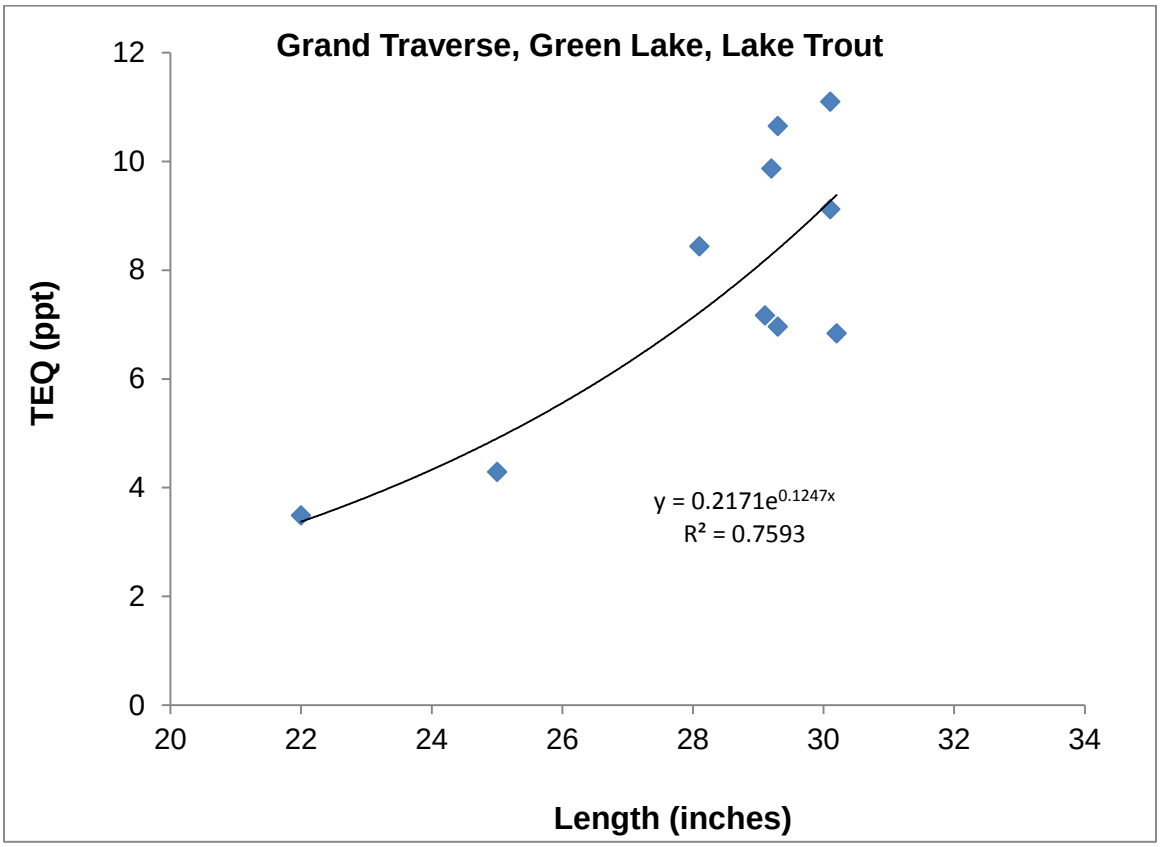
Shaded area denotes extrapolated estimates


Grand Traverse, Green Lake, Lake Trout
2003
2013
Mercury (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
20
22
24
26
28
30
32
34
Length (inches)


Grand Traverse, Green Lake, Lake Trout
2003
2013
Total PCB (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
20
22
24
26
28
30
32
34
Length (inches)


Grand Traverse, Green Lake, Lake Trout
2003
2013
DDT Metabolites (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
20
22
24
26
28
30
32
34
Length (inches)


Grand Traverse, Green Lake, Lake Trout
2003
2013
Total Chlordane (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
20
22
24
26
28
30
32
34
Length (inches)


Grand Traverse, Green Lake, Lake Trout
TEQ (ppt)
Length (inches)
y = 0.2171e^0.1247x
R² = 0.7593
0
2
4
6
8
10
12
20
22
24
26
28
30
32
34

Northern Pike **Green Lake** **Grand Traverse 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	2013	15	22	24	24.4	32.9

Datasets available: 1993, 2013

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	11	0.76	0.53	1.0	0.86	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.513	0.527

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: --

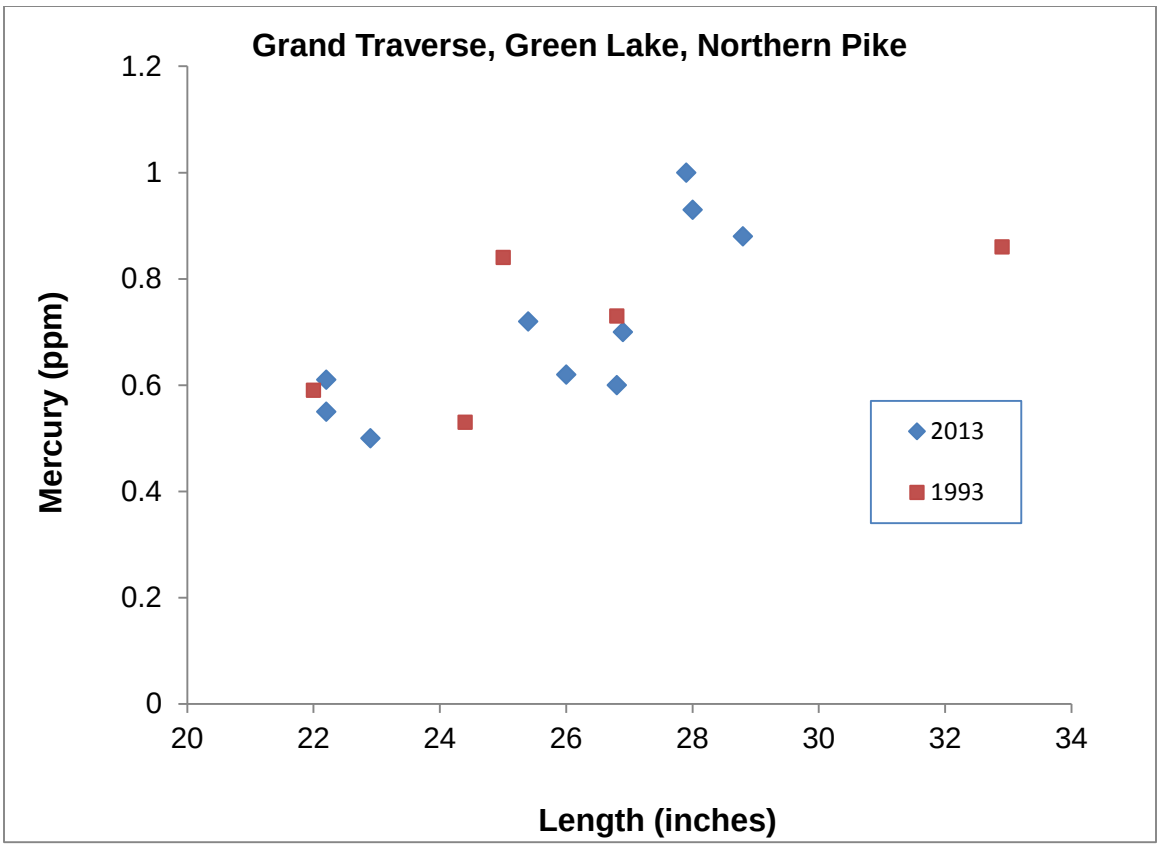
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

Existing Advisory: No one should eat more than 1 meal per month of Green Lake 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 statewide length break was applied as the number of samples larger than 30 inches is limited.


Grand Traverse, Green Lake, Northern Pike
Mercury (ppm)
1.2
1
0.8
0.6
0.4
0.2
0
20
22
24
26
28
30
32
34
Length (inches)
2013
1993

White Sucker **Green Lake** **Grand Traverse County**

Hg Analysis:

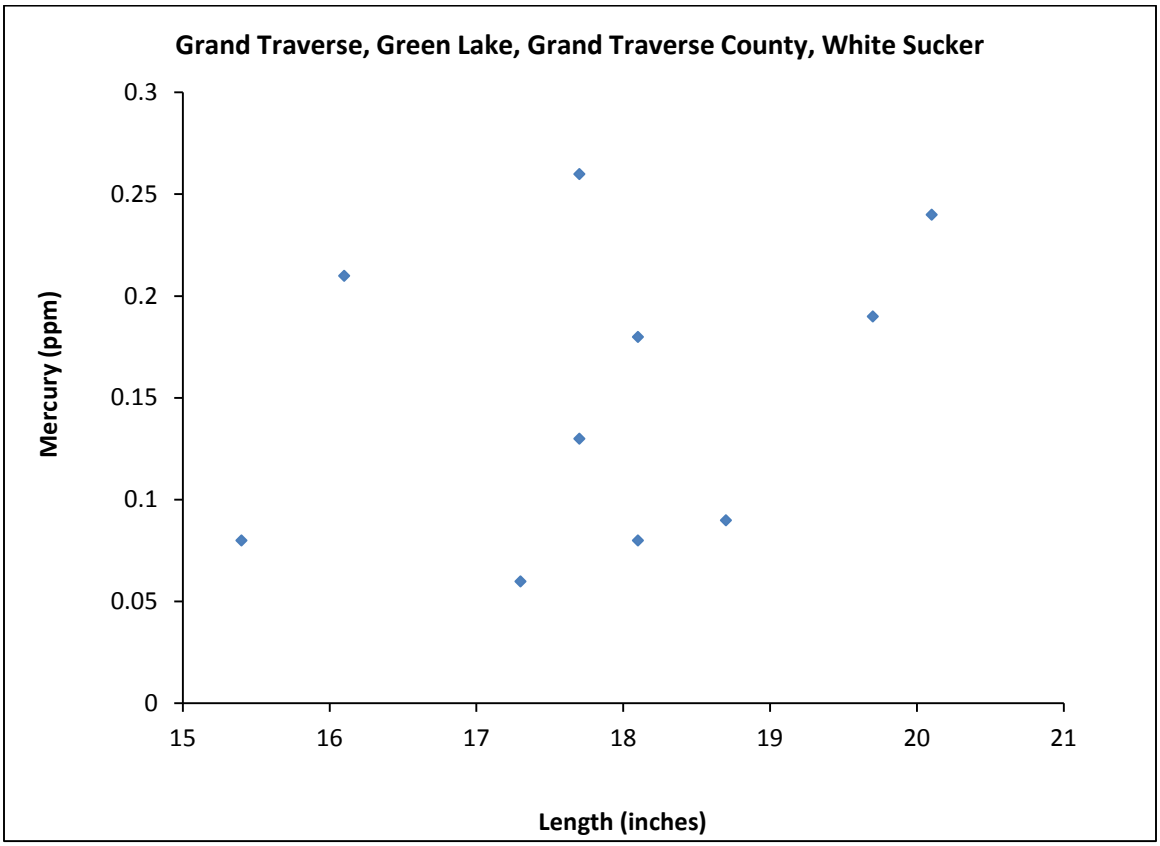
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1993	1993	10	15.4	na	15.4	20.1	
Datasets available:	1993						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.15		0.06	0.26	0.20	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.112	0.120					

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 (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:**			**4**

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

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


Grand Traverse, Green Lake, Grand Traverse County, White Sucker
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
21
Length (inches)

Walleye **Long Lake** **Grand Traverse 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	6	14.4	15	14.4	19.6

Datasets available: 2007

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.35	0.27	0.42	0.39	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.632	0.671

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	6	14.4	15	14.4	19.6

Datasets available: 2007

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	6	ND	--	--	--	--
DDT	6	0.001	0.001	0.002	--	--
Chlordane	6	ND	--	--	--	--
Toxaphene	6	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.211	0.211
Chlordane	--	--
Toxaphene	--	--

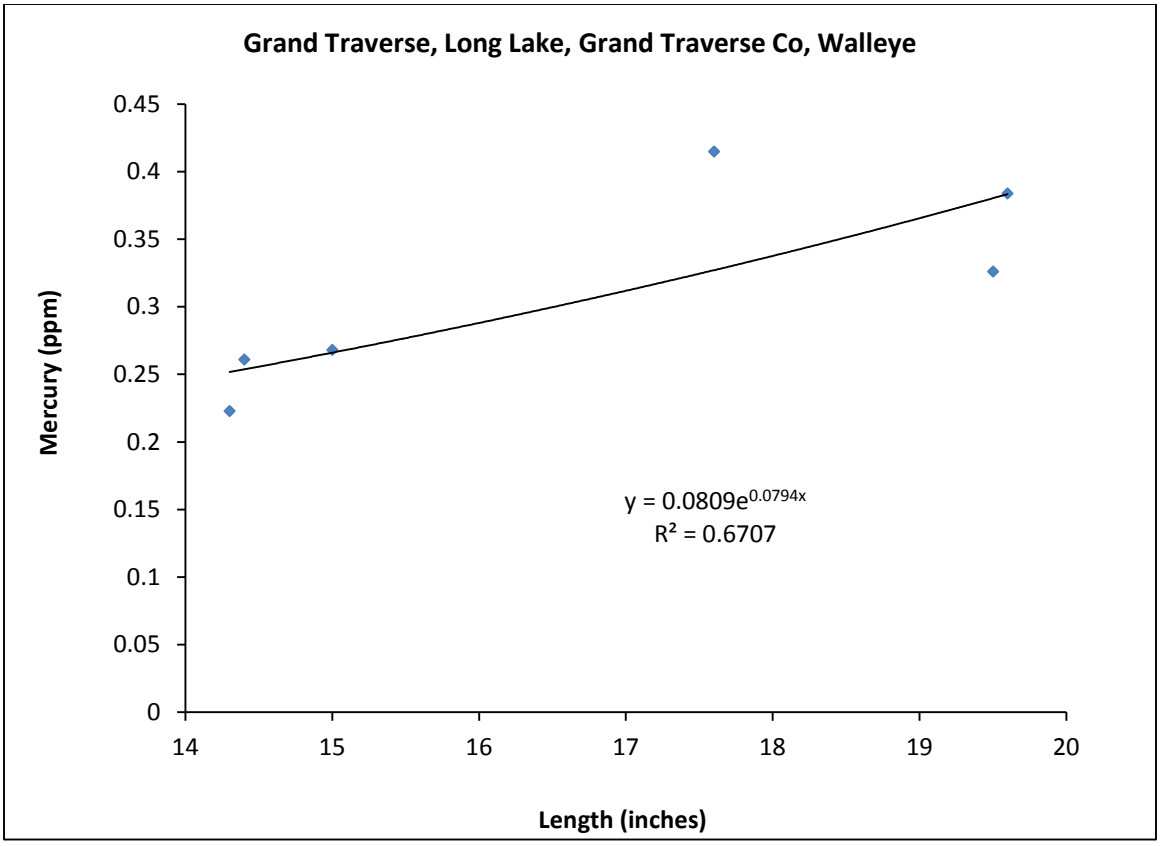
Final meal category based on UCL: 2

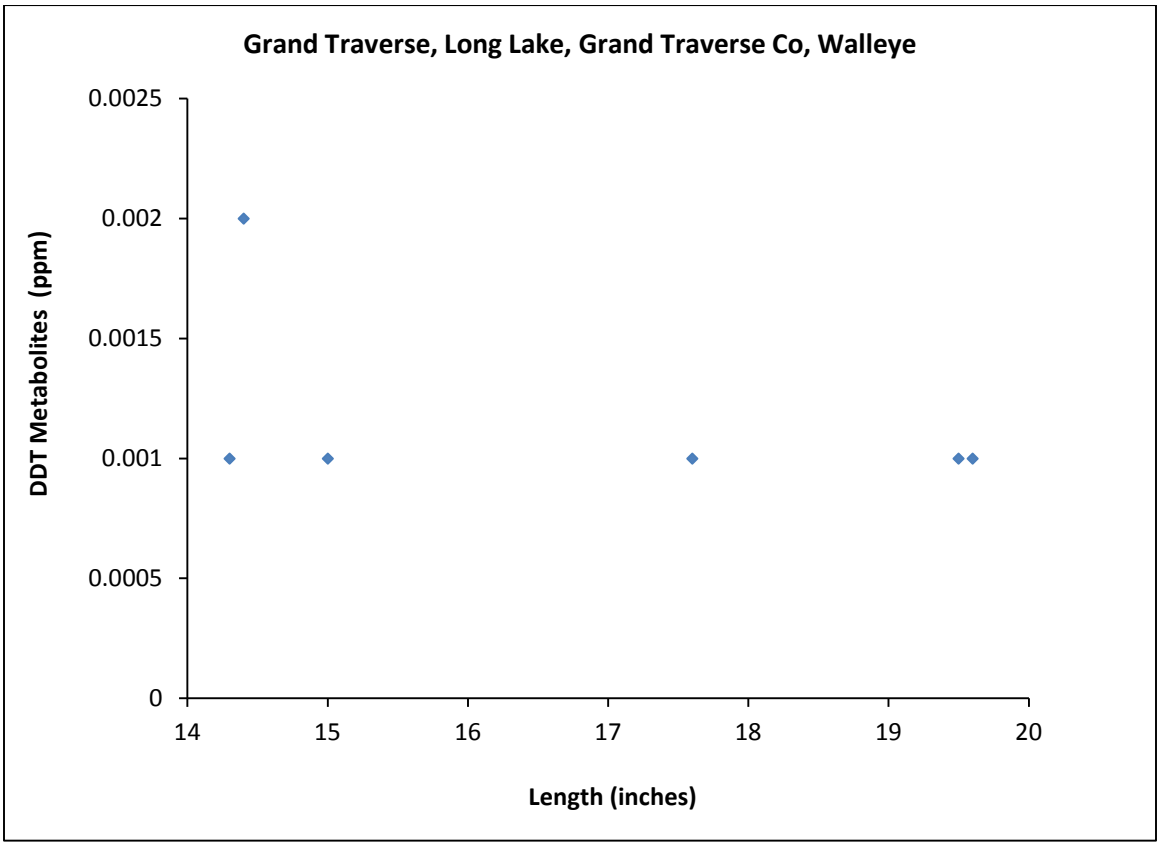
Existing Advisory: Long Lake walleye are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Long Lake walleye smaller than 20 inches or more than 1 meal per month of those fish larger than 20 inches due to mercury. The statewide length break was applied as the size range of fish was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.27	4
16	0.29	2
17	0.31	2
18	0.34	2
19	0.37	2
20	0.40	2
21	0.43	2
22	0.46	2
23	0.50	2

Shaded area denotes extrapolated estimates


Grand Traverse, Long Lake, Grand Traverse Co, Walleye
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
14
15
16
17
18
19
20
Length (inches)
y = 0.0809e^0.0794x
R² = 0.6707


Grand Traverse, Long Lake, Grand Traverse Co, Walleye
DDT Metabolites (ppm)
0.0025
0.002
0.0015
0.001
0.0005
0
14
15
16
17
18
19
20
Length (inches)

Brown Trout **Parker Creek** **Grand Traverse 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	8.9	8	8.9	13.2

Datasets available: 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.25	0.23	0.27	--	--

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	8.9	8	8.9	13.2

Datasets available: 1998

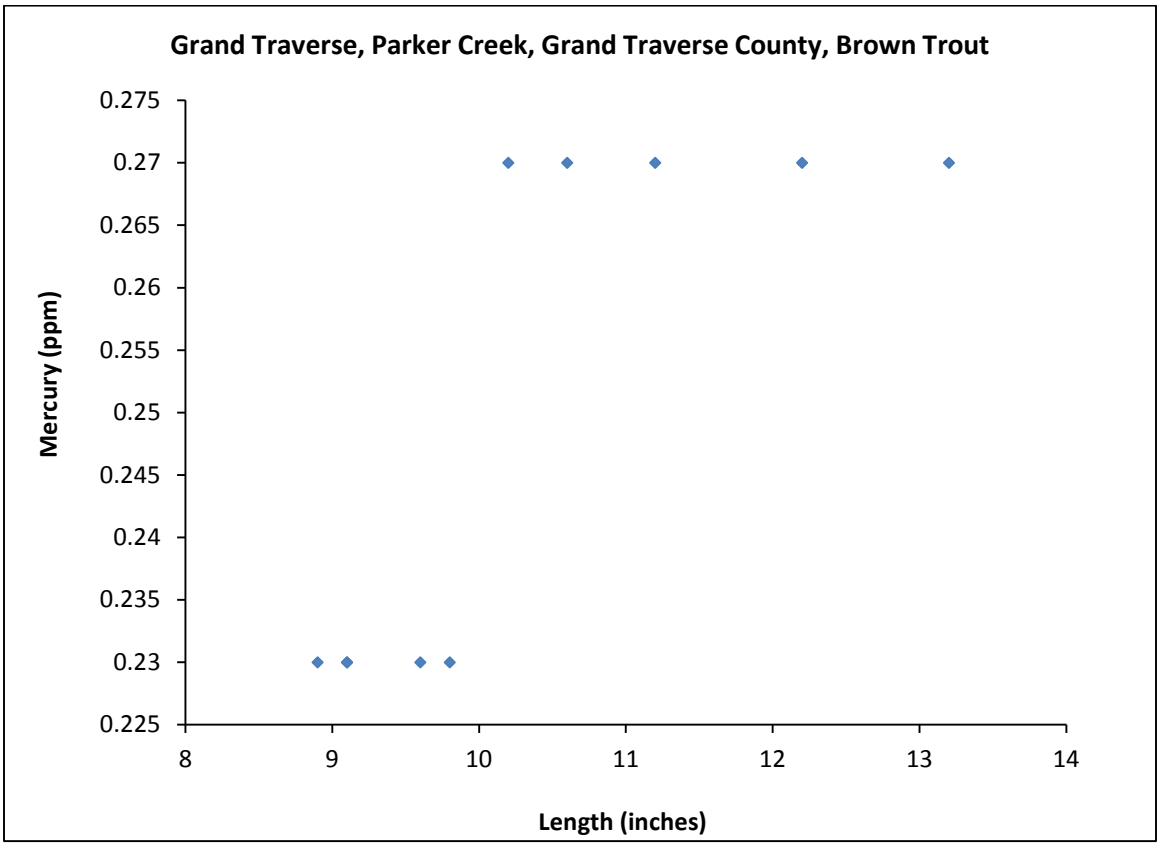
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	0.006	0.006	0.006	--	--
Chlordane	2*	ND	--	--	--	--
Toxaphene	2*	ND	--	--	--	--

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 Parker Creek brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.


Grand Traverse, Parker Creek, Grand Traverse County, Brown Trout
Mercury (ppm)
0.275
0.27
0.265
0.26
0.255
0.25
0.245
0.24
0.235
0.23
0.225
8
9
10
11
12
13
14
Length (inches)

Walleye **Silver Lake** **Grand Traverse 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	13.8	15	14.6	18.4

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.39	0.19	0.56	0.52	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.856	0.922

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 (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	--	--

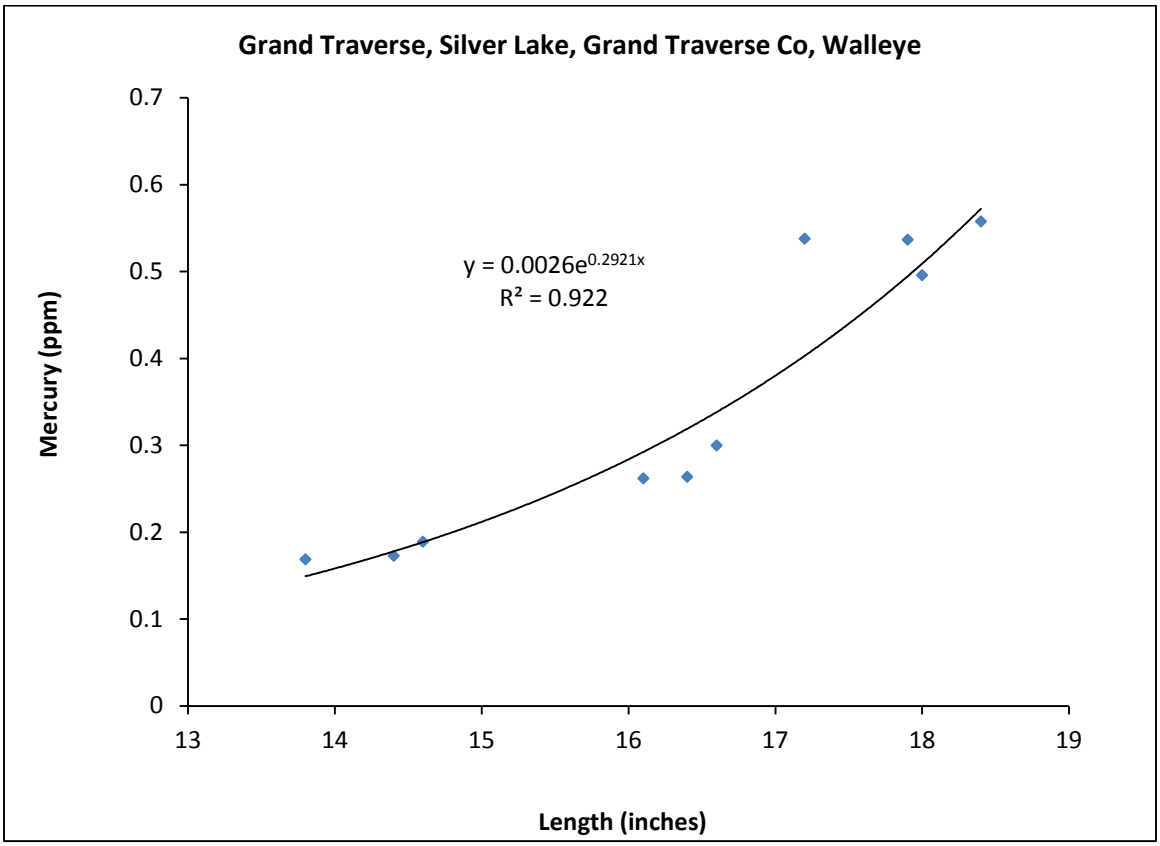
Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of Silver Lake walleye smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.208	4
16	0.278	2
17	0.373	2
18	0.499	2
19	0.669	1
20	0.896	1
21	1.199	0.5
22	1.606	0.5
23	2.151	0.5

Shaded area denotes extrapolated estimates


Grand Traverse, Silver Lake, Grand Traverse Co, Walleye
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
13
14
15
16
17
18
19
Length (inches)
y = 0.0026e^0.2921x
R² = 0.922

Kalkaska County

Brown Trout **Bear Lake** **Kalkaska 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	4	12.2	12	12.2	14.2

Datasets available: 1987

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	ND*	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	--	--

* - detection level = 0.10 ppm

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 Bear Lake brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.

Smallmouth Bass **Bear Lake** **Kalkaska 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	7	8.7	14	14.0	16.1

Datasets available: 1987

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.23	0.12	0.35	0.32	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.833	0.877

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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	--	--

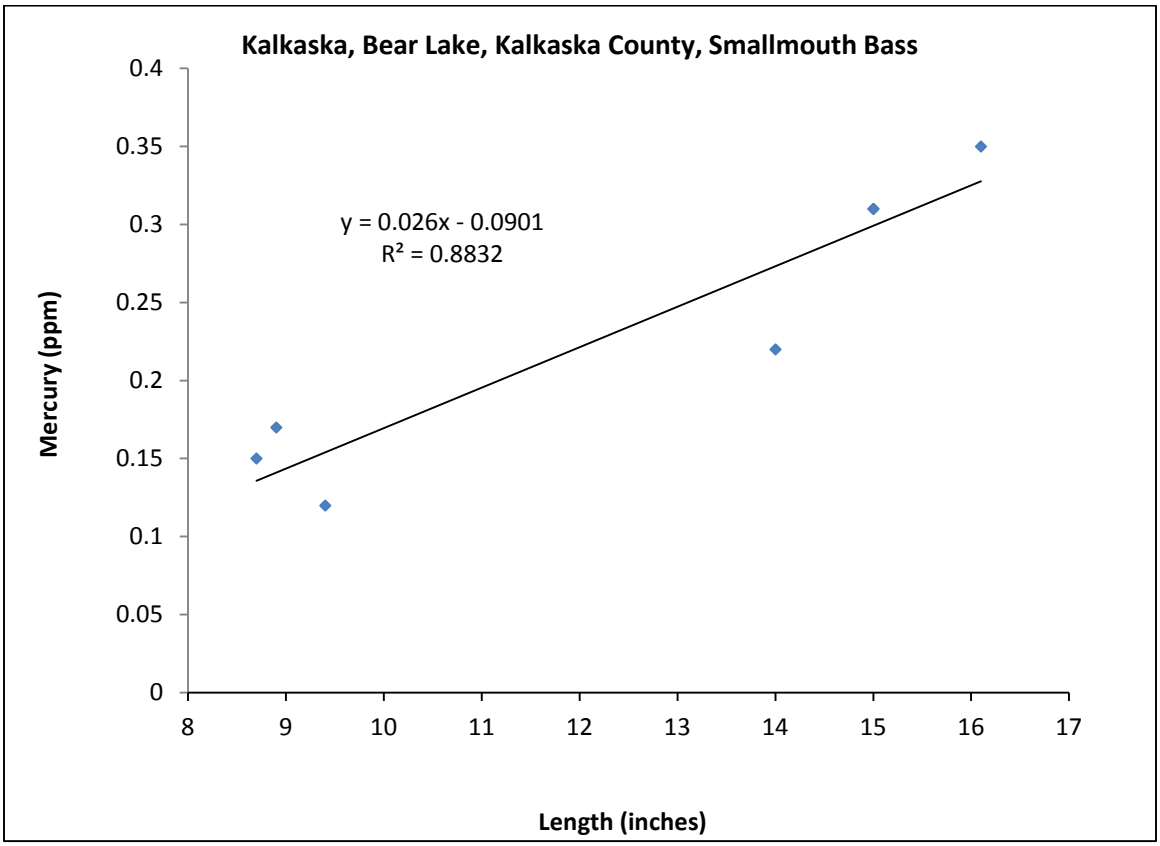
Final meal category based on UCL: 2

Existing Advisory: Bear Lake smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Bear Lake smallmouth bass smaller 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 as the size range of fish was limited.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.27	2
15	0.30	2
16	0.33	2
17	0.35	2
18	0.38	2
19	0.40	2
20	0.43	2
21	0.46	2
22	0.48	2

Shaded area denotes extrapolated estimates


Kalkaska, Bear Lake, Kalkaska County, Smallmouth Bass
y = 0.026x - 0.0901
R² = 0.8832
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
14
15
16
17
Length (inches)

Lake Herring **Big Twin Lake** **Kalkaska 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
2006	2006	5	13	na	13	14.1

Datasets available: 2006

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.31	0.22	0.35	0.37	2

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)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
2006	2006	5	13	na	13	14.1

Datasets available: 2006

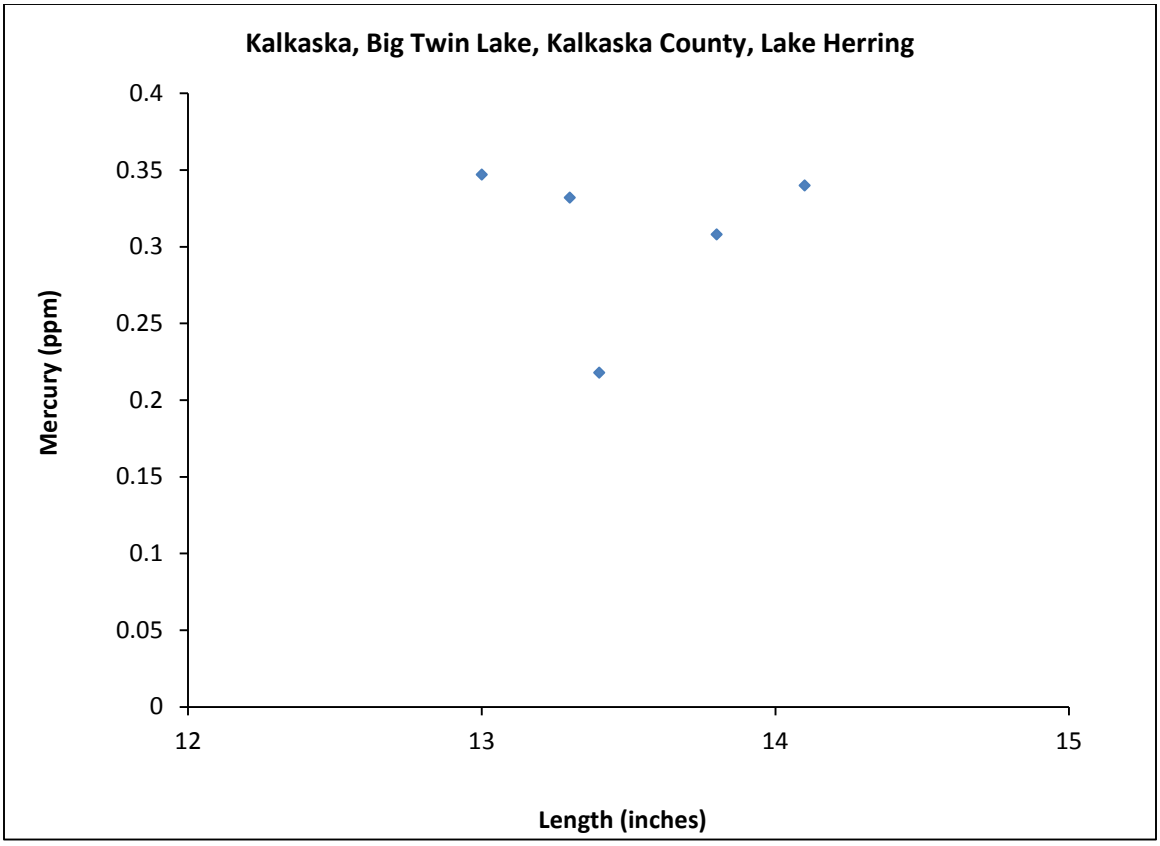
Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.001	0.001	0.002	0.002	16
DDT	5	0.004	0.001	0.009	0.01	16
Chlordane	5	0.001	0.001	0.002	0.002	16
Toxaphene	5	ND	--	--	--	--

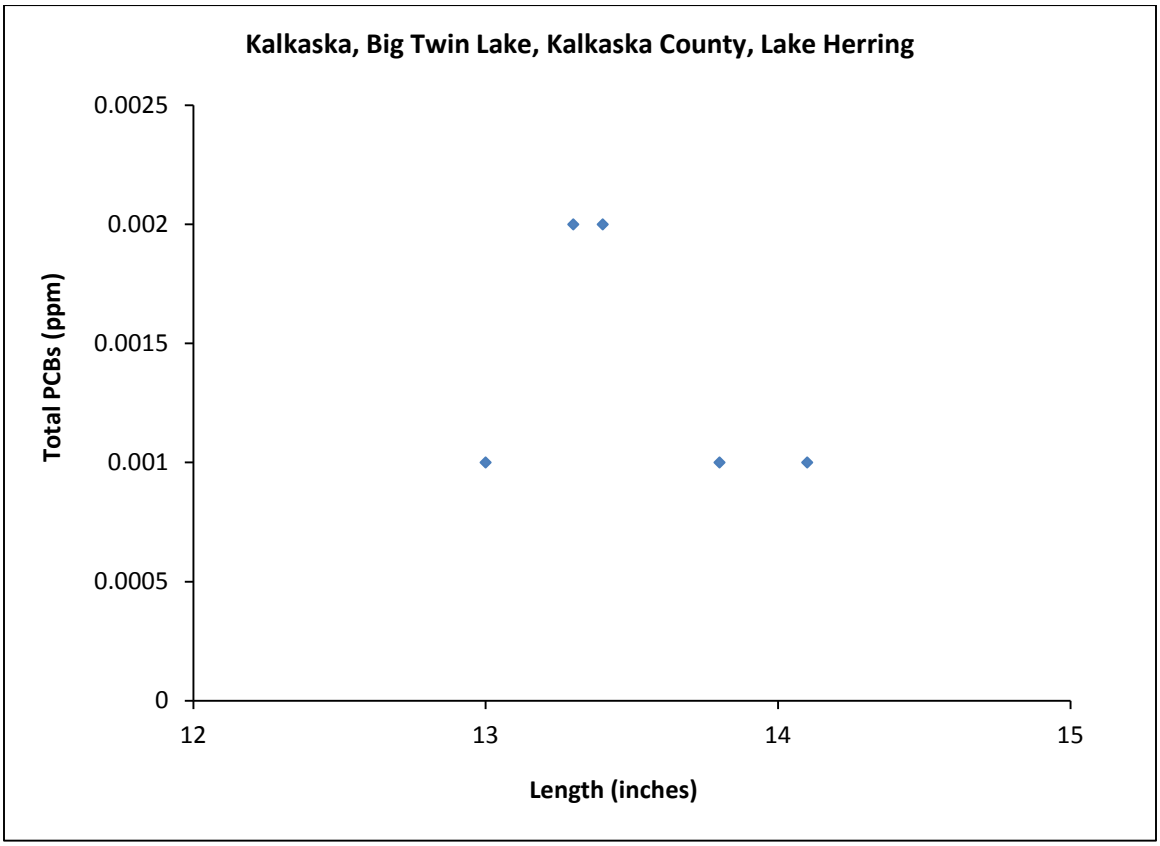
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.129	0.129
DDT	0.154	0.282
Chlordane	0.024	0.024
Toxaphene	--	--

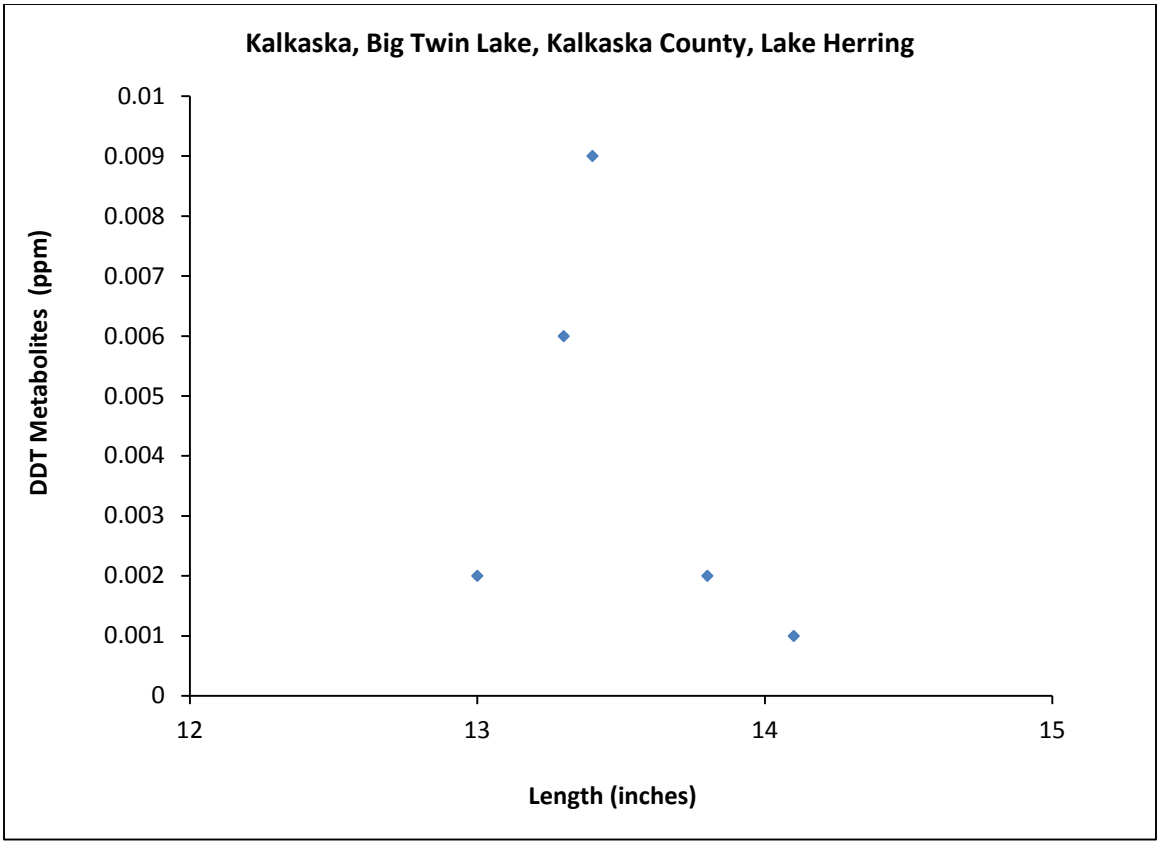
Final meal category based on UCL: 2

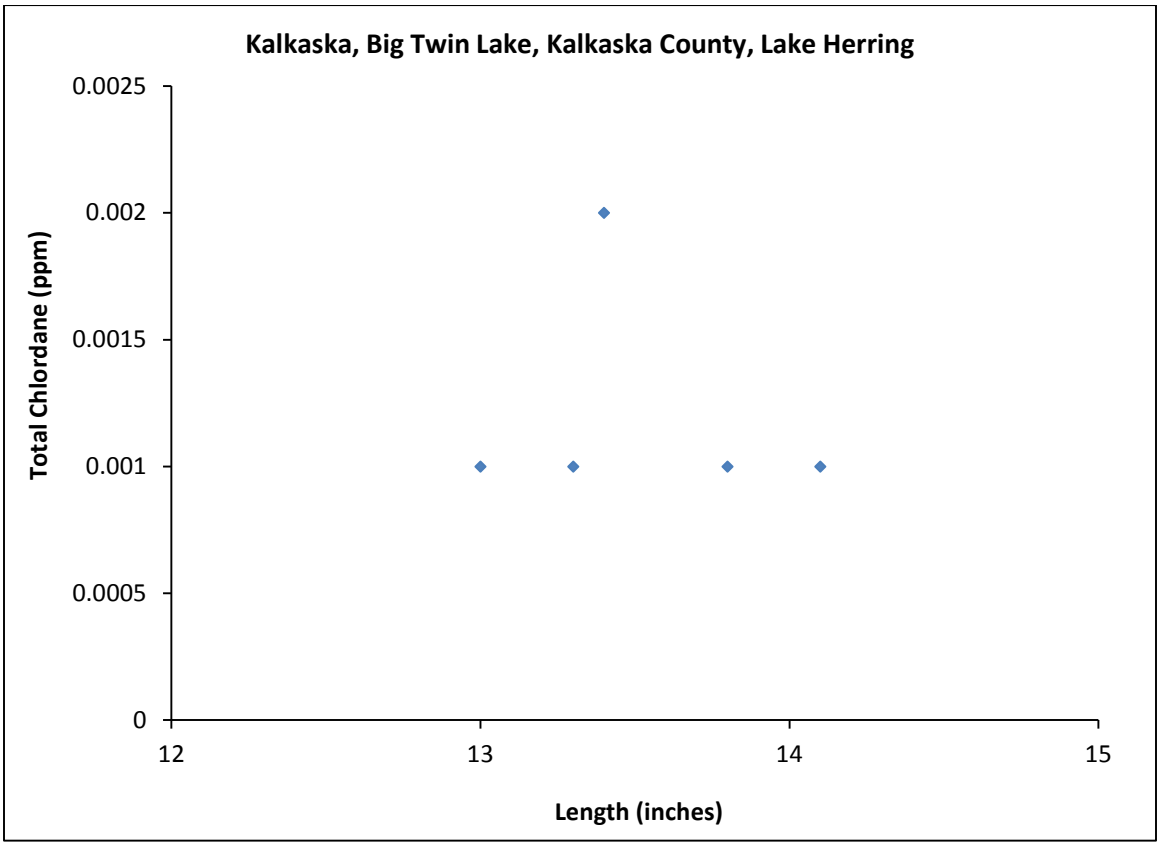
Existing Advisory: There are no current consumption advisories for Big Twin Lake lake herring.

Recommendation: No one should eat more than 2 meals per month of Big Twin Lake lake herring due to mercury.


Kalkaska, Big Twin Lake, Kalkaska County, Lake Herring
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
12
13
14
15
Length (inches)


Kalkaska, Big Twin Lake, Kalkaska County, Lake Herring
Total PCBs (ppm)
0.0025
0.002
0.0015
0.001
0.0005
0
12
13
14
15
Length (inches)


Kalkaska, Big Twin Lake, Kalkaska County, Lake Herring
DDT Metabolites (ppm)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
12
13
14
15
Length (inches)


Kalkaska, Big Twin Lake, Kalkaska County, Lake Herring
Total Chlordane (ppm)
0.0025
0.002
0.0015
0.001
0.0005
0
12
13
14
15
Length (inches)

Brown Trout **Rapid River** **Kalkaska 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
1998	1998	5	8.3	8	8.3	12.2

Datasets available: 1998

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	2*	0.19	0.15	0.24	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.841	0.841

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1998	1998	5	8.3	8	8.3	12.2

Datasets available: 1998

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	2*	ND	--	--	--	--
DDT	2*	0.01	0.007	0.01	0.01	16
Chlordane	2*	ND	--	--	--	--
Toxaphene	2*	ND	--	--	--	--

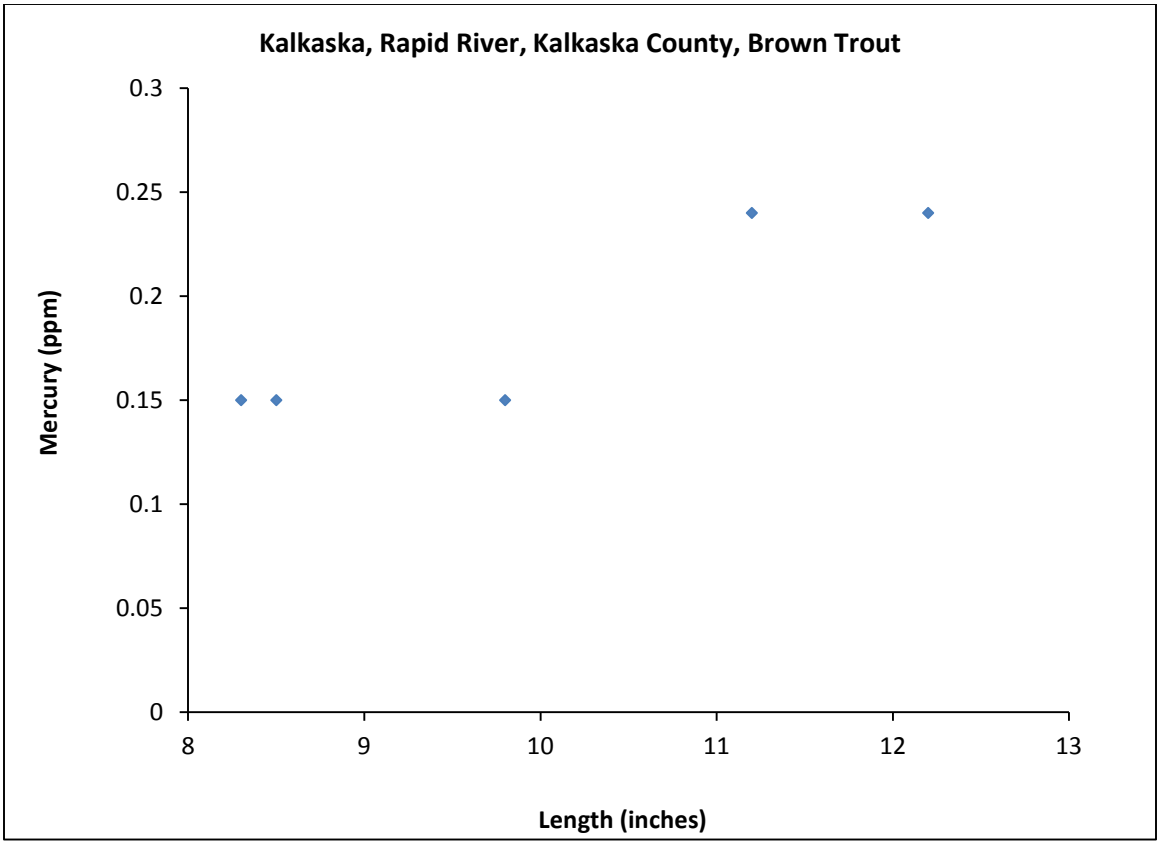
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.841	0.841
Chlordane	--	--
Toxaphene	--	--

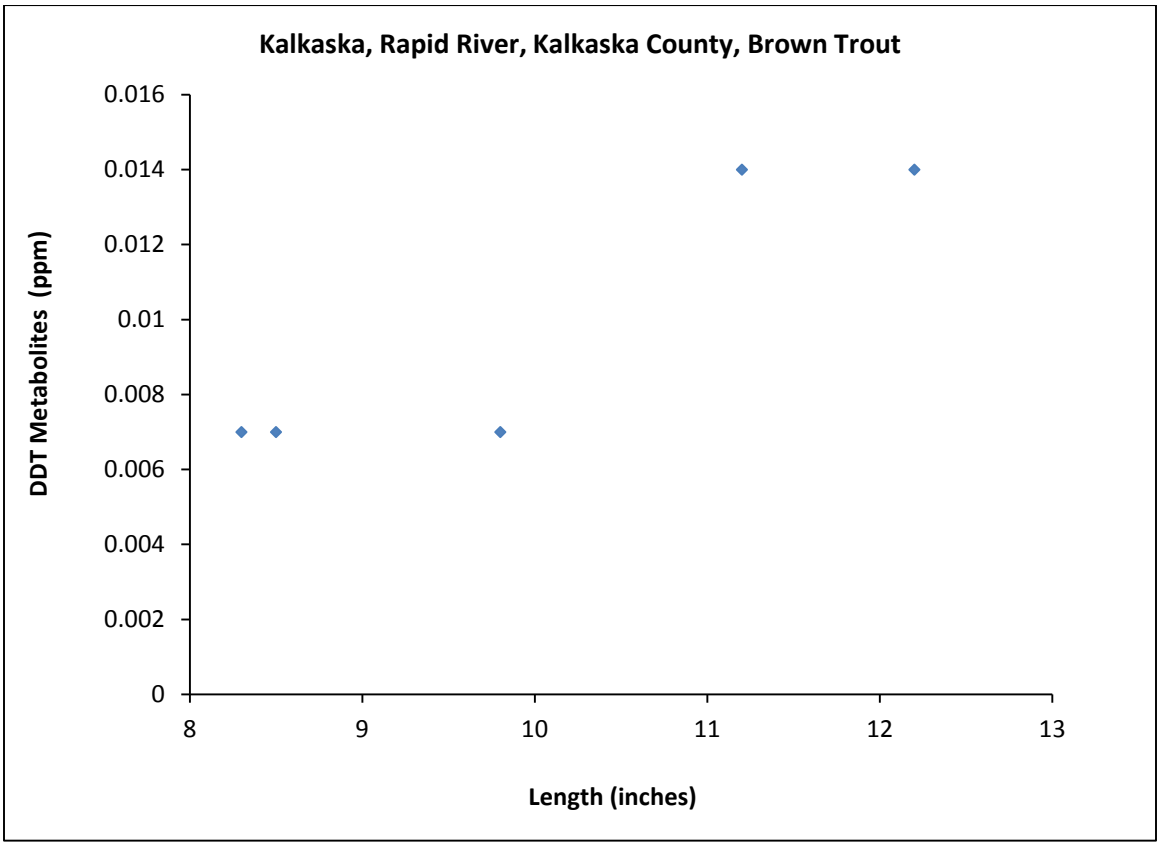
Final meal category based on UCL: --

* - 5 fish were analyzed as 2 composite samples

Existing Advisory: There are no current consumption advisories for Rapid River brown trout.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method.


Kalkaska, Rapid River, Kalkaska County, Brown Trout
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
Length (inches)


Kalkaska, Rapid River, Kalkaska County, Brown Trout
DDT Metabolites (ppm)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
8
9
10
11
12
13
Length (inches)

Lake County

Largemouth Bass **Big Star Lake** **Lake 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	12.5	14	14.8	17.4

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	6	0.24	0.10	0.69	0.48	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.001	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
--	--	0				

Datasets available: --

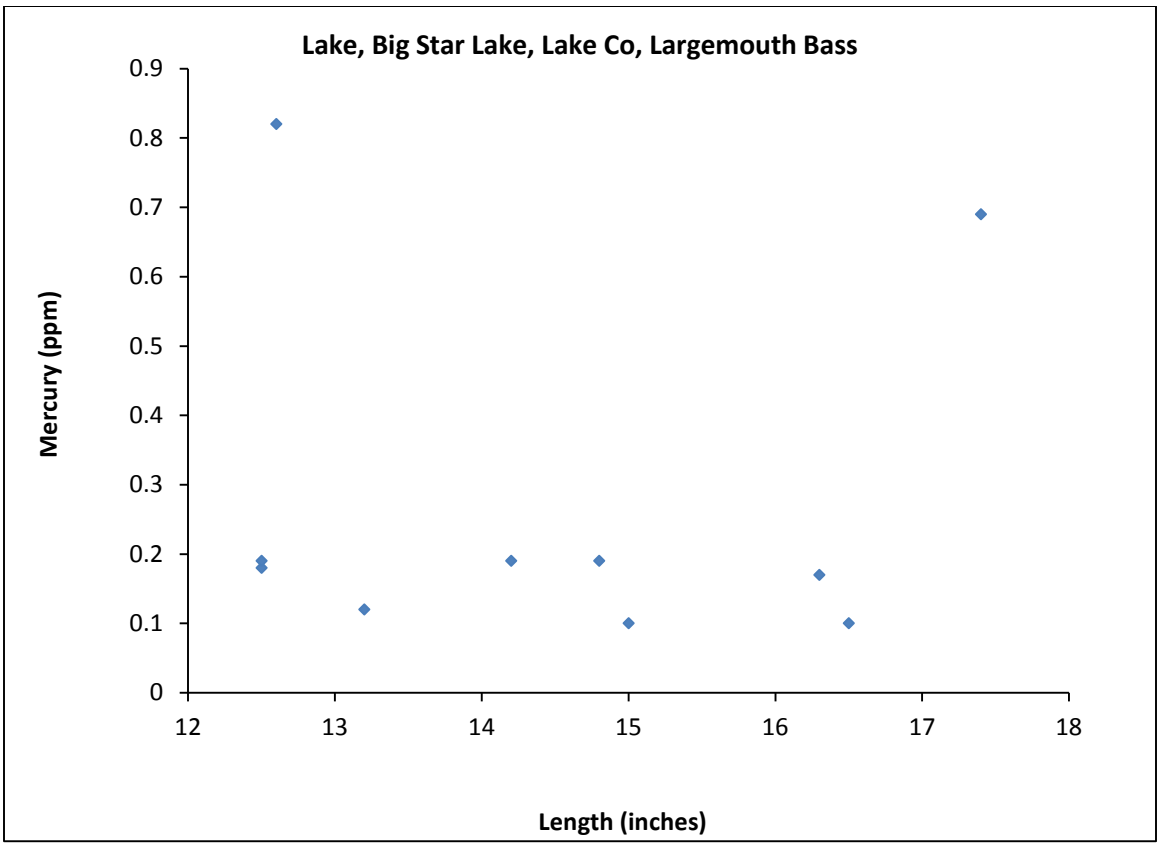
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

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

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


Lake, Big Star Lake, Lake Co, Largemouth Bass
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
12
13
14
15
16
17
18
Length (inches)

Leelanau County

Northern Pike **Little Traverse Lake** **Leelanau 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	8	17.8	24	24.1	29.9

Datasets available: 2013

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.63	0.49	0.77	0.81	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.578	0.595

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: --

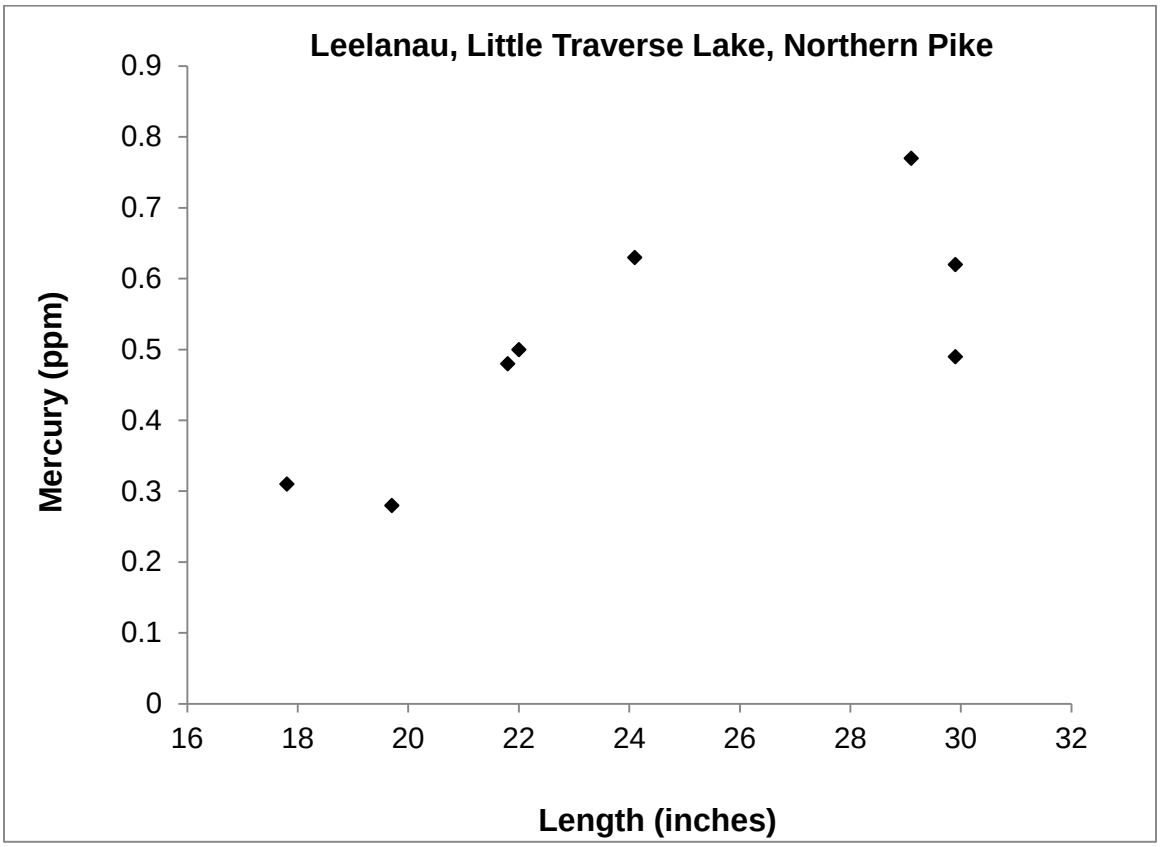
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	--	--	--	--	--	--
DDT	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: --

Existing Advisory: Little Traverse Lake northern pike are covered under the Statewide Guidelines. No one should eat more than 2 meals per month of northern pike under 30 inches or more than 1 meal per month of those fish over 30 inches in length due to mercury.

Recommendation: No change is recommended. There are insufficient data available to develop specific advice for Little Traverse Lake northern pike.


Leelanau, Little Traverse Lake, Northern Pike
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
16
18
20
22
24
26
28
30
32
Length (inches)

White Sucker **North Lake Leelanau** **Leelanau County**

Hg Analysis:

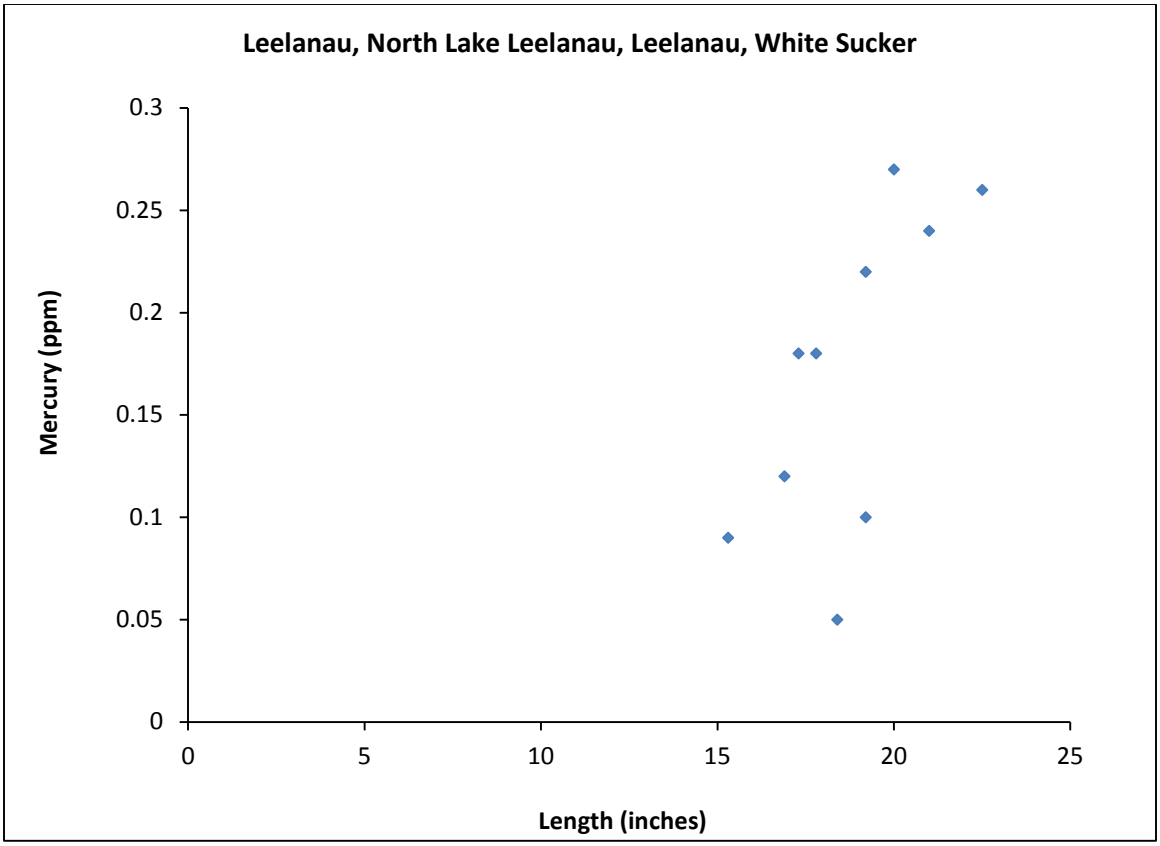
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2002	2002	10	15.3	na	15.3	22.5	
Datasets available: 2002							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.17		0.05	0.27	0.23	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.467	0.326					

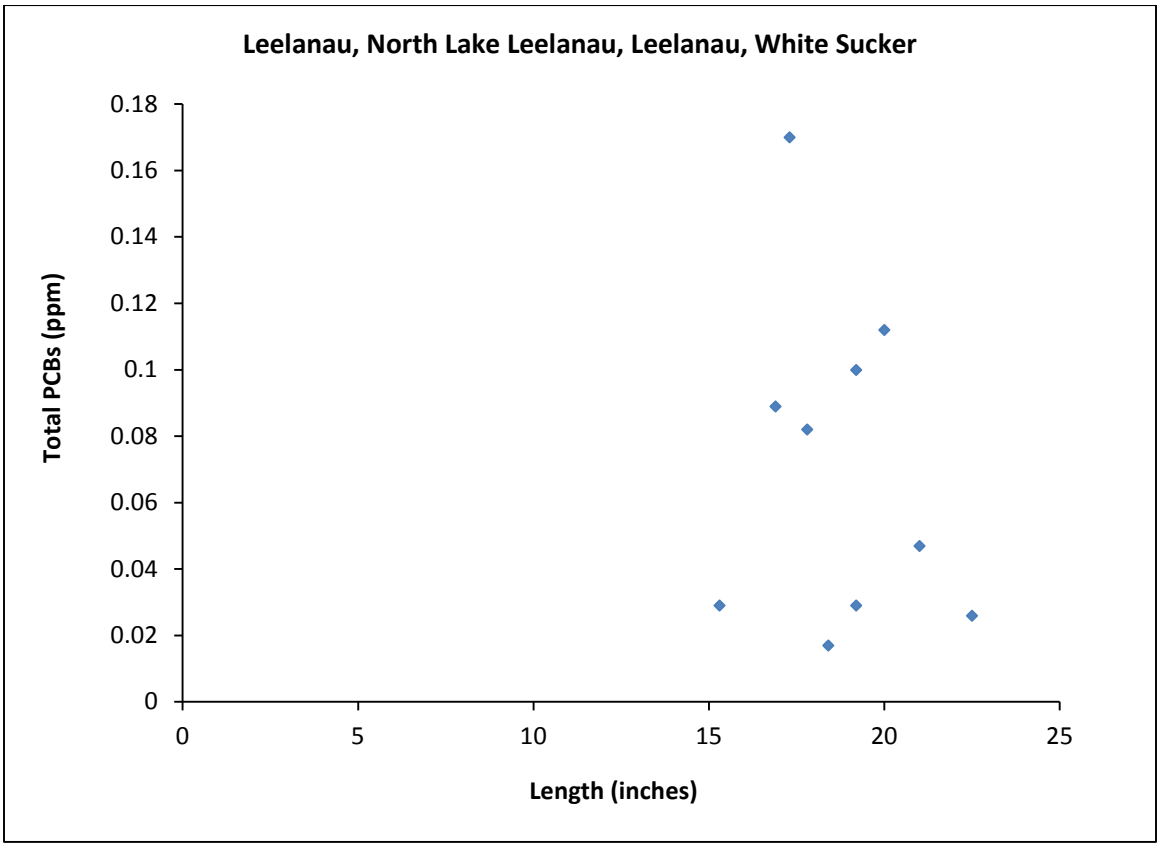
Organics Analysis:

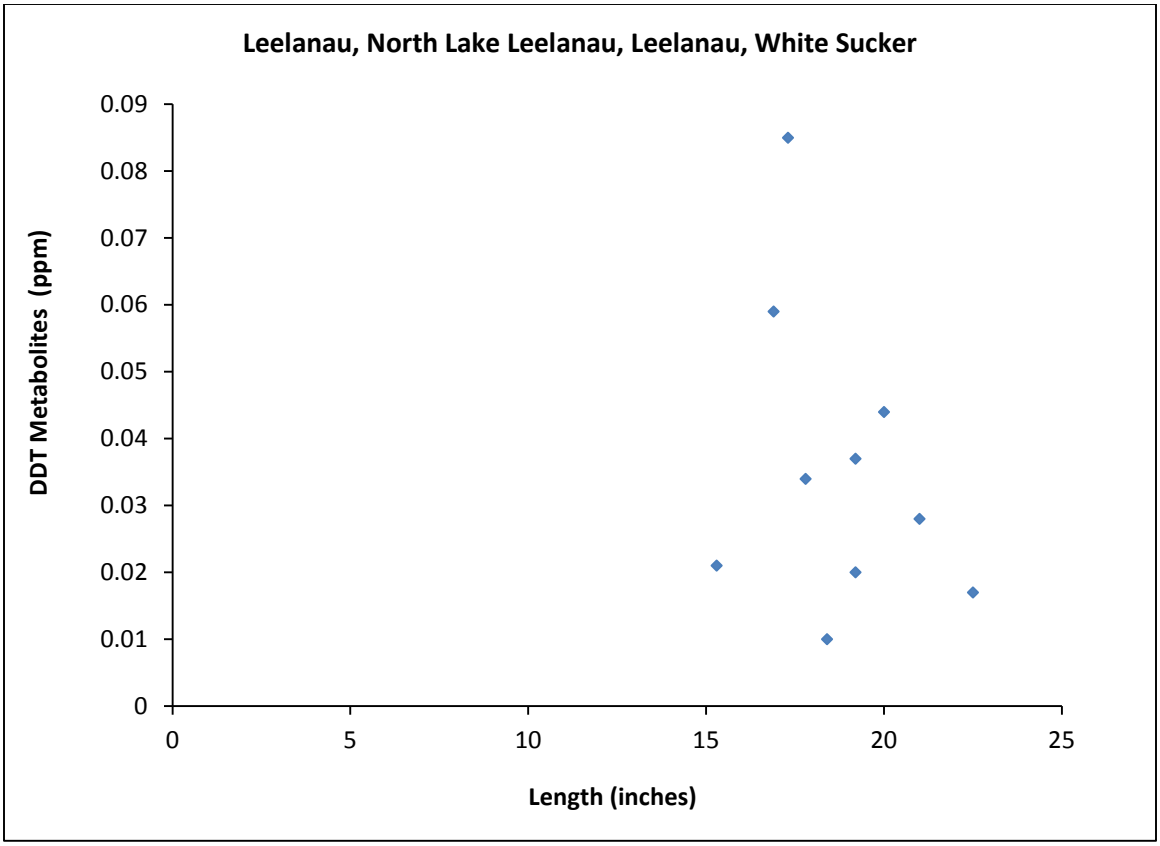
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2002	2002	10	15.3	na	15.3	22.5	
Datasets available: 2002							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.07		0.02	0.17	0.11	2
DDT	10	0.04		0.01	0.08	0.05	16
Chlordane	10	0.002		0.001	0.006	0.004	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.047	0.032					
DDT	0.103	0.071					
Chlordane	0.029	0.036					
Toxaphene	--	--		**Final meal category based on UCL:**			**2**

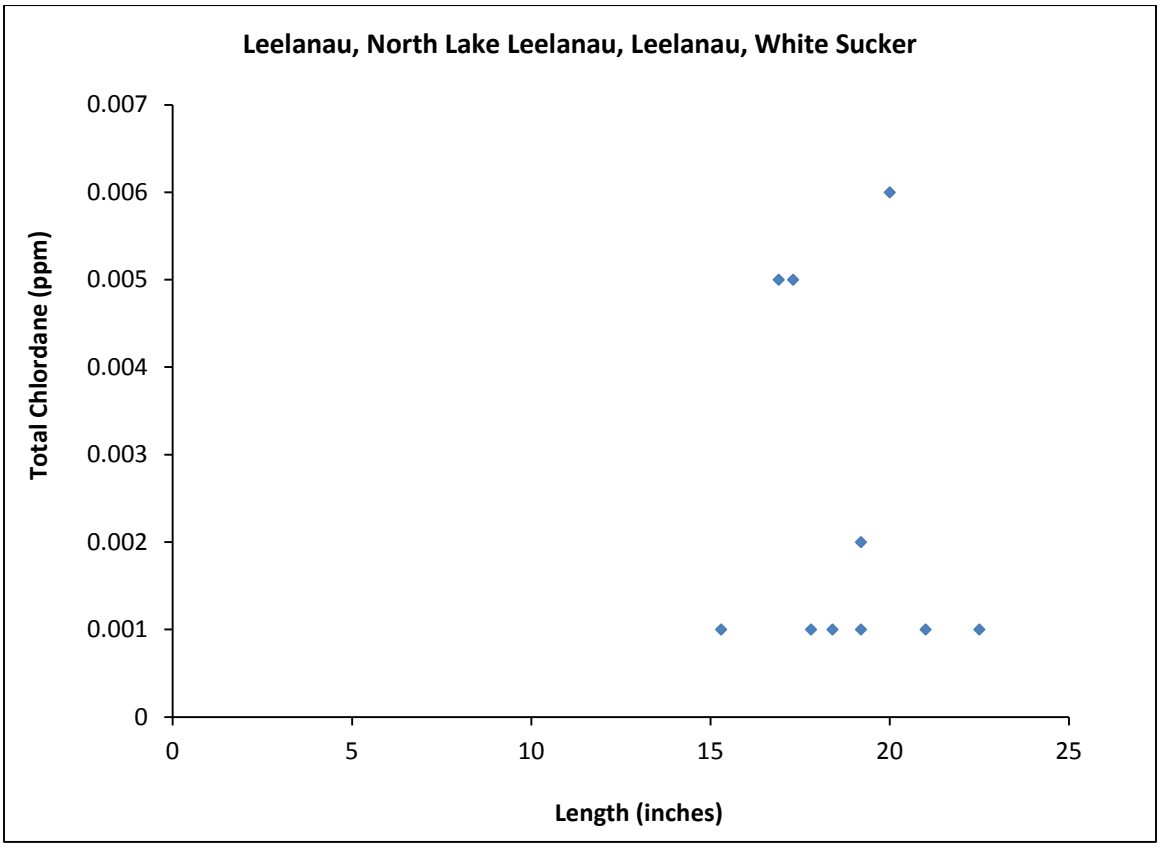
Existing Advisory: There are no current consumption advisories for North Lake Leelanau white sucker.

Recommendation: No one should eat more than 2 meals per month of North Lake Leelanau sucker due to PCBs. Mercury would cause an advisory.


Leelanau, North Lake Leelanau, Leelanau, White Sucker
Mercury (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Length (inches)


Leelanau, North Lake Leelanau, Leelanau, White Sucker
Total PCBs (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
5
10
15
20
25
Length (inches)


Leelanau, North Lake Leelanau, Leelanau, White Sucker
DDT Metabolites (ppm)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
5
10
15
20
25
Length (inches)


Leelanau, North Lake Leelanau, Leelanau, White Sucker
Total Chlordane (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0
5
10
15
20
25
Length (inches)

Lake Trout **North Lake Leelanau** **Leelanau 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	12	25.2	15	25.2	34.3

Datasets available: 2003

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	12	0.62	0.54	0.78	0.68	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.649	0.621

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	12	25.2	15	25.2	34.3

Datasets available: 2003

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	12	0.27	0.13	0.62	0.36	0.5
DDT	12	0.46	0.23	1.04	0.60	2
Chlordane	12	0.07	0.04	0.16	0.10	--
Toxaphene	12	ND	--	--	--	--
TEQ*	12	6.9 ppt	3.5 ppt	15.3 ppt	7.3 ppt	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.734	0.737
DDT	0.636	0.675
Chlordane	0.673	0.667
Toxaphene	--	--
TEQ*	0.673	0.675

Final meal category based on UCL: 0.5

* - 2005 WHO TEFs; dl-PCBs not included

Existing Advisory: Women and children should not eat more than 1 meal per month of North Lake Leelanau lake trout due to mercury and PCBs.

Recommendation: No one should eat more than 1 meal per month of North Lake Leelanau lake trout smaller than 26 inches or more than 6 meals per year of those fish between 26 and 32 inches due to PCBs and dioxins. In addition, sensitive populations should not eat North Lake Leelanau lake trout larger than 32 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)	Hg Regression Equation Estimate (ppm)	Meal Category
20	0.43	2
22	0.48	2
24	0.53	2
26	0.58	1
28	0.62	1
30	0.67	1
32	0.72	1
34	0.77	1
36	0.82	1

Shaded area denotes extrapolated estimates

Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
20	0.08	2
22	0.10	2
24	0.14	1
26	0.19	1
28	0.25	0.5
30	0.33	0.5
32	0.44	Limited
34	0.58	Limited
36	0.78	Limited

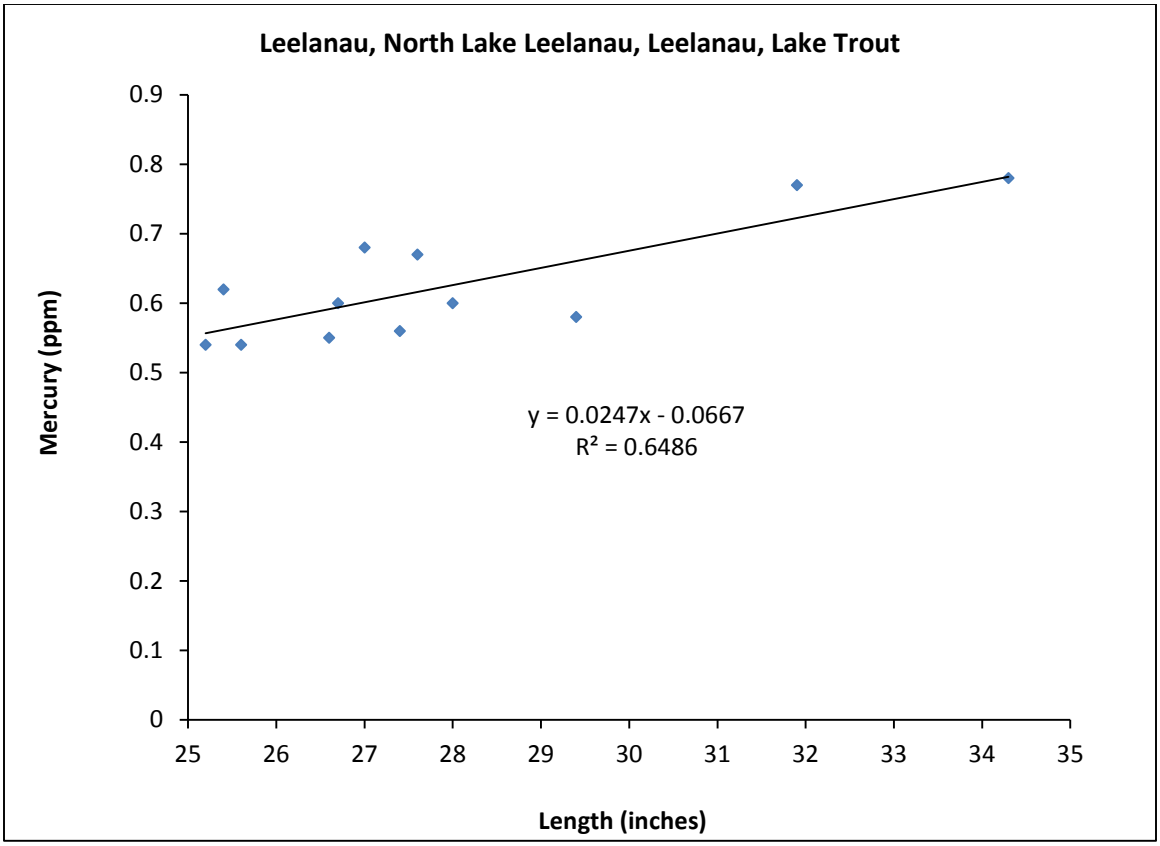
Shaded area denotes extrapolated estimates

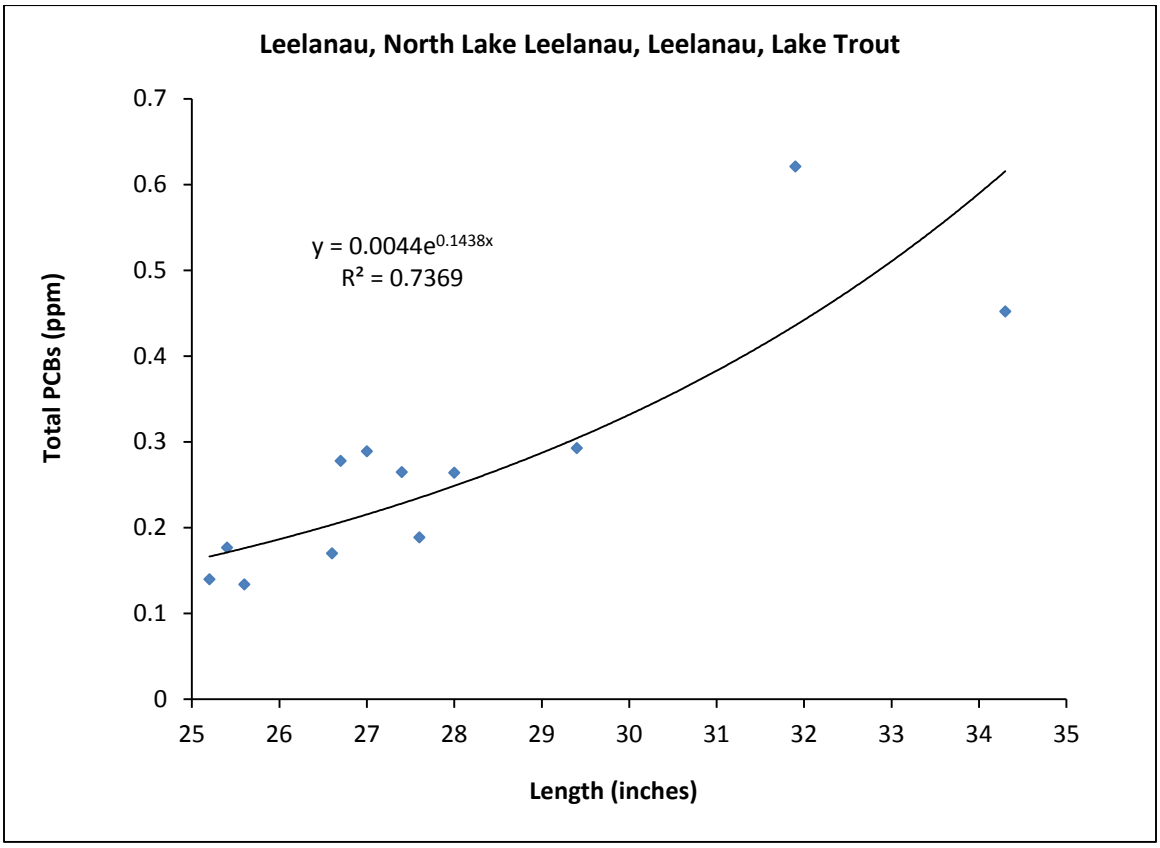
Length (Inches)	DDT Regression Equation Estimate (ppm)	Meal Category
20	0.15	8
22	0.20	8
24	0.25	4
26	0.33	4
28	0.42	4
30	0.55	2
32	0.70	2
34	0.91	1
36	1.17	1

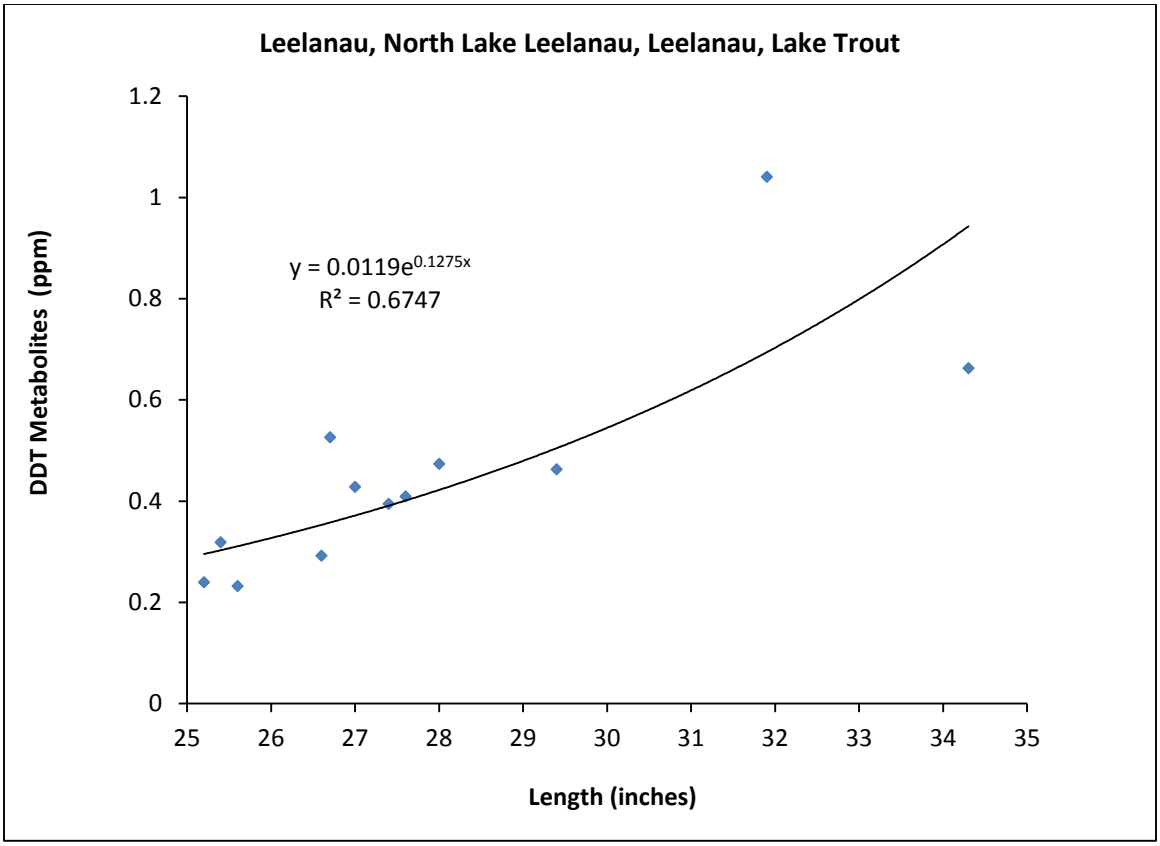
Shaded area denotes extrapolated estimates

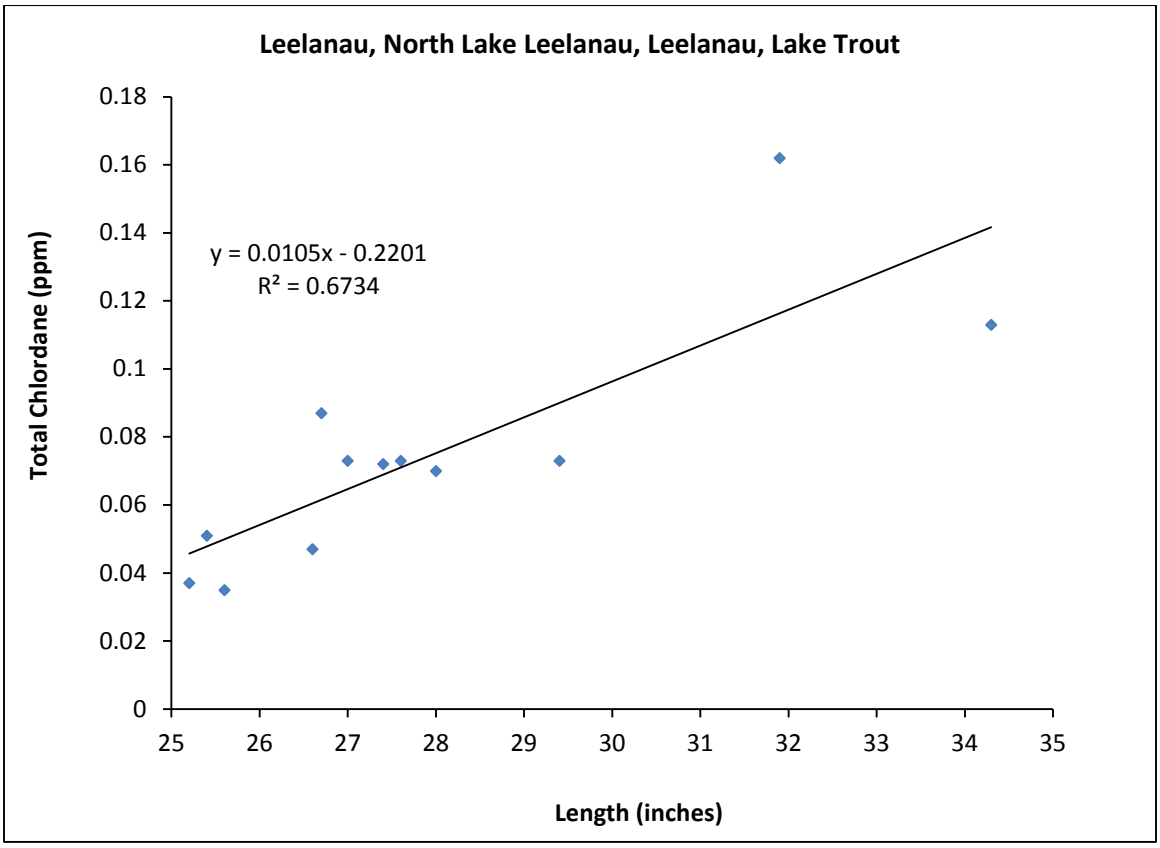
Length (Inches)	TEQ Regression Equation Estimate (ppt)	Meal Category
20	2.2	2
22	2.8	2
24	3.7	1
26	4.8	1
28	6.3	1
30	8.3	0.5
32	10.8	0.5
34	14.2	0.5
36	18.5	Limited

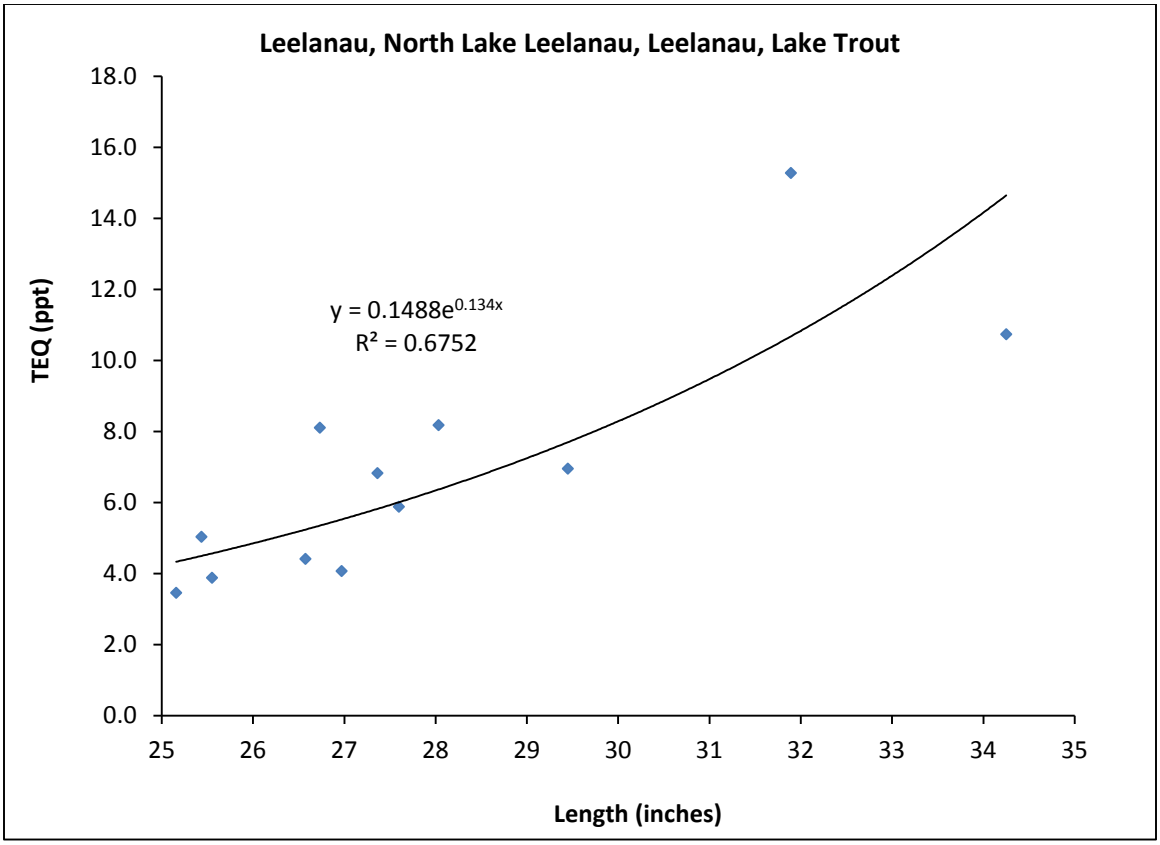
Shaded area denotes extrapolated estimates


Leelanau, North Lake Leelanau, Leelanau, Lake Trout
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
25
26
27
28
29
30
31
32
33
34
35
Length (inches)
y = 0.0247x - 0.0667
R² = 0.6486


Leelanau, North Lake Leelanau, Leelanau, Lake Trout
Total PCBs (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
25
26
27
28
29
30
31
32
33
34
35
Length (inches)
y = 0.0044e^0.1438x
R² = 0.7369


Leelanau, North Lake Leelanau, Leelanau, Lake Trout
DDT Metabolites (ppm)
Length (inches)
y = 0.0119e^0.1275x
R² = 0.6747
1.2
1
0.8
0.6
0.4
0.2
0
25
26
27
28
29
30
31
32
33
34
35


Leelanau, North Lake Leelanau, Leelanau, Lake Trout
Total Chlordane (ppm)
Length (inches)
y = 0.0105x - 0.2201
R² = 0.6734
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
25
26
27
28
29
30
31
32
33
34
35


Leelanau, North Lake Leelanau, Leelanau, Lake Trout
TEQ (ppt)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
y = 0.1488e^0.134x
R² = 0.6752
25
26
27
28
29
30
31
32
33
34
35
Length (inches)

Brown Bullhead **Tucker Lake** **Leelanau 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	9	9.1	na	9.1	12

Datasets available: 2005

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.04	0.02	0.08	0.05	16

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.149	0.059

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	9	9.1	na	9.1	12

Datasets available: 2005

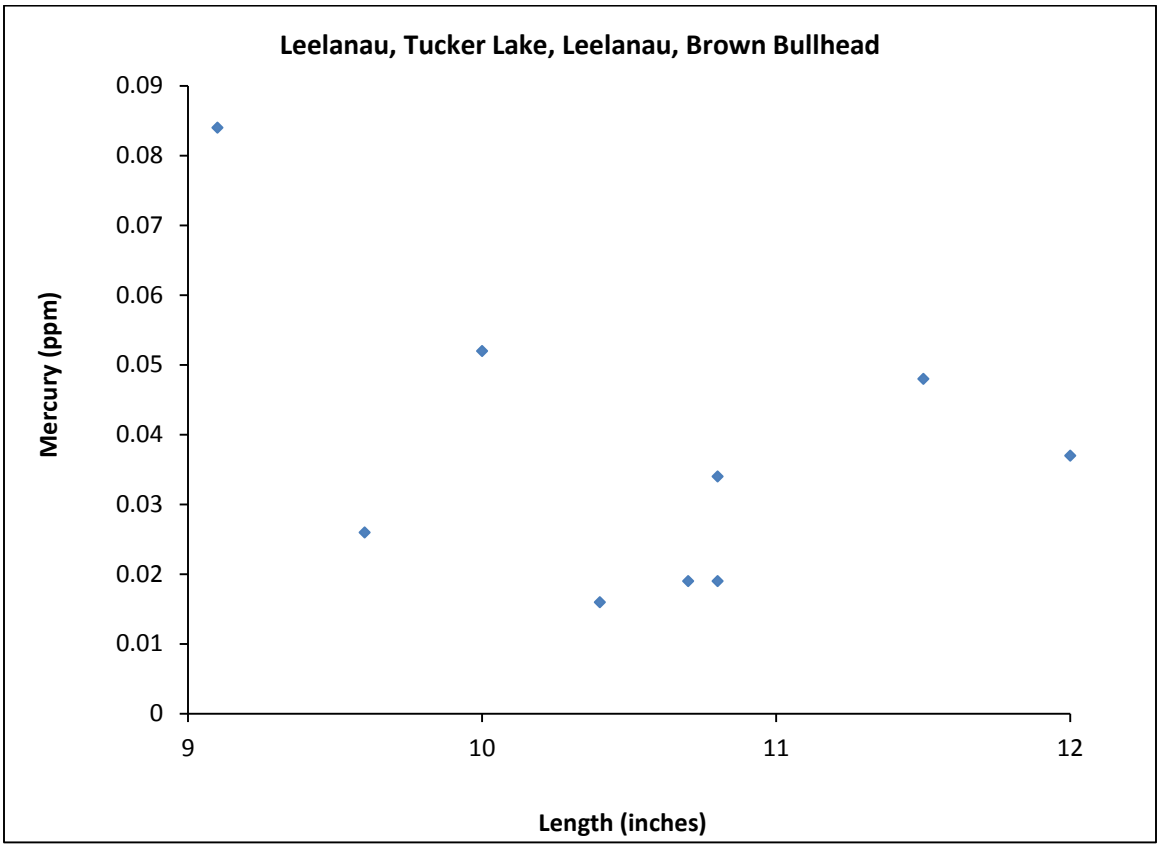
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	ND	--	--	--	--
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 16

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

Recommendation: Consumption of 16 meals per month poses minimal risk to the consumer. No analyzed chemical causes a guideline. The maximum guideline of 16 meals per month will be listed in the guide.


Leelanau, Tucker Lake, Leelanau, Brown Bullhead
Mercury (ppm)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
9
10
11
12
Length (inches)

Lake Trout **Glen Lake** **Leelanau 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	2009	19	17.9	15	17.9	34.3

Datasets available: 1990, 2009

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	19	0.67	0.18	1.57	0.88	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.829	0.840

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2009	2009	9	17.9	15	17.9	26.4

Datasets available: 1990, 2009

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	9	0.14	0.03	0.30	0.22	0.5
DDT	9	0.19	0.08	0.38	0.28	4
Chlordane	9	0.04	0.01	0.06	0.05	--
Toxaphene	9	0.19	0.05	1.30	0.51	0.5
TEQ*	9	11.0 ppt	5.6 ppt	19.2 ppt	12.7 ppt	0.5

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.380	0.351
DDT	0.414	0.523
Chlordane	0.504	0.639
Toxaphene	0.004	0.004
TEQ*	0.402	0.429

Final meal category based on UCL: 0.5

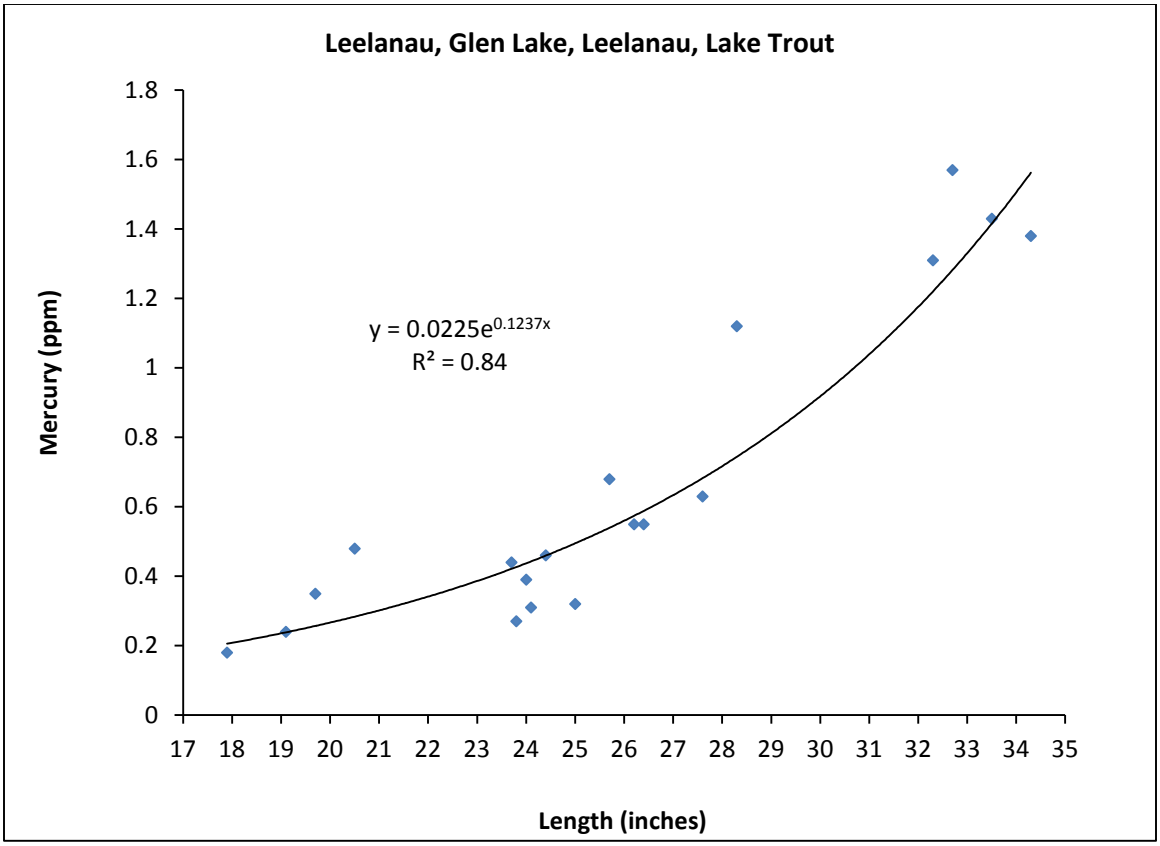
* - 2005 WHO TEFs; dl-PCBs included

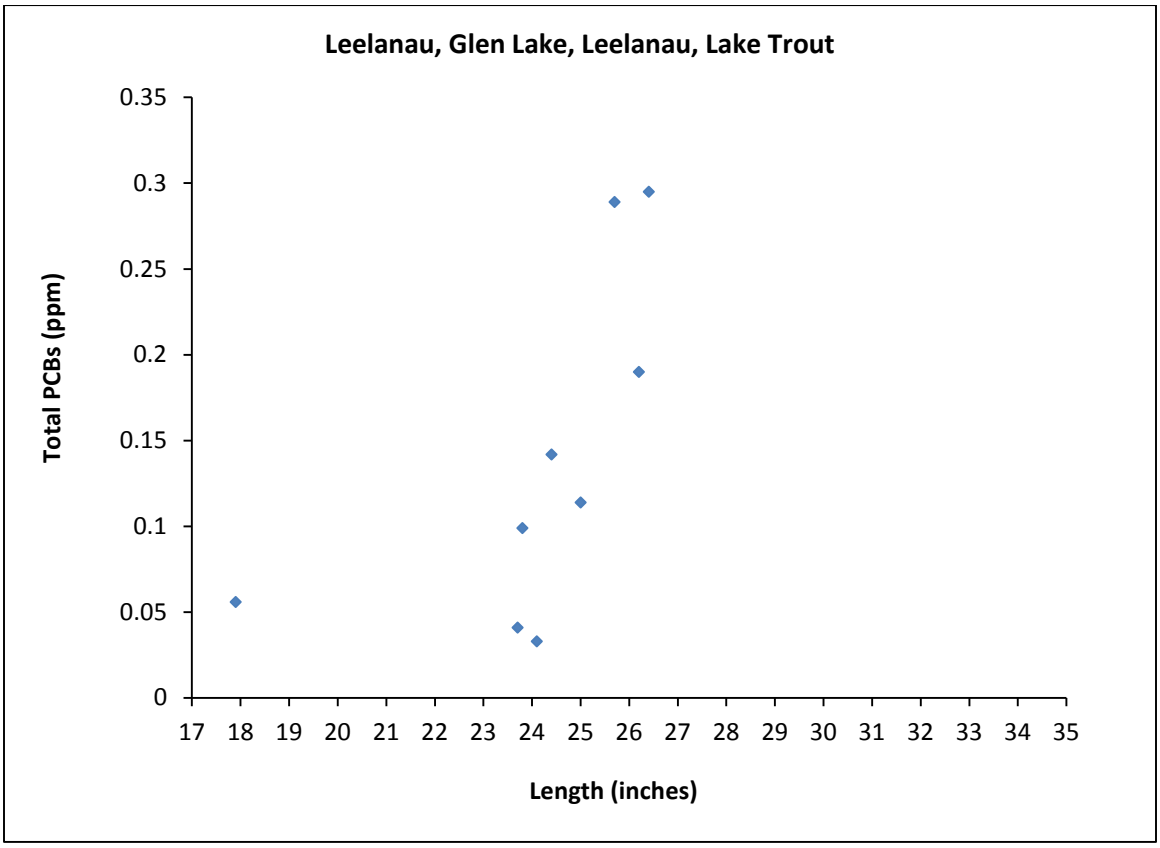
Existing Advisory: Due to elevated levels of mercury, PCBs and chlordane; women and children should not eat Glen Lake lake trout greater than 14 inches in length.

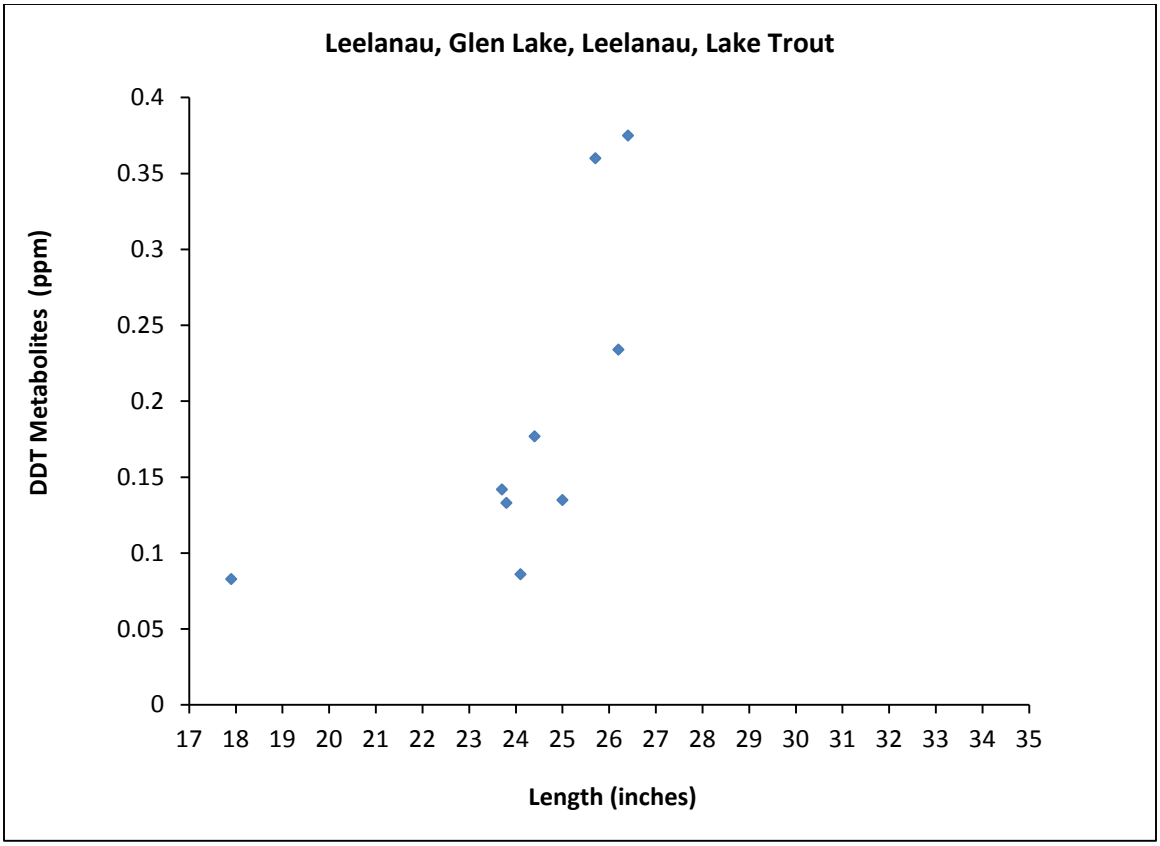
Recommendation: No one should eat more than 6 meals per year of Glen Lake lake trout smaller than 32 inches due to dioxins, PCBs, and toxaphene or more than 6 meals per year of lake trout greater than 32 inches due to mercury, dioxins, PCBs, and toxaphene. DDT would cause an advisory.

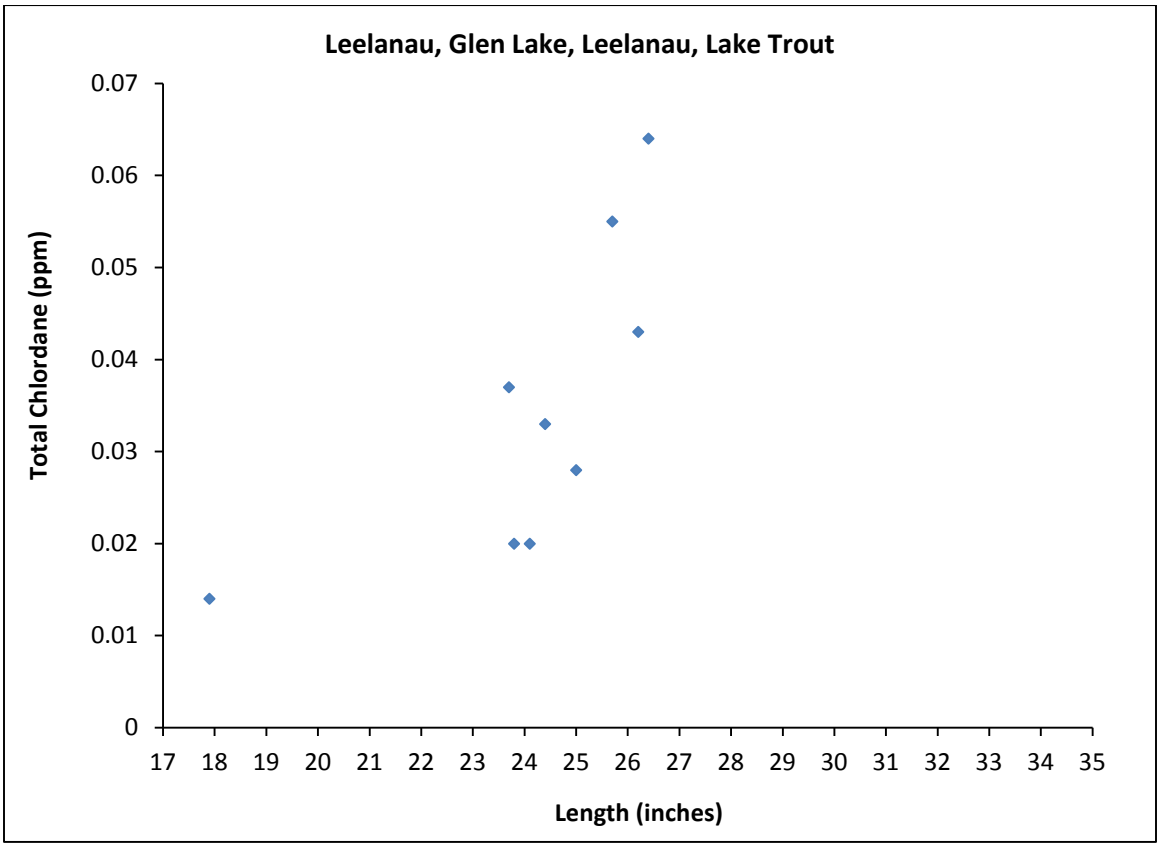
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
16	0.163	4
18	0.209	4
20	0.267	4
22	0.342	2
24	0.438	2
26	0.561	1
28	0.718	1
30	0.920	1
32	1.178	0.5

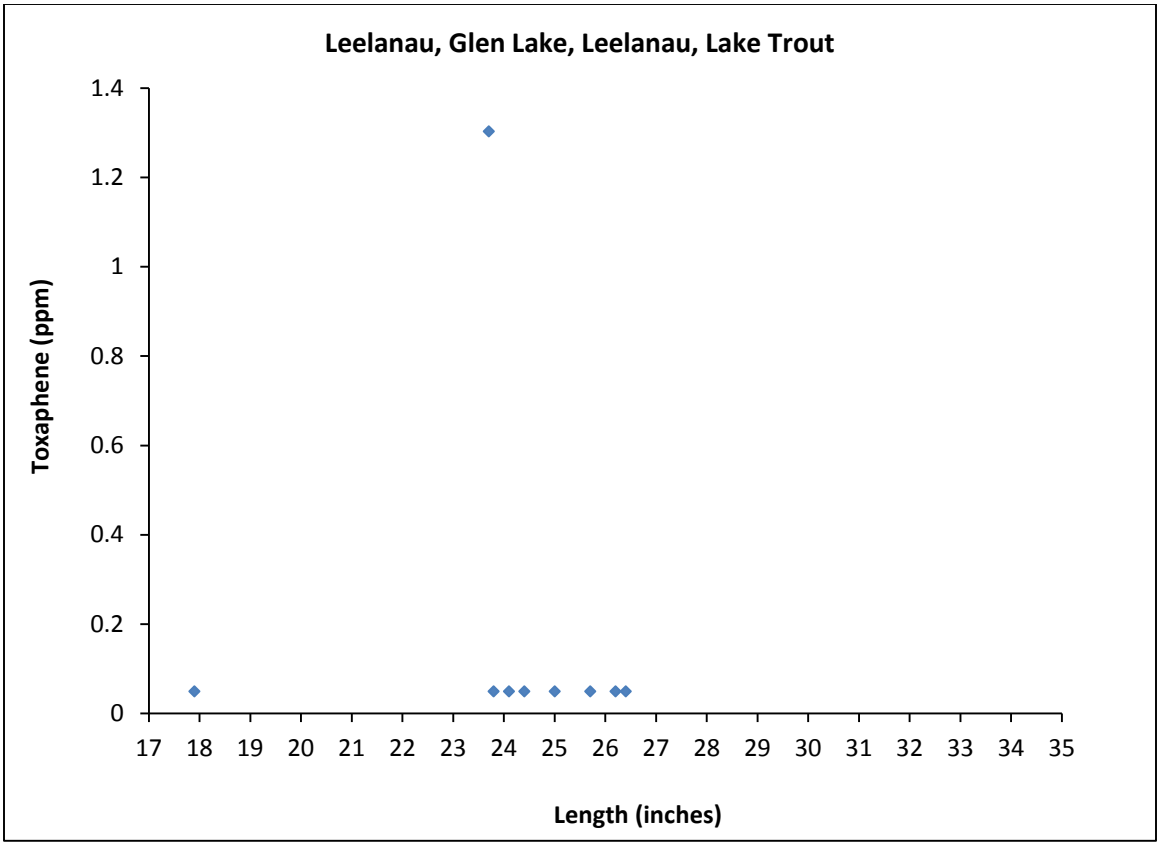
Shaded area denotes extrapolated estimates

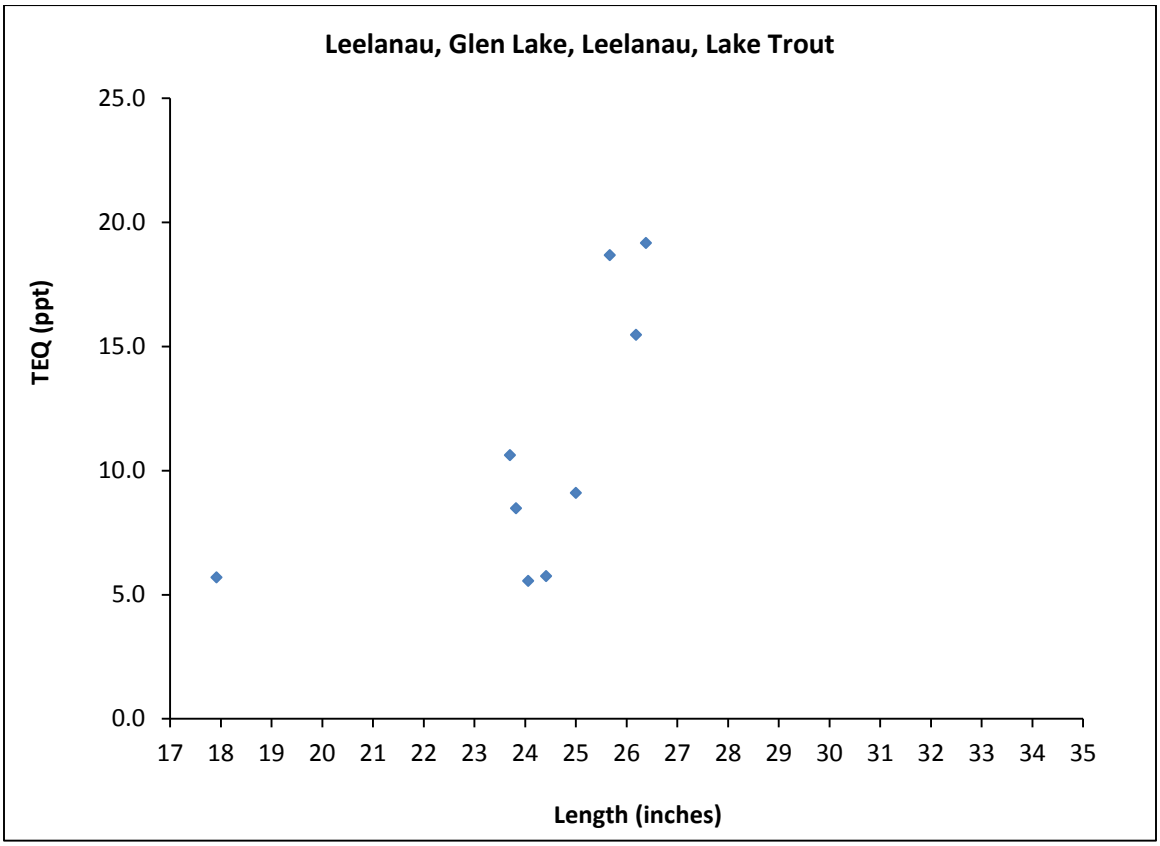

Leelanau, Glen Lake, Leelanau, Lake Trout
Mercury (ppm)
Length (inches)
y = 0.0225e^0.1237x
R² = 0.84
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35


Leelanau, Glen Lake, Leelanau, Lake Trout
Total PCBs (ppm)
Length (inches)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35


Leelanau, Glen Lake, Leelanau, Lake Trout
DDT Metabolites (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Length (inches)


Leelanau, Glen Lake, Leelanau, Lake Trout
Total Chlordane (ppm)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Length (inches)


Leelanau, Glen Lake, Leelanau, Lake Trout
Toxaphene (ppm)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Length (inches)


Leelanau, Glen Lake, Leelanau, Lake Trout
TEQ (ppt)
25.0
20.0
15.0
10.0
5.0
0.0
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Length (inches)

Rainbow Trout **Glen Lake** **Leelanau 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	11	13.3	15	15.1	25.4

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.19	0.10	0.32	0.28	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.862	0.842

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	11	13.3	15	15.1	25.4

Datasets available: 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.021	0.003	0.054	0.040	4
DDT	7	0.036	0.008	0.084	0.060	16
Chlordane	7	0.010	0.001	0.022	0.020	--
Toxaphene	7	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.894	0.703
DDT	0.799	0.548
Chlordane	0.819	0.649
Toxaphene	--	--

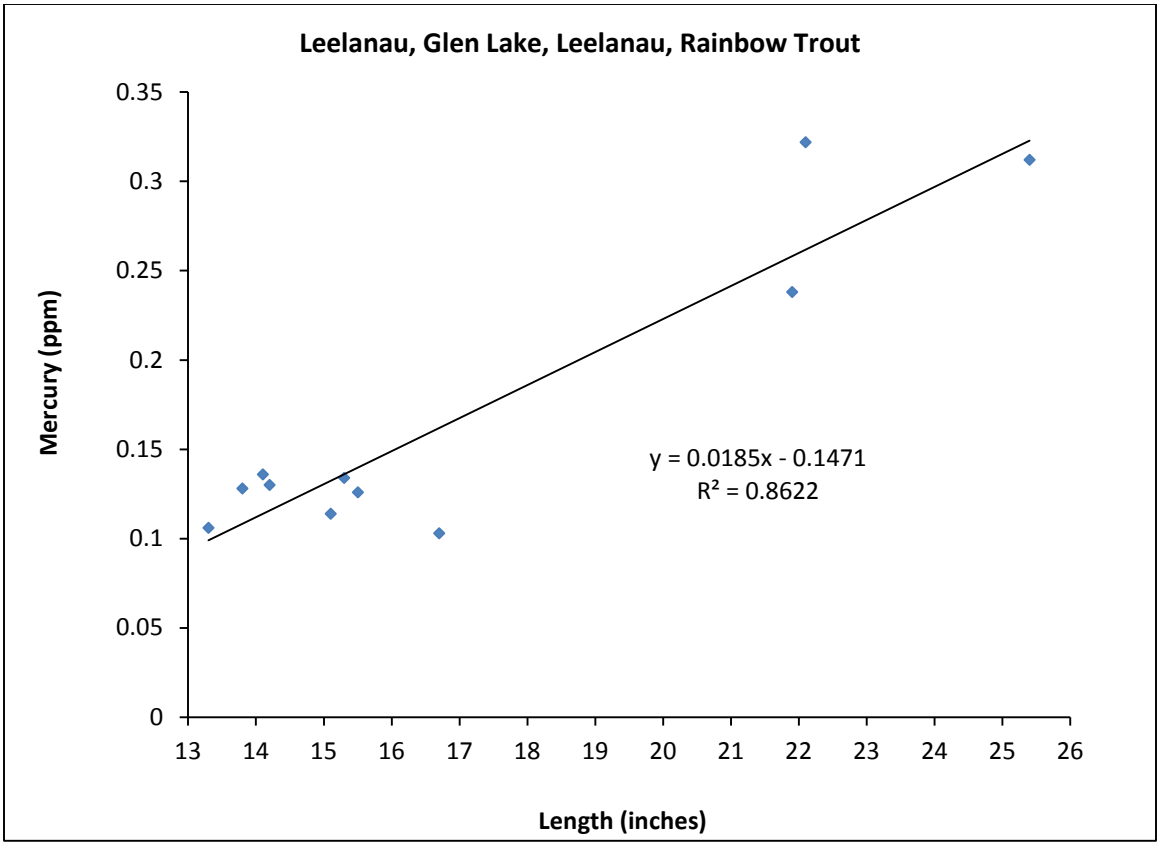
Final meal category based on UCL: 2

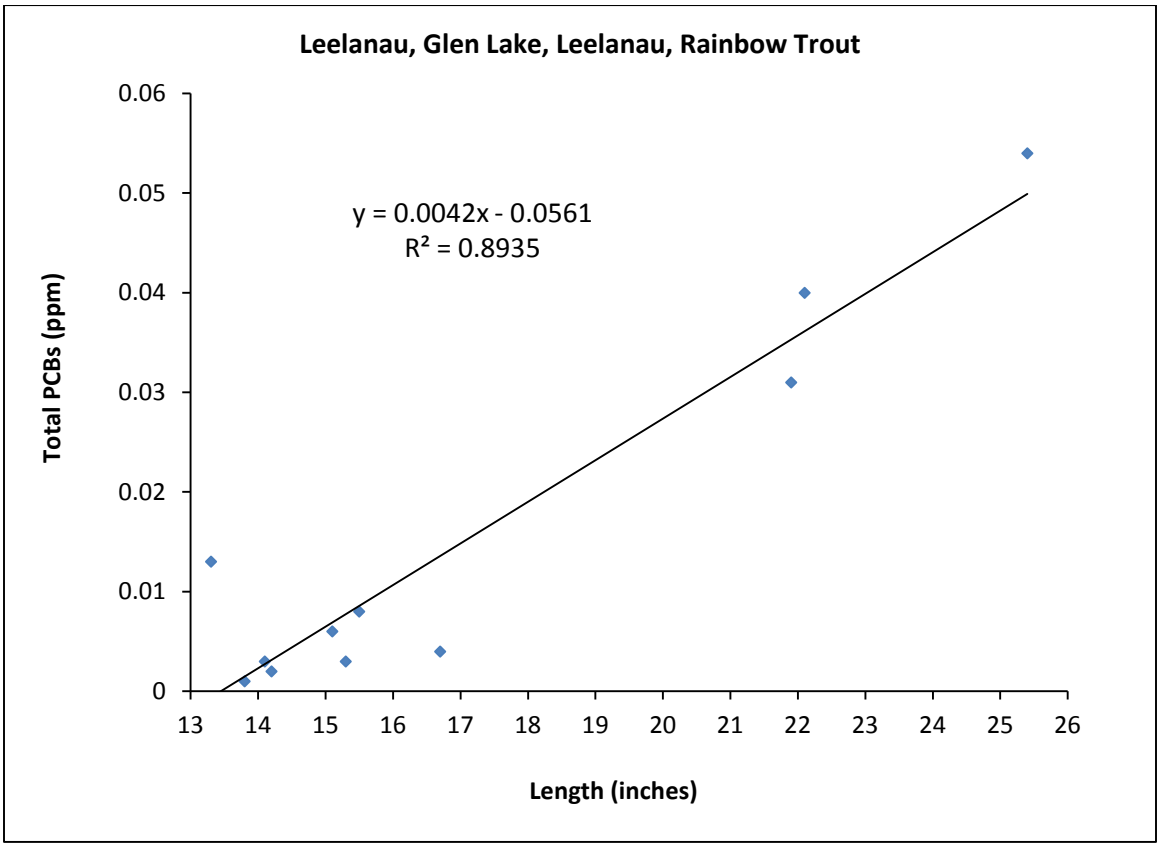
Existing Advisory: Women and children should eat not eat more than one meal per week of Glen Lake rainbow trout larger than 22 inches due to PCBs.

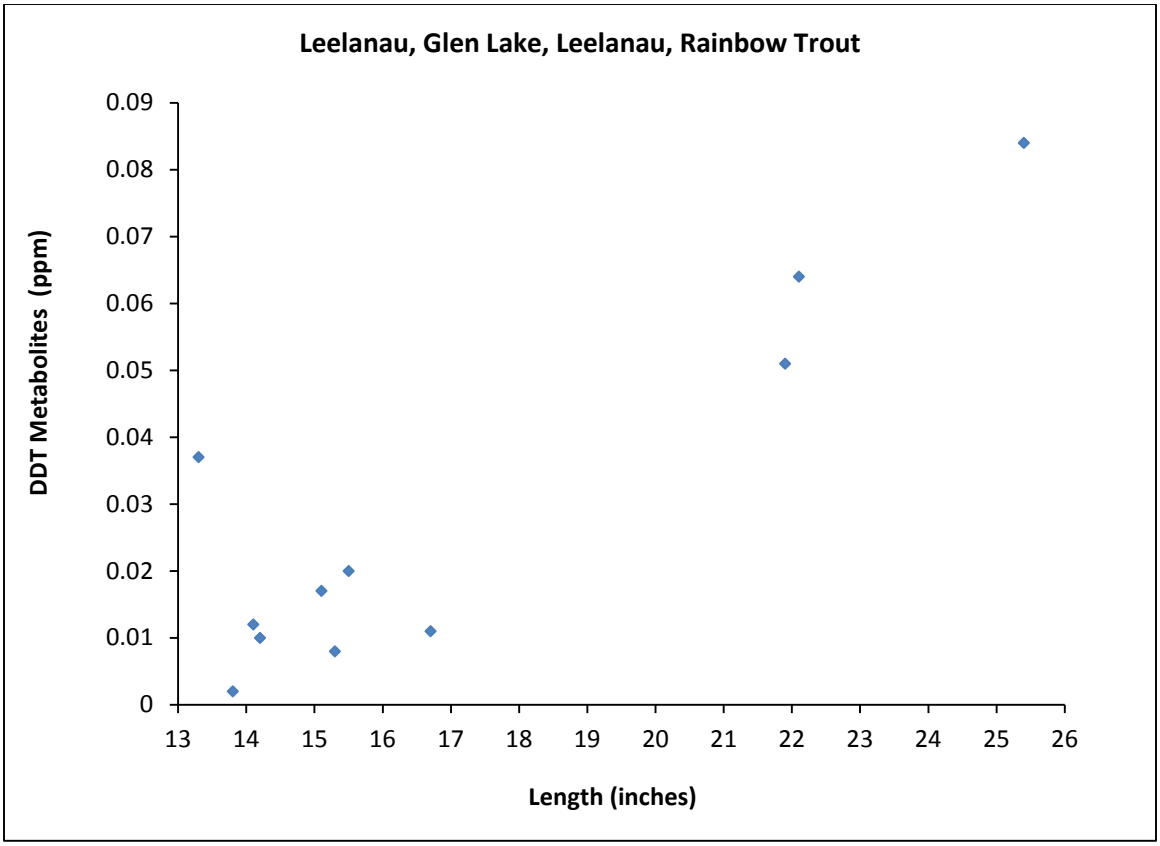
Recommendation: No one should eat more than 4 meals per month of Glen Lake rainbow trout smaller than smaller than 22 inches due to mercury and PCBs or more than 2 meals per month of those fish larger than 22 inches due to mercury.

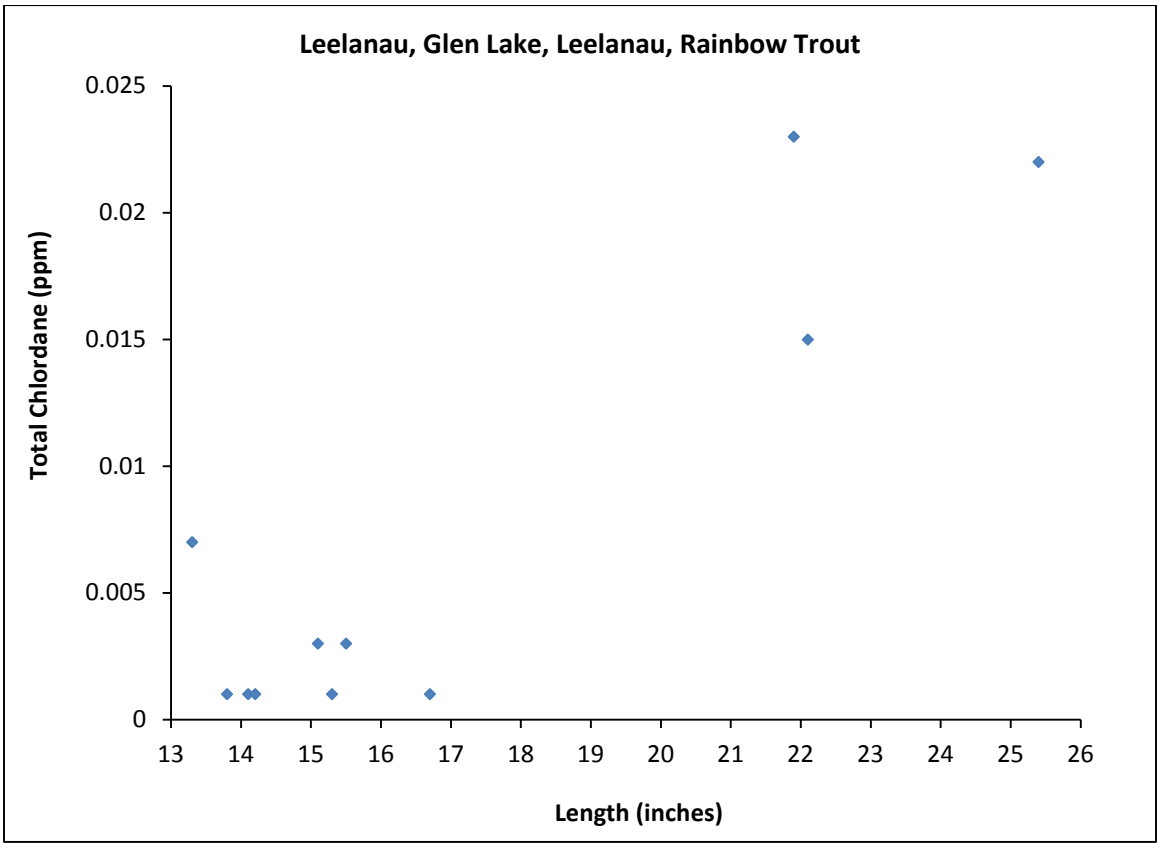
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category	PCB Regression Equation Estimate (ppm)	Meal Category
14	0.11	8	0	16
16	0.15	4	0.01	16
18	0.19	4	0.02	12
20	0.22	4	0.03	8
22	0.26	4	0.04	4
24	0.30	2	0.04	4
26	0.33	2	0.05	4
28	0.37	2	0.06	2
30	0.41	2	0.07	2

Shaded area denotes extrapolated estimates


Leelanau, Glen Lake, Leelanau, Rainbow Trout
Mercury (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Length (inches)
y = 0.0185x - 0.1471
R² = 0.8622


Leelanau, Glen Lake, Leelanau, Rainbow Trout
Total PCBs (ppm)
0.06
0.05
0.04
0.03
0.02
0.01
0
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Length (inches)
y = 0.0042x - 0.0561
R² = 0.8935


Leelanau, Glen Lake, Leelanau, Rainbow Trout
DDT Metabolites (ppm)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Length (inches)


Leelanau, Glen Lake, Leelanau, Rainbow Trout
Total Chlordane (ppm)
0.025
0.02
0.015
0.01
0.005
0
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Length (inches)

Smallmouth Bass **Glen Lake** **Leelanau 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
1990	1990	7	12	14	12	15.6

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.25	0.12	0.39	0.35	2*

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.488	0.455

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1990	1990	7	12	14	12	15.6

Datasets available: 1990

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.03	0.02	0.04	--	--
DDT	7	0.03	0.02	0.04	--	--
Chlordane	7	0.004	0.003	0.007	--	--
Toxaphene	7	ND	--	--	--	--

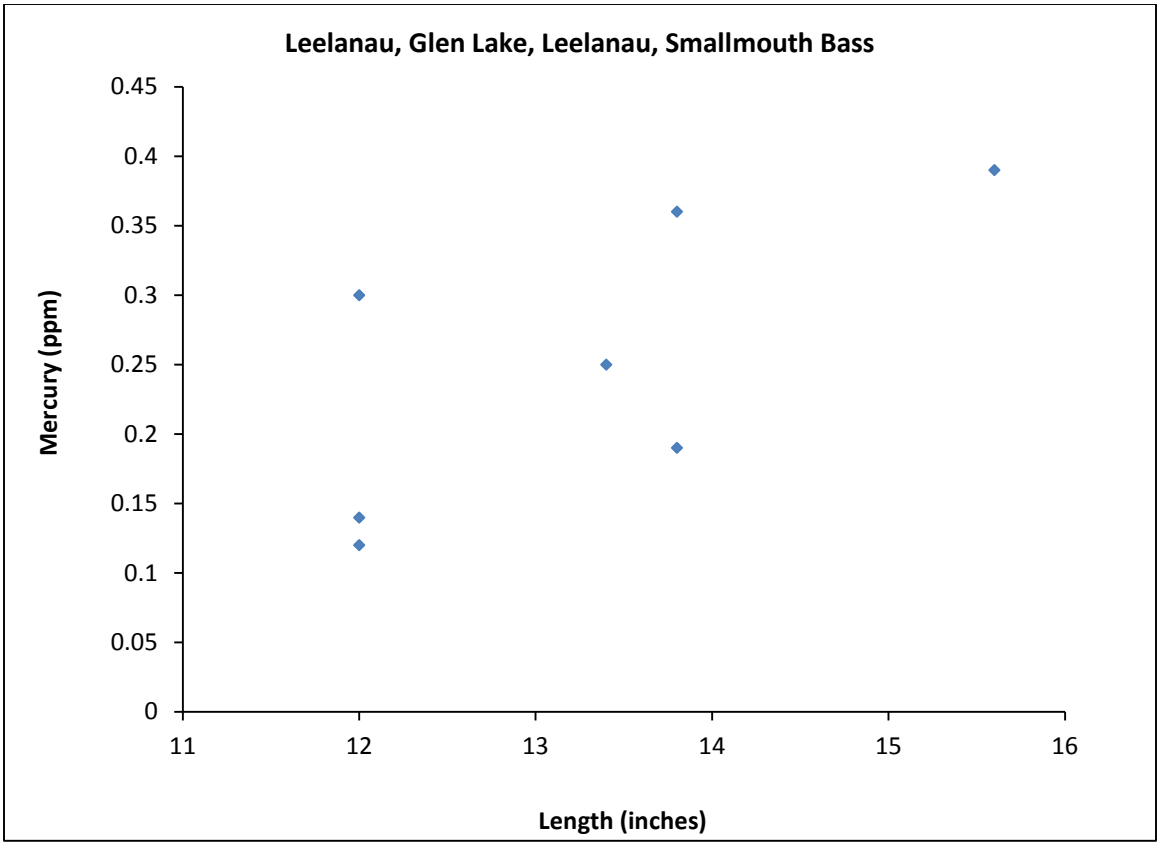
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.060	0.067
DDT	0.432	0.483
Chlordane	0.035	0.035
Toxaphene	--	--

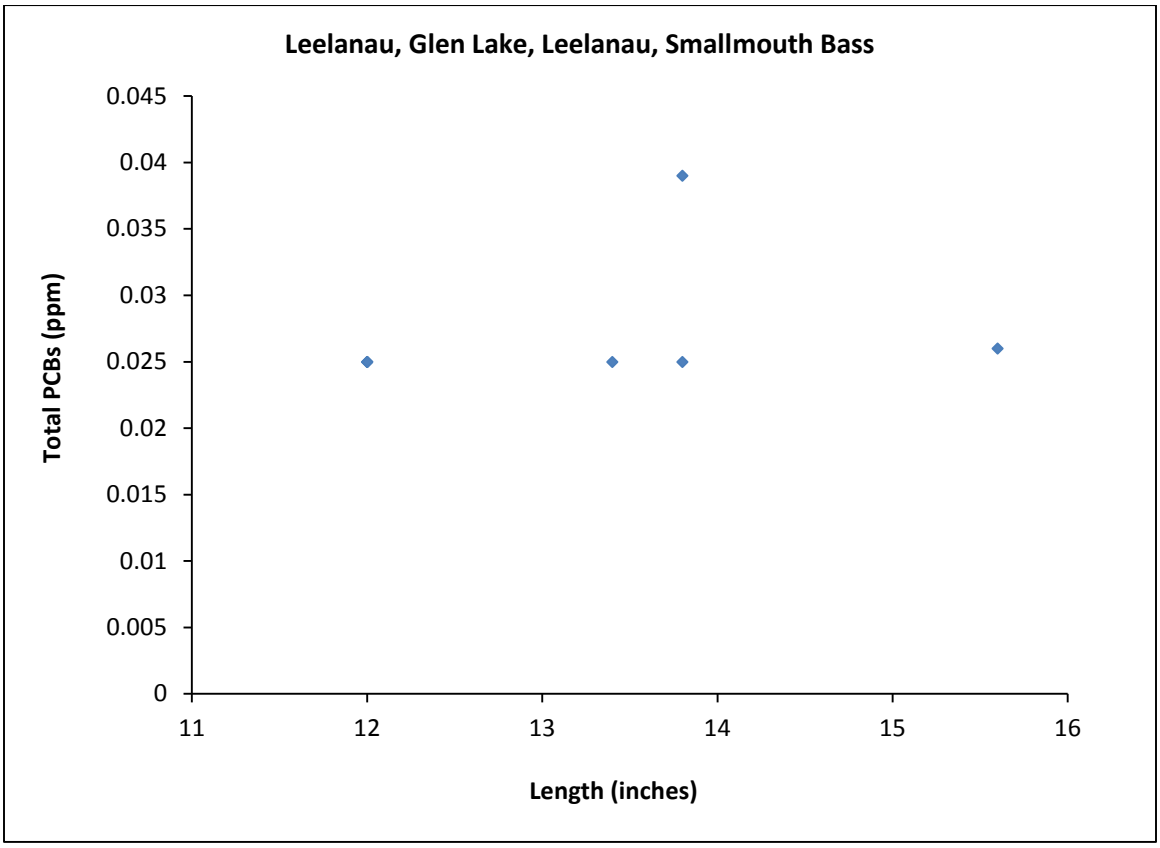
Final meal category based on UCL: 2*

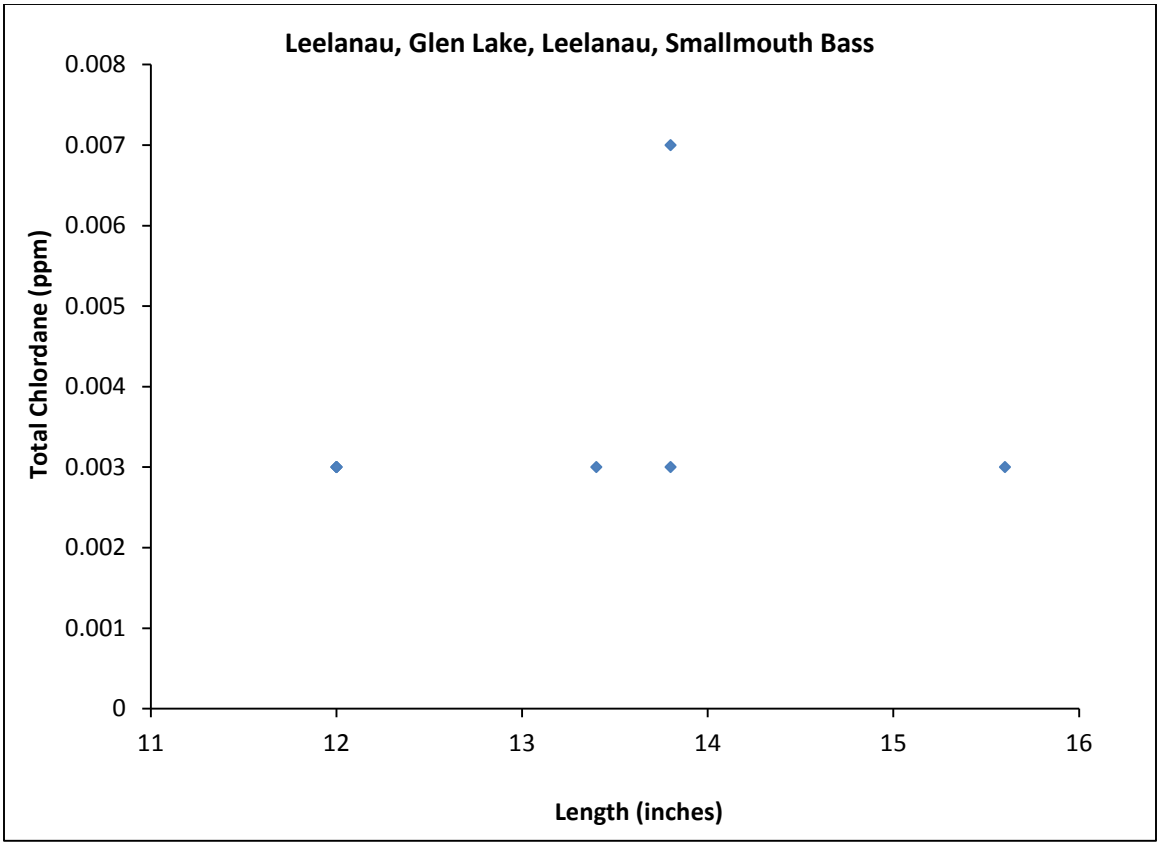
Existing Advisory: Glen Lake smallmouth bass are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 2 meals per month of Glen 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. The statewide length break was applied as the size range of fish was limited.

*Note: Evaluation was based on 95%UCL of 0.35 ppm Hg calculated using all 7 samples, 3 of which were of sub-legal size.


Leelanau, Glen Lake, Leelanau, Smallmouth Bass
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11
12
13
14
15
16
Length (inches)


Leelanau, Glen Lake, Leelanau, Smallmouth Bass
Total PCBs (ppm)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
11
12
13
14
15
16
Length (inches)


Leelanau, Glen Lake, Leelanau, Smallmouth Bass
Total Chlordane (ppm)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
11
12
13
14
15
16
Length (inches)

Manistee County

Black Crappie **Manistee Lake** **Manistee County**

Hg Analysis:

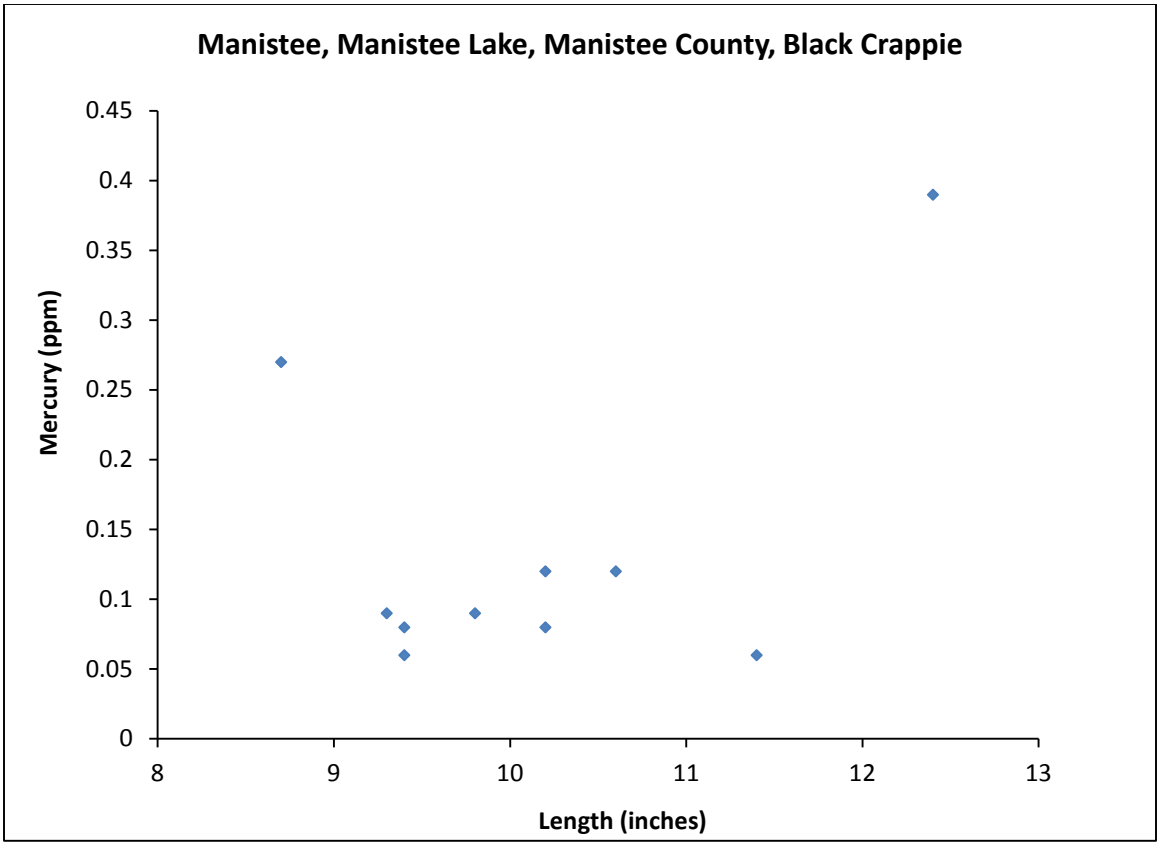
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1992	1992	10	8.7	na	8.7	12.4	
Datasets available:	1992						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.14		0.06	0.39	0.21	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.158	0.082					

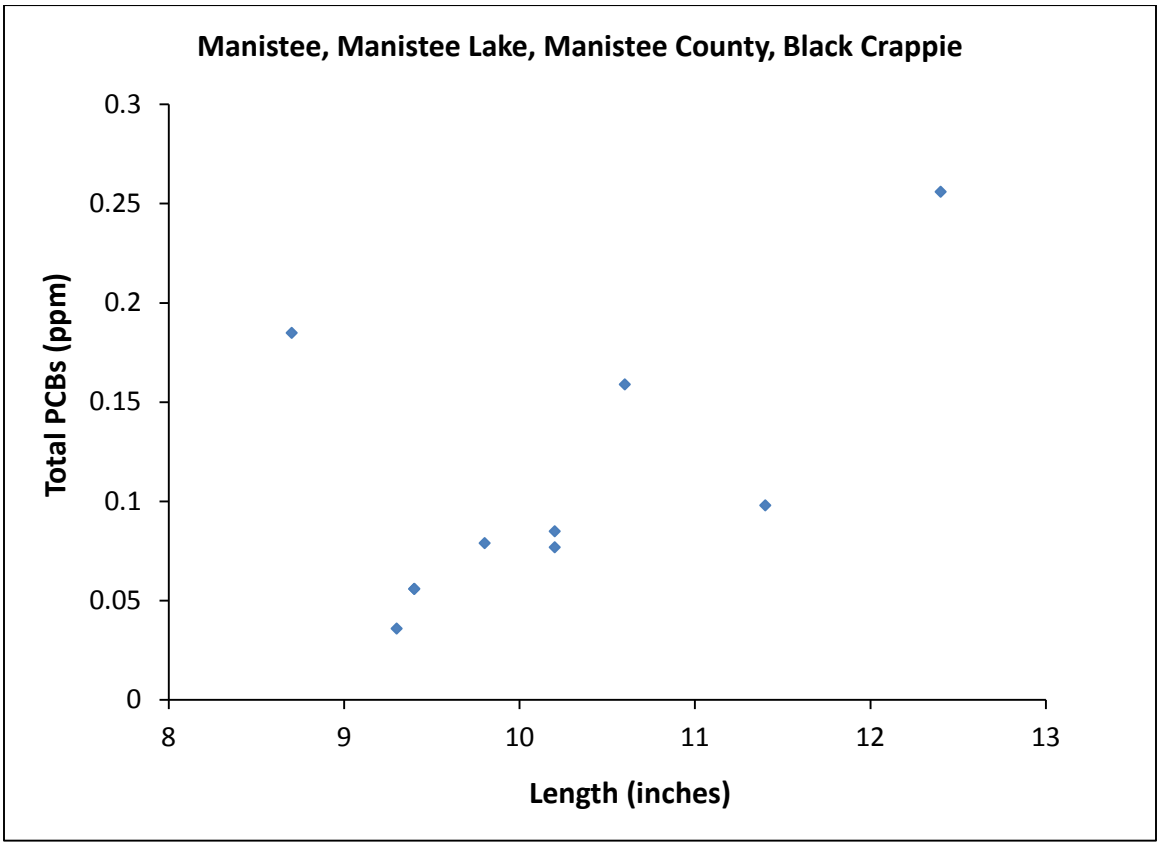
Organics Analysis:

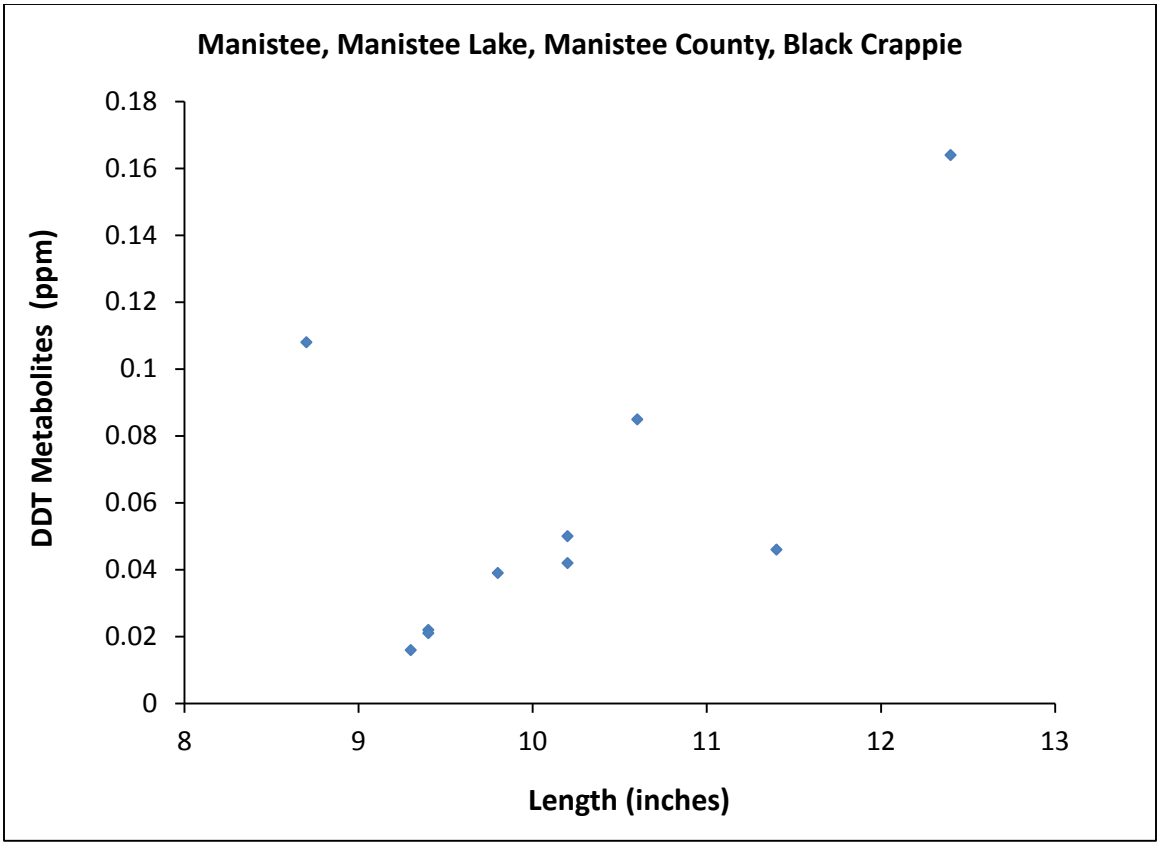
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1992	1992	10	8.7	na	8.7	12.4	
Datasets available:	1992						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.11		0.04	0.26	0.16	1
DDT	10	0.06		0.02	0.16	0.09	16
Chlordane	10	0.02		0.003	0.04	0.03	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.302	0.286					
DDT	0.313	0.291					
Chlordane	0.241	0.258					
Toxaphene	--	--		**Final meal category based on UCL:**			**1***

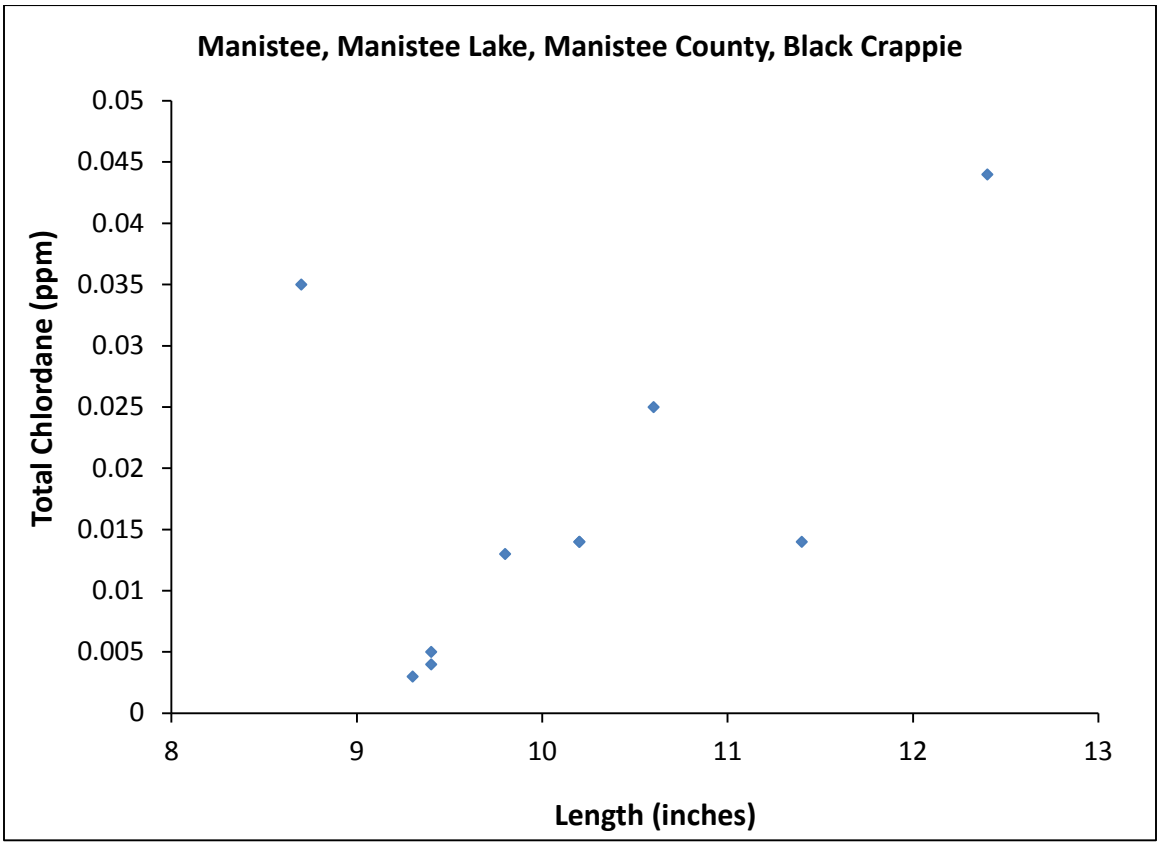
Existing Advisory: Women and children should not eat more than one meal per week of Manistee Lake black crappie smaller than 8 inches in length or more than one meal per month of those fish larger than 8 inches due to mercury and PCBs.

Recommendation: No one should eat more than 2 meals per month of Manistee Lake crappie due to PCBs. Mercury would cause an advisory. The quality of this dataset is limited due to the age of the data. *Based on the MDEQ 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.


Manistee, Manistee Lake, Manistee County, Black Crappie
Mercury (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
Length (inches)


Manistee, Manistee Lake, Manistee County, Black Crappie
Total PCBs (ppm)
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
Length (inches)


Manistee, Manistee Lake, Manistee County, Black Crappie
DDT Metabolites (ppm)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
9
10
11
12
13
Length (inches)


Manistee, Manistee Lake, Manistee County, Black Crappie
Total Chlordane (ppm)
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
8
9
10
11
12
13
Length (inches)

Bluegill **Manistee Lake** **Manistee 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	5	8.1	na	8.1	8.9

Datasets available: 1995

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.15	0.11	0.18	0.18	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.082	0.056

Organics 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	5	8.1	na	8.1	8.9

Datasets available: 1995

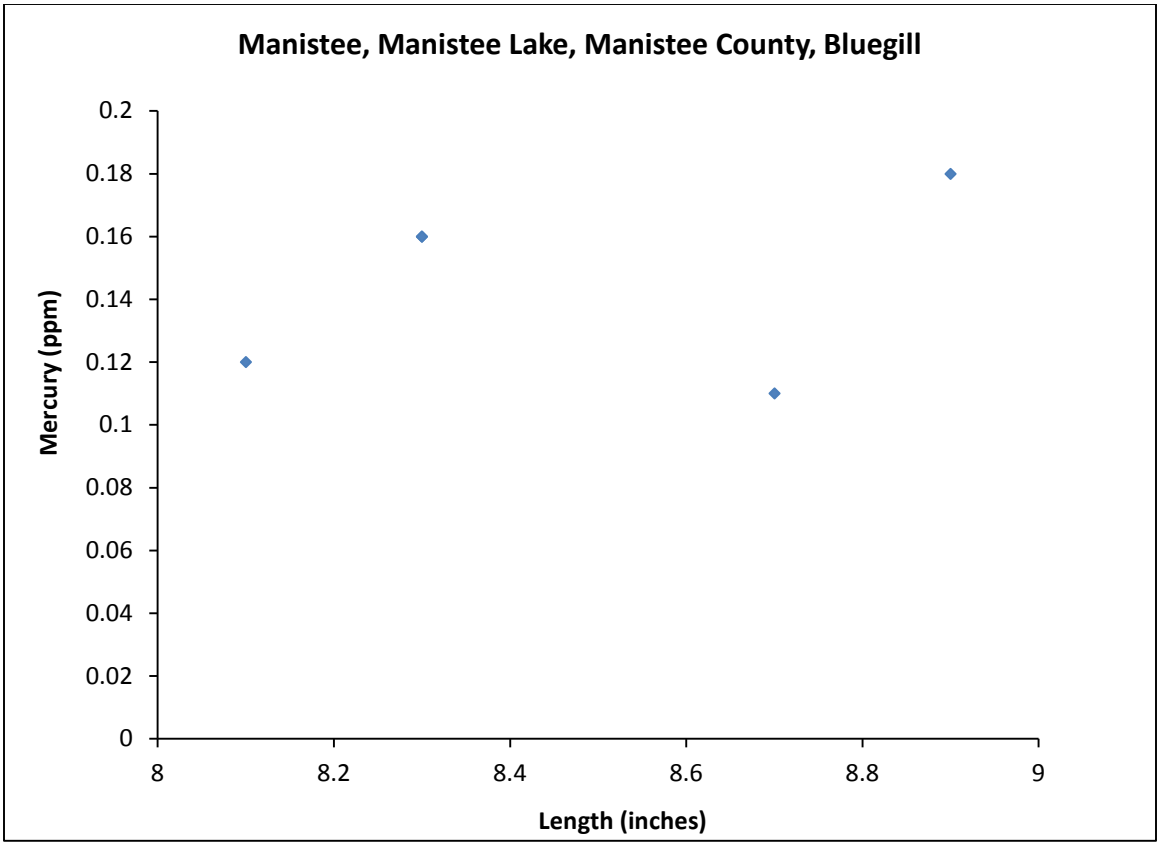
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.09	0.03	0.17	0.17	1
DDT	5	0.04	0.01	0.07	0.07	16
Chlordane	5	0.01	0.005	0.02	0.02	--
Toxaphene	5	ND	--	--	--	--

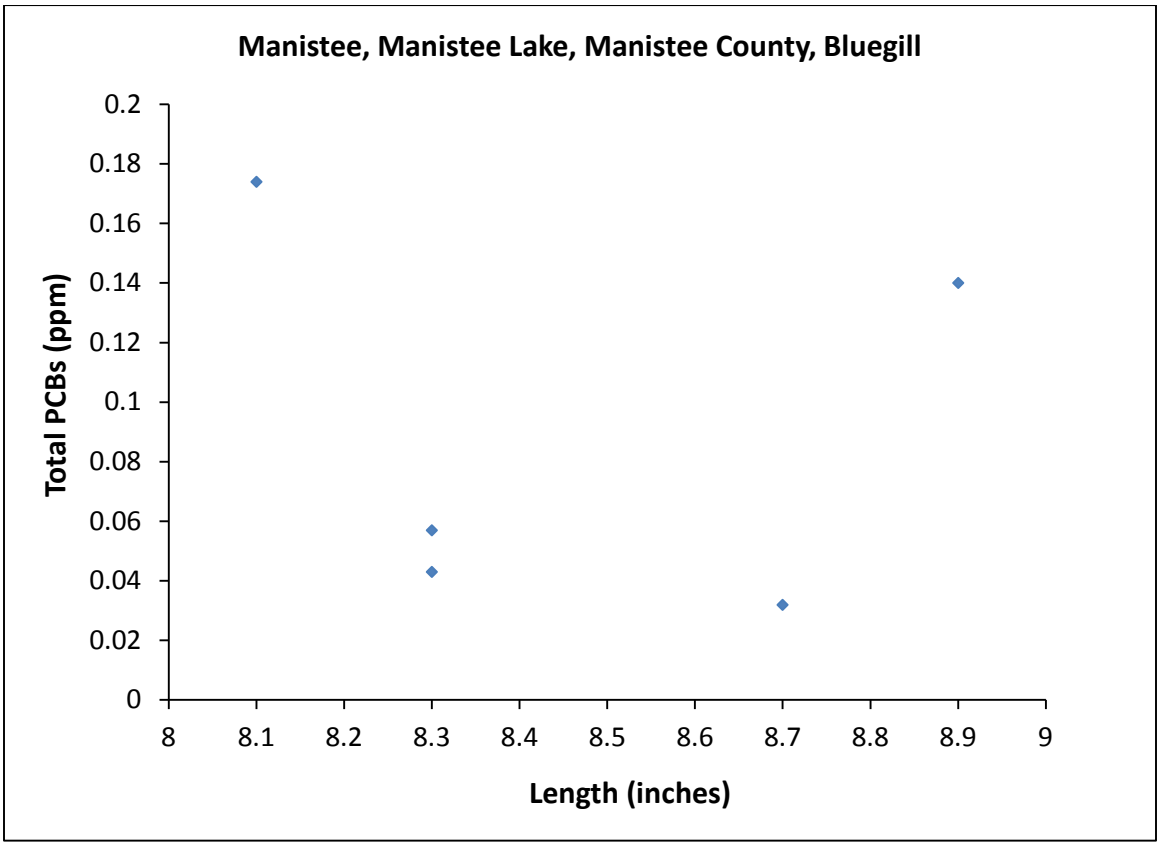
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.013	0.010
DDT	0.004	0.005
Chlordane	0.132	0.046
Toxaphene	--	--

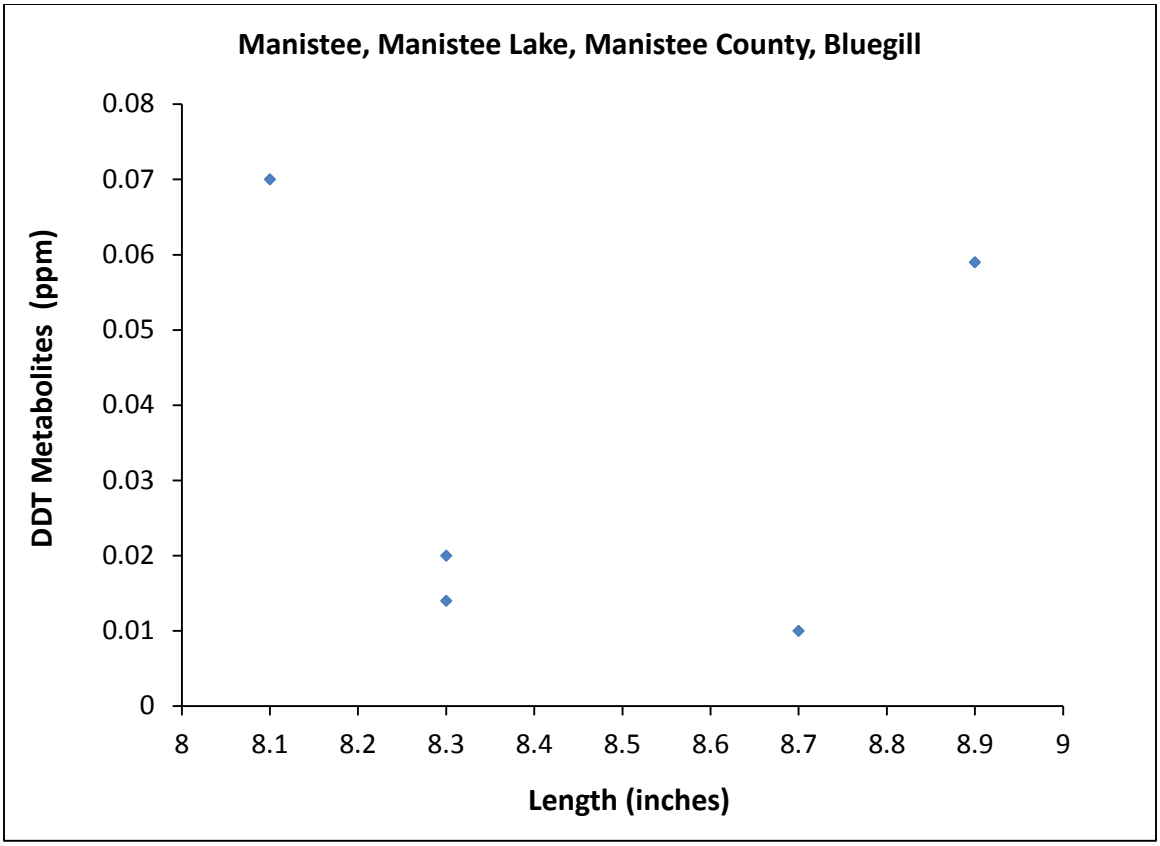
Final meal category based on UCL: 1*

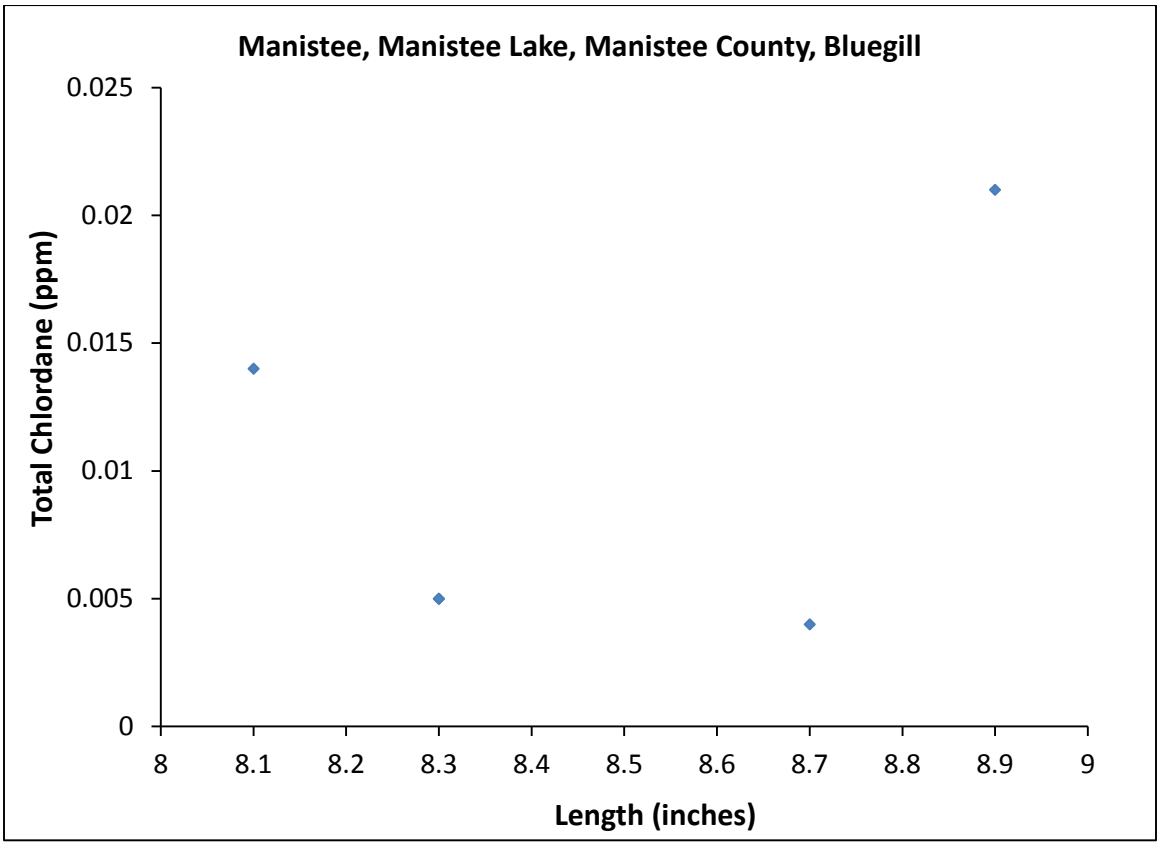
Existing Advisory: Women and children should not eat more than one meal per week of Manistee Lake bluegill due to PCBs.

Recommendation: No one should eat more than 2 meals per month of Manistee Lake bluegill or other sunfish due to PCBs. Mercury would cause an advisory. The quality of this dataset is limited due to the age of the data. *Based on the MDEQ 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.


Manistee, Manistee Lake, Manistee County, Bluegill
Mercury (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
8.2
8.4
8.6
8.8
9
Length (inches)


Manistee, Manistee Lake, Manistee County, Bluegill
Total PCBs (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
8.1
8.2
8.3
8.4
8.5
8.6
8.7
8.8
8.9
9
Length (inches)


Manistee, Manistee Lake, Manistee County, Bluegill
DDT Metabolites (ppm)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
8
8.1
8.2
8.3
8.4
8.5
8.6
8.7
8.8
8.9
9
Length (inches)


Manistee, Manistee Lake, Manistee County, Bluegill
Total Chlordane (ppm)
0.025
0.02
0.015
0.01
0.005
0
8
8.1
8.2
8.3
8.4
8.5
8.6
8.7
8.8
8.9
9
Length (inches)

Largemouth Bass & Smallmouth Bass | **Manistee Lake** | **Manistee 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	1992	13	11.4	14	13.9	15.6

Datasets available: 1991, 1992

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.26	0.20	0.31	0.32	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.787	0.779

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	1992	13	11.4	14	13.9	15.6

Datasets available: 1991, 1992

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.29	0.04	0.44	0.49	Limited
DDT	5	0.14	0.10	0.17	0.19	8
Chlordane	5	0.05	0.03	0.06	0.07	16
Toxaphene	5	ND	--	--	--	--
TEQ*	4	0.4 ppt	0.2 ppt	0.5 ppt	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.319	0.238
DDT	0.578	0.611
Chlordane	0.658	0.737
Toxaphene	--	--
TEQ*	--	--

Final meal category based on UCL: Limited*

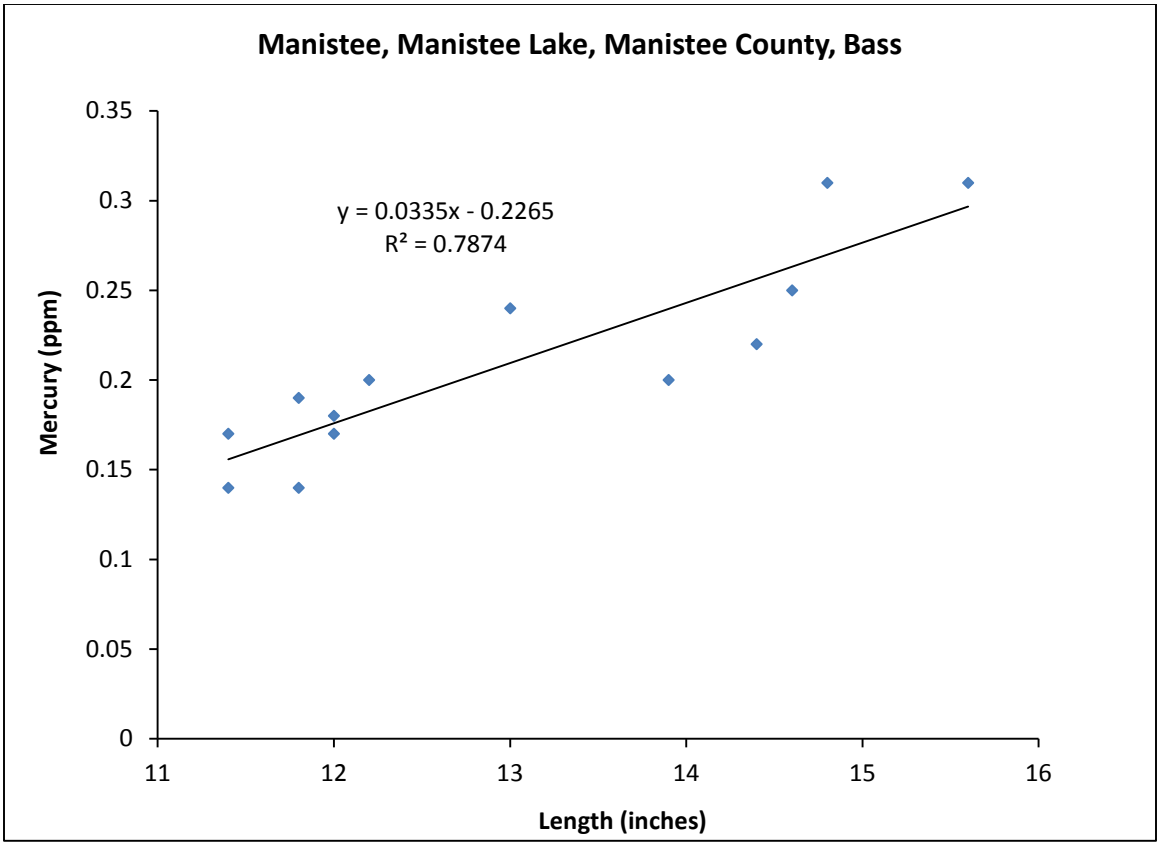
* - 2005 WHO TEFs; dl-PCBs not included

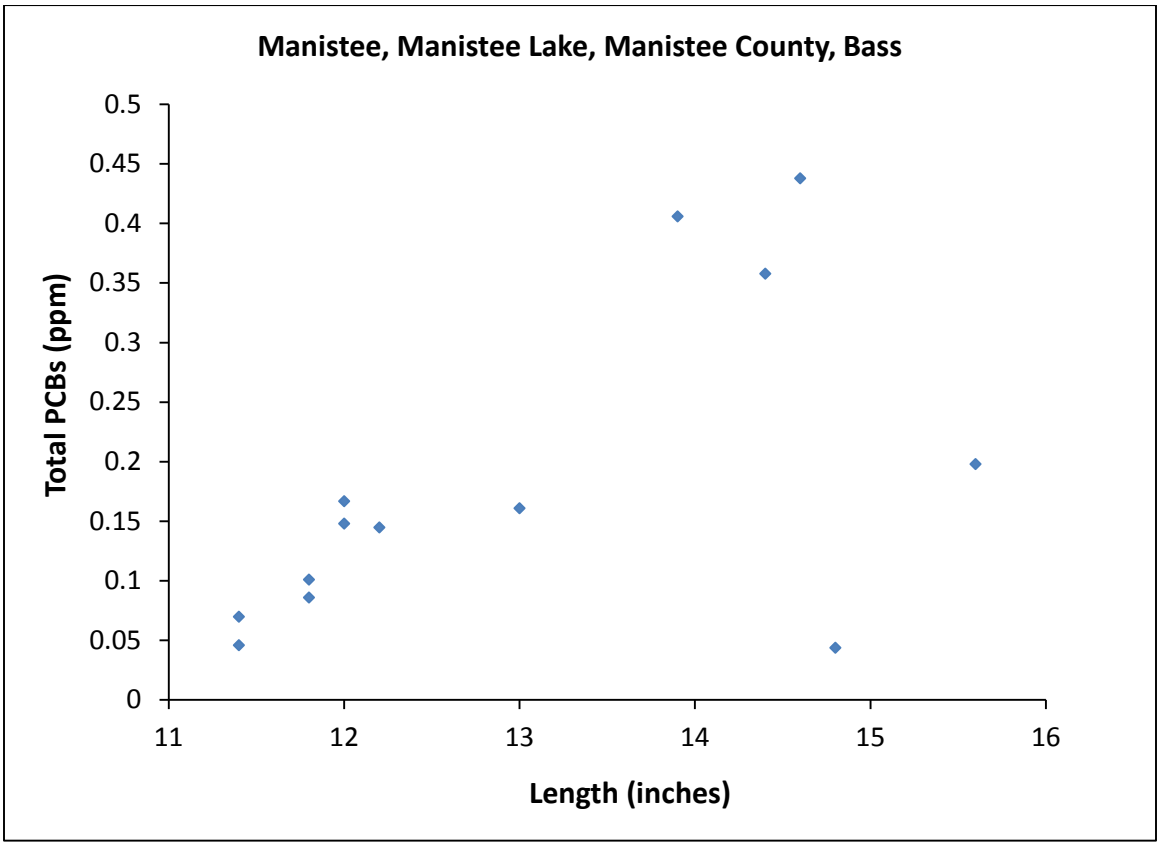
Existing Advisory: Women and children should not eat more than one meal per month of Manistee Lake smallmouth or largemouth bass due to mercury and PCBs.

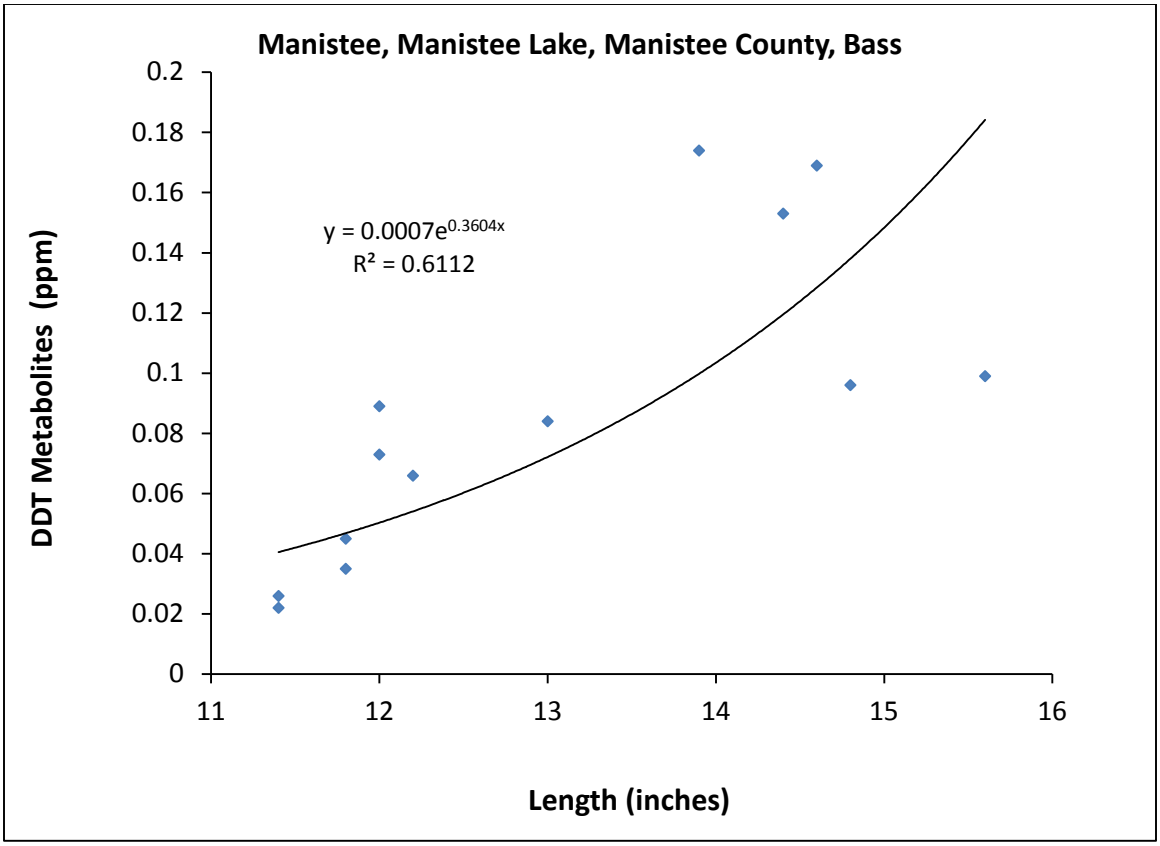
Recommendation: No one should eat more than 6 meals per year of largemouth or smallmouth bass from Manistee Lake due to PCBs. Mercury and dioxins would cause advisories. The quality of this dataset is limited due to the age of the data.*Based on the MDEQ Fish Contaminant Monitoring Program, PCB concentrations ≥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.

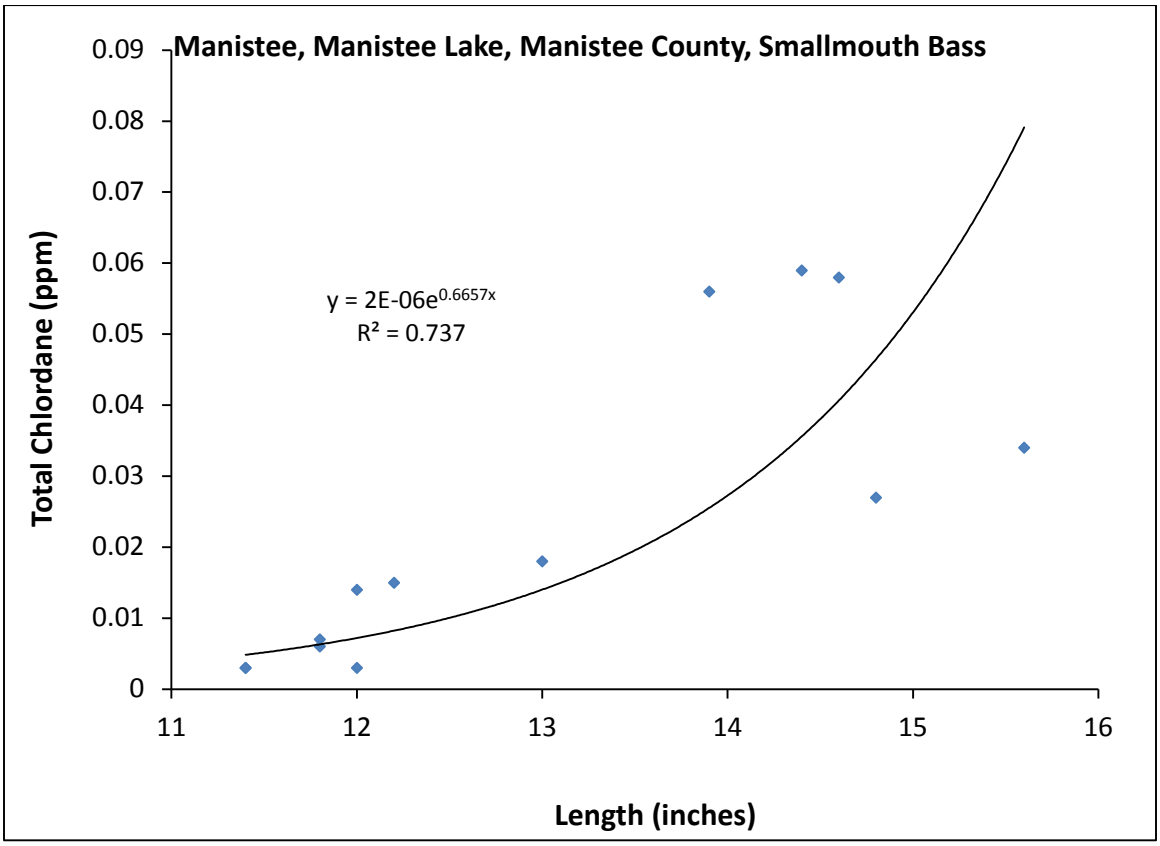
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.24	4
15	0.28	2
16	0.31	2
17	0.34	2
18	0.38	2
19	0.41	2
20	0.44	2
21	0.48	2
22	0.51	2

Shaded area denotes extrapolated estimates


Manistee, Manistee Lake, Manistee County, Bass
y = 0.0335x - 0.2265
R² = 0.7874
Mercury (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11
12
13
14
15
16
Length (inches)


Manistee, Manistee Lake, Manistee County, Bass
Total PCBs (ppm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
11
12
13
14
15
16
Length (inches)


Manistee, Manistee Lake, Manistee County, Bass
DDT Metabolites (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
y = 0.0007e^0.3604x
R² = 0.6112
11
12
13
14
15
16
Length (inches)


Manistee, Manistee Lake, Manistee County, Smallmouth Bass
Total Chlordane (ppm)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
y = 2E-06e^0.6657x
R² = 0.737
11
12
13
14
15
16
Length (inches)

Rock Bass **Manistee Lake** **Manistee County**

Hg Analysis:

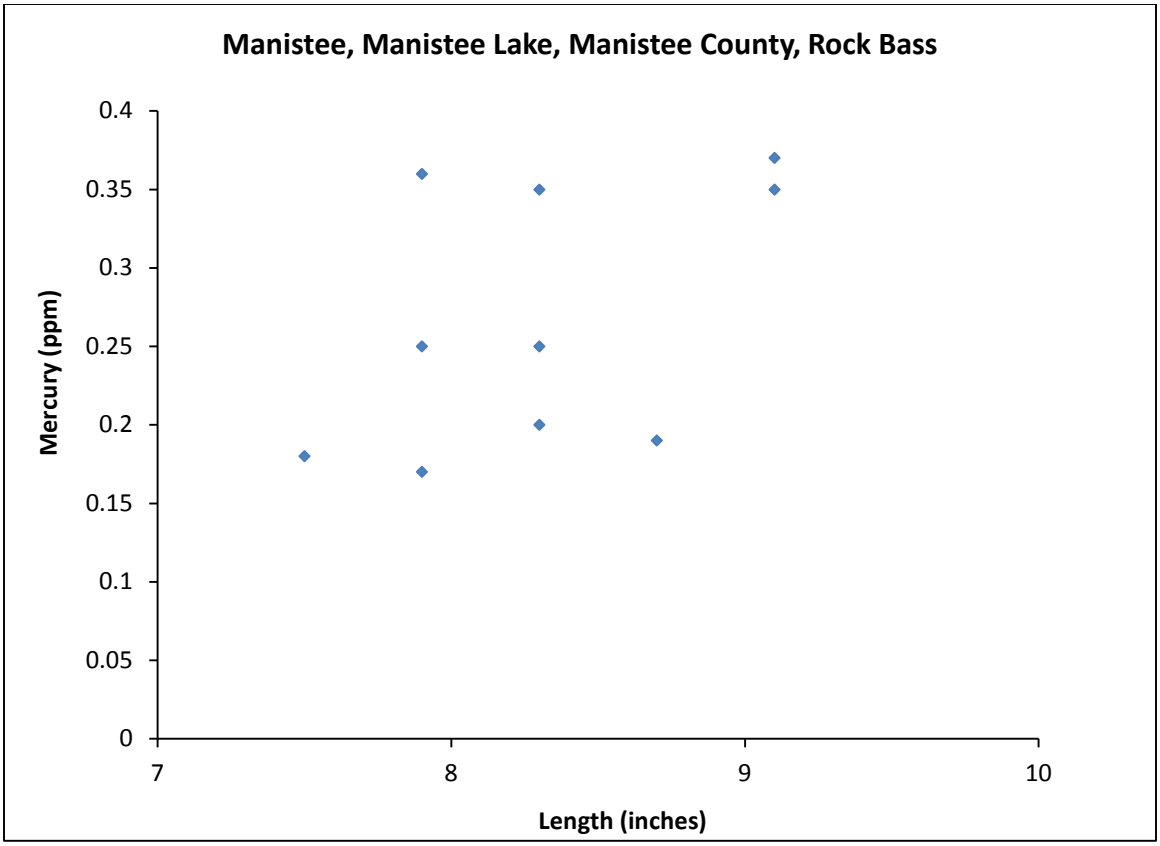
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1992	1992	10	7.5	na	7.5	9.1	
Datasets available:	1992						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	10	0.27		0.17	0.37	0.33	2
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.246	0.243					

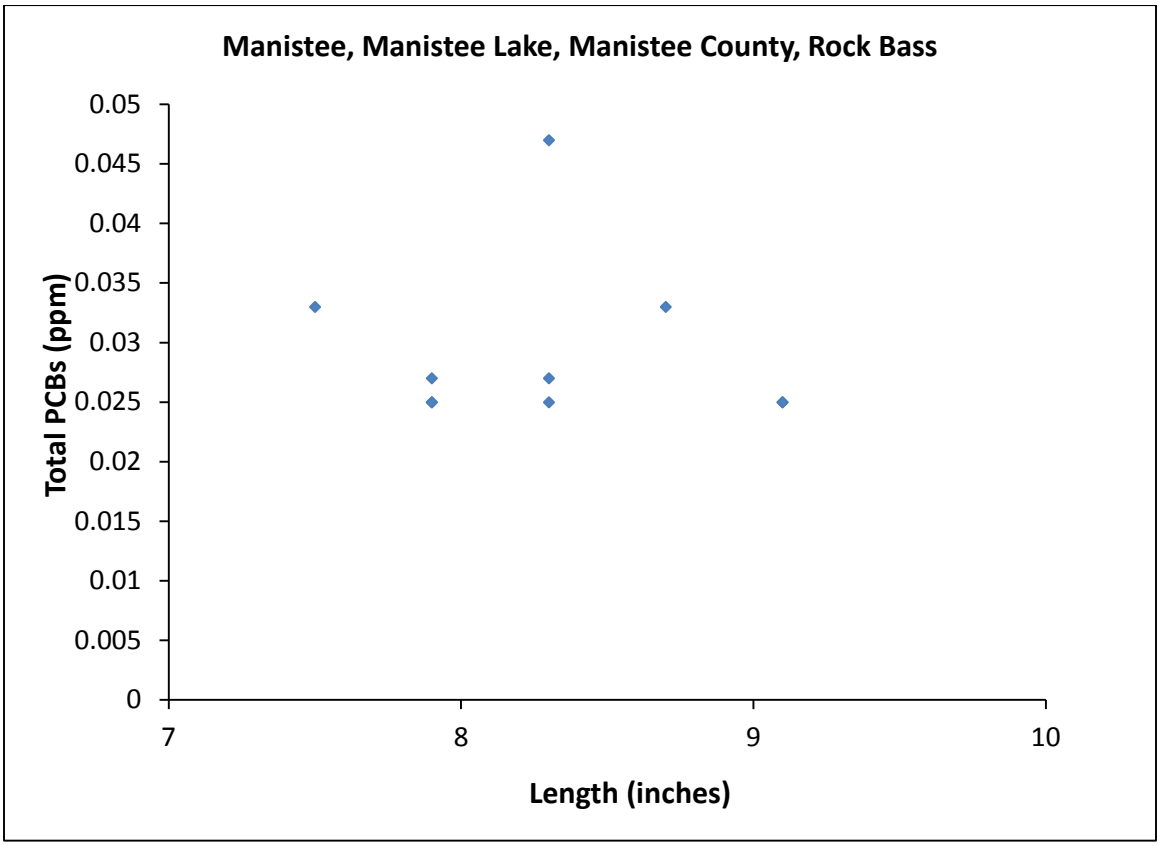
Organics Analysis:

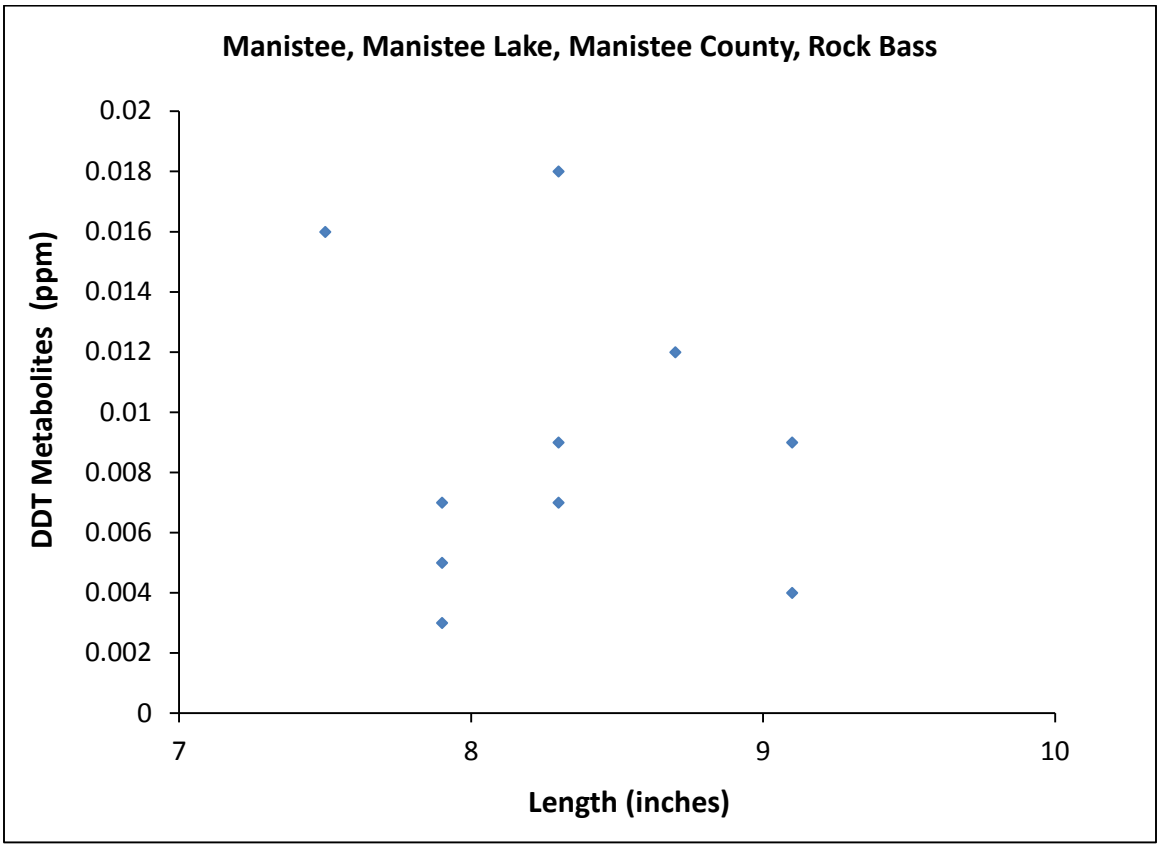
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1992	1992	10	7.5	na	7.5	9.1	
Datasets available:	1992						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	10	0.03		0.02	0.05	0.03	8
DDT	10	0.009		0.003	0.02	0.01	16
Chlordane	10	ND		--	--	--	--
Toxaphene	10	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.014	0.020					
DDT	0.023	0.006					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**2**

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

Recommendation: No one should eat more than 2 meals per month of Manistee Lake rock bass due to mercury. PCBs would cause an advisory.


Manistee, Manistee Lake, Manistee County, Rock Bass
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
7
8
9
10
Length (inches)


Manistee, Manistee Lake, Manistee County, Rock Bass
Total PCBs (ppm)
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
7
8
9
10
Length (inches)


Manistee, Manistee Lake, Manistee County, Rock Bass
DDT Metabolites (ppm)
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
7
8
9
10
Length (inches)

Walleye **Manistee Lake** **Manistee 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	16.1	15	16.1	24.4

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	4	0.26	0.11	0.32	--	--

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	16.1	15	16.1	24.4

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	4	0.24	0.11	0.49	--	--
DDT	4	0.13	0.04	0.24	--	--
Chlordane	4	0.05	0.02	0.09	--	--
Toxaphene	4	0.09	0.05	0.12	--	--
TEQ*	4	0.2 ppt	0.05 ppt	0.6 ppt	--	--

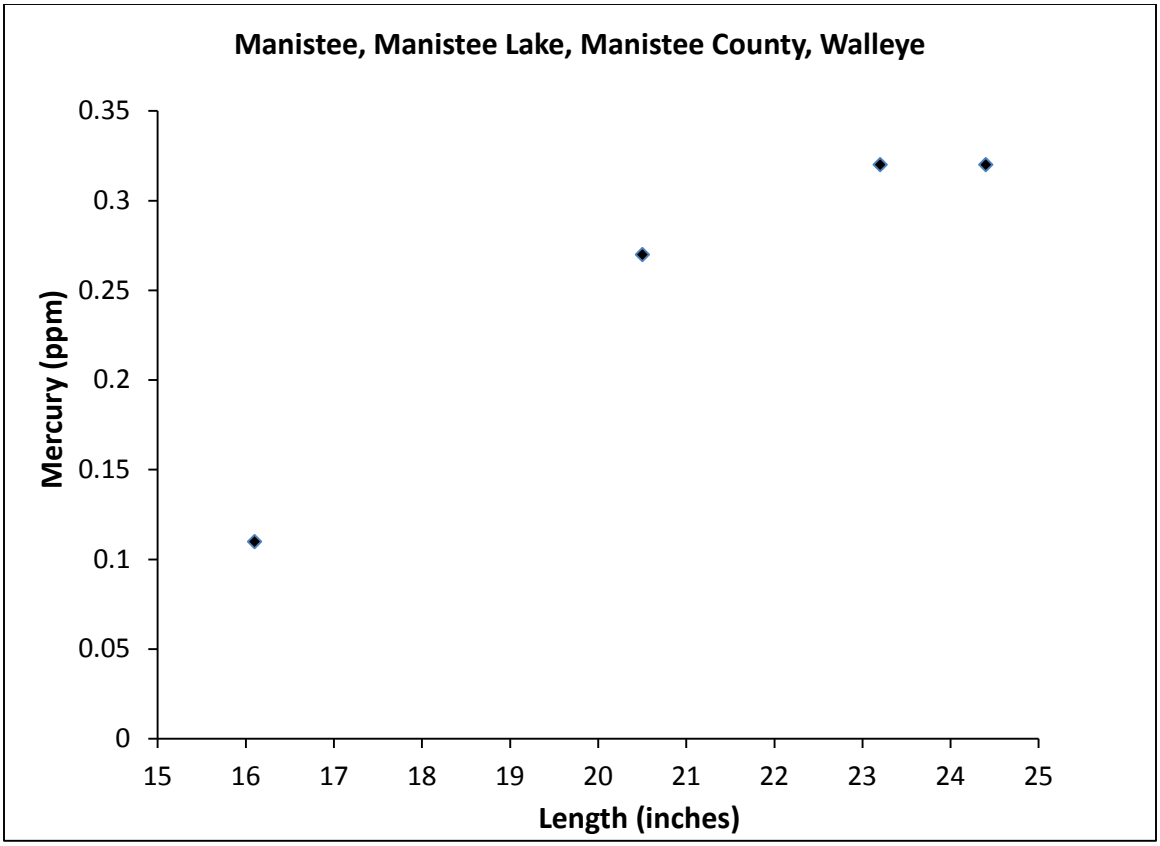
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--
TEQ*	--	--

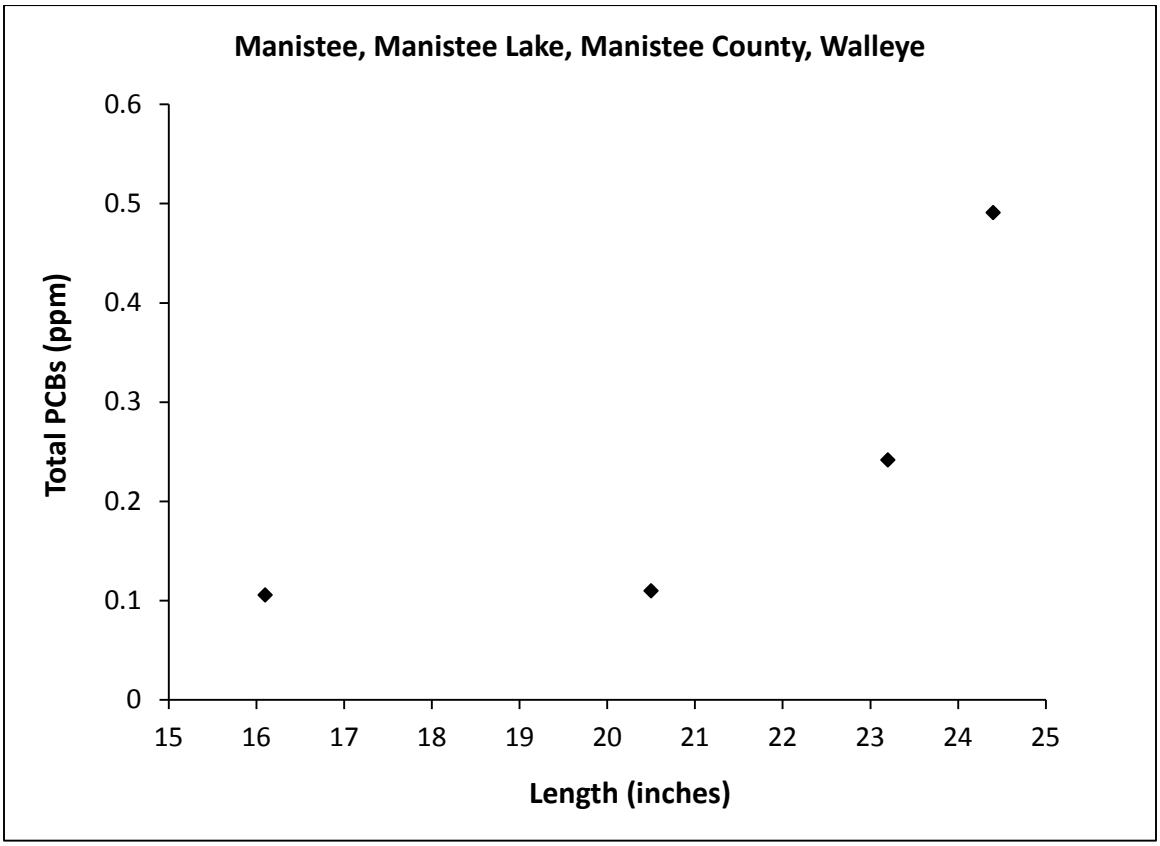
Final meal category based on UCL: --

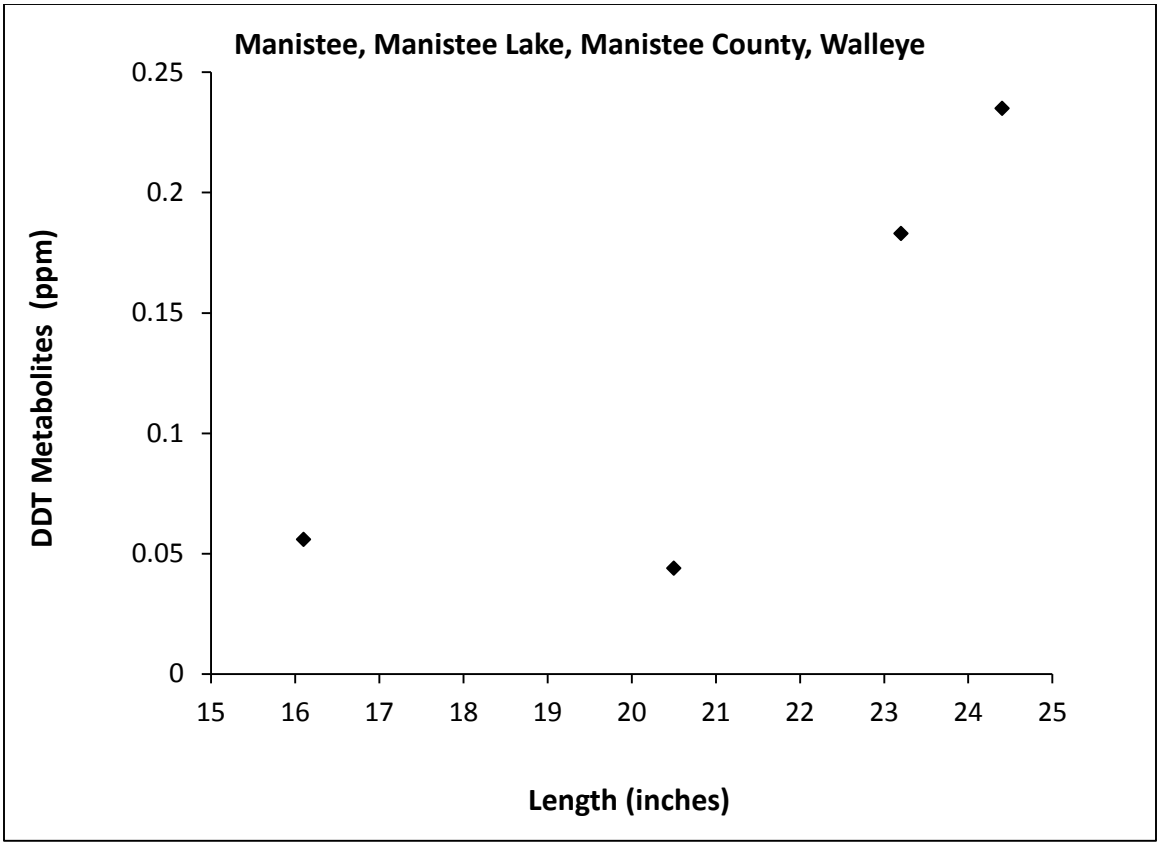
* - 2005 WHO TEFs; dl-PCBs not included

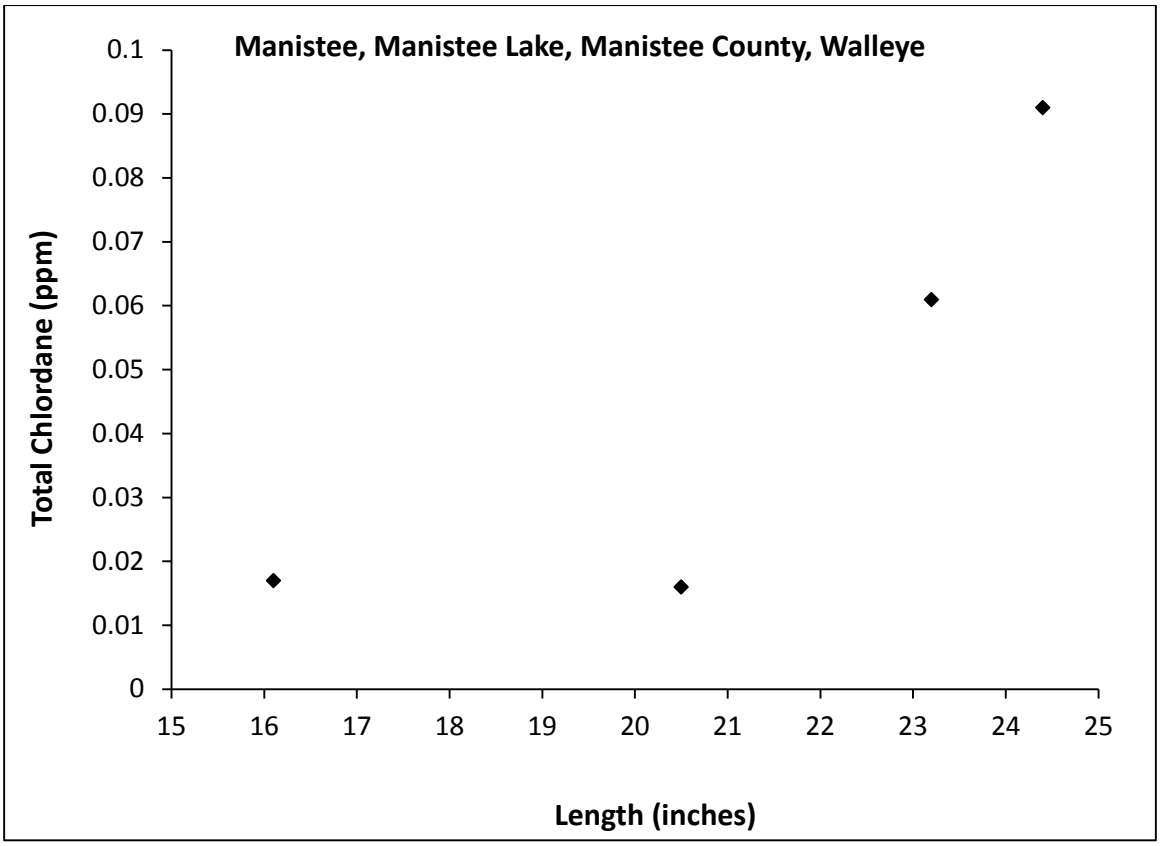
Existing Advisory: Women and children should not eat more than one meal per month of Manistee Lake walleye due to mercury and PCBs.

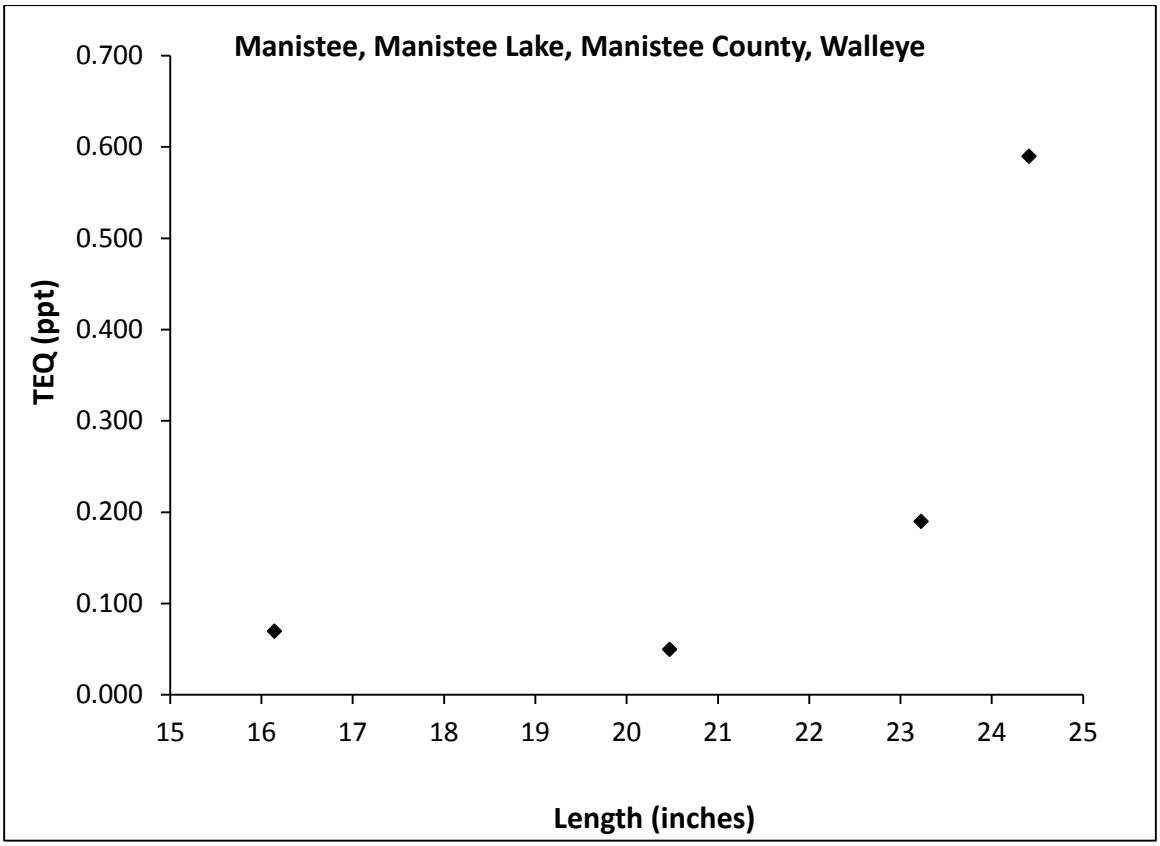
Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies: No one should eat more than 2 meals per month of walleye smaller than 20 inches or more than 1 meal per month of walleye larger than 20 inches.


Manistee, Manistee Lake, Manistee County, Walleye
Mercury (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
21
22
23
24
25
Length (inches)


Manistee, Manistee Lake, Manistee County, Walleye
Total PCBs (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
15
16
17
18
19
20
21
22
23
24
25
Length (inches)


Manistee, Manistee Lake, Manistee County, Walleye
DDT Metabolites (ppm)
0.25
0.2
0.15
0.1
0.05
0
15
16
17
18
19
20
21
22
23
24
25
Length (inches)


Manistee, Manistee Lake, Manistee County, Walleye
Total Chlordane (ppm)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
15
16
17
18
19
20
21
22
23
24
25
Length (inches)


Manistee, Manistee Lake, Manistee County, Walleye
TEQ (ppt)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
15
16
17
18
19
20
21
22
23
24
25
Length (inches)

Brown Trout **Pine Lake** **Manistee 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	1	20.9	8	--	--

Datasets available: 1987

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.26	--	--	--	--

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
--	--	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: Pine Lake 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 evaluation using the standard evaluation method.

Largemouth Bass **Pine Lake** **Manistee County**

Hg Analysis:

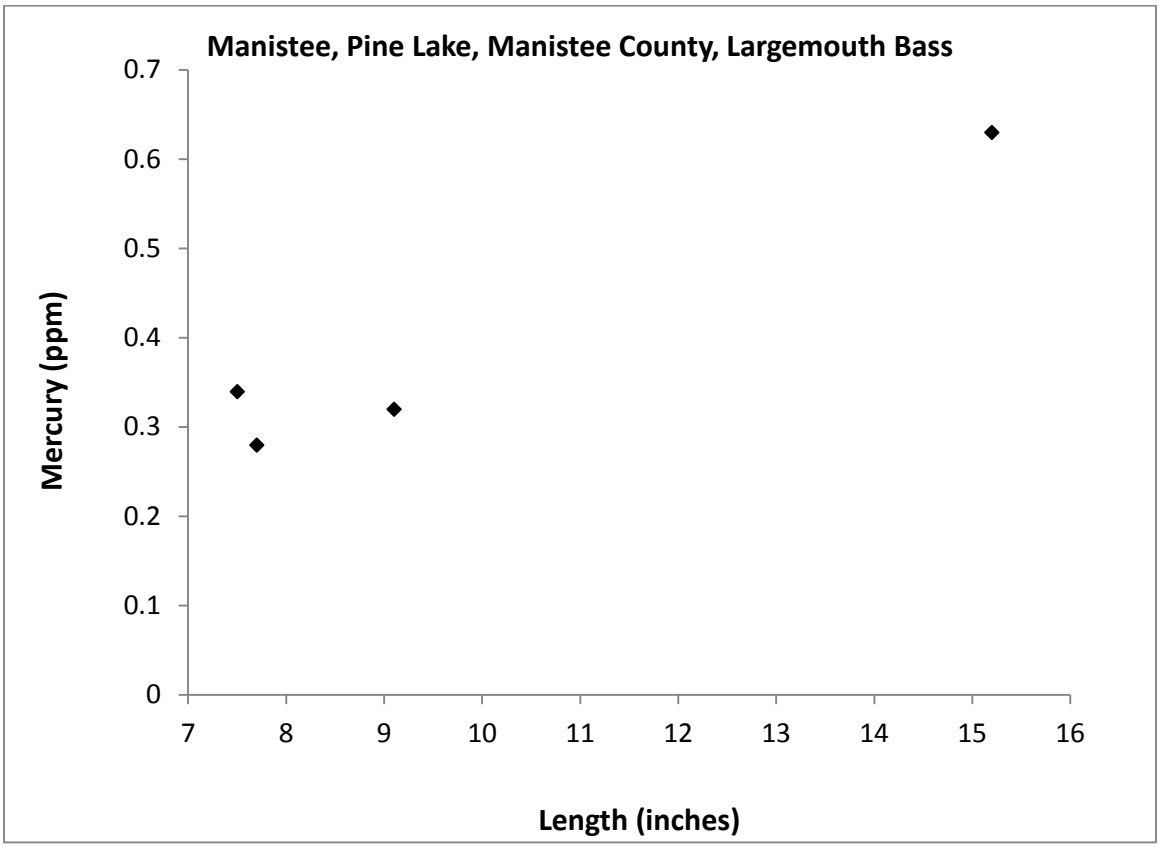
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples		
Earliest	Most Recent				Min	Max	
1987	1987	4	7.5	14	7.5	15.2	
Datasets available: 1987							
Chemical	**Sample Size (All)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	4	0.39		0.28	0.63	--	--
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	
--	--	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: Pine Lake largemouth bass are covered under the statewide mercury consumption advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies: 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.


Manistee, Pine Lake, Manistee County, Largemouth Bass
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
7
8
9
10
11
12
13
14
15
16
Length (inches)

Rock Bass **Pine Lake** **Manistee 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	9	5.5	na	5.5	9.4

Datasets available: 1987

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	9	0.31	0.12	0.54	0.43	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.712	0.654

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 (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	--	--

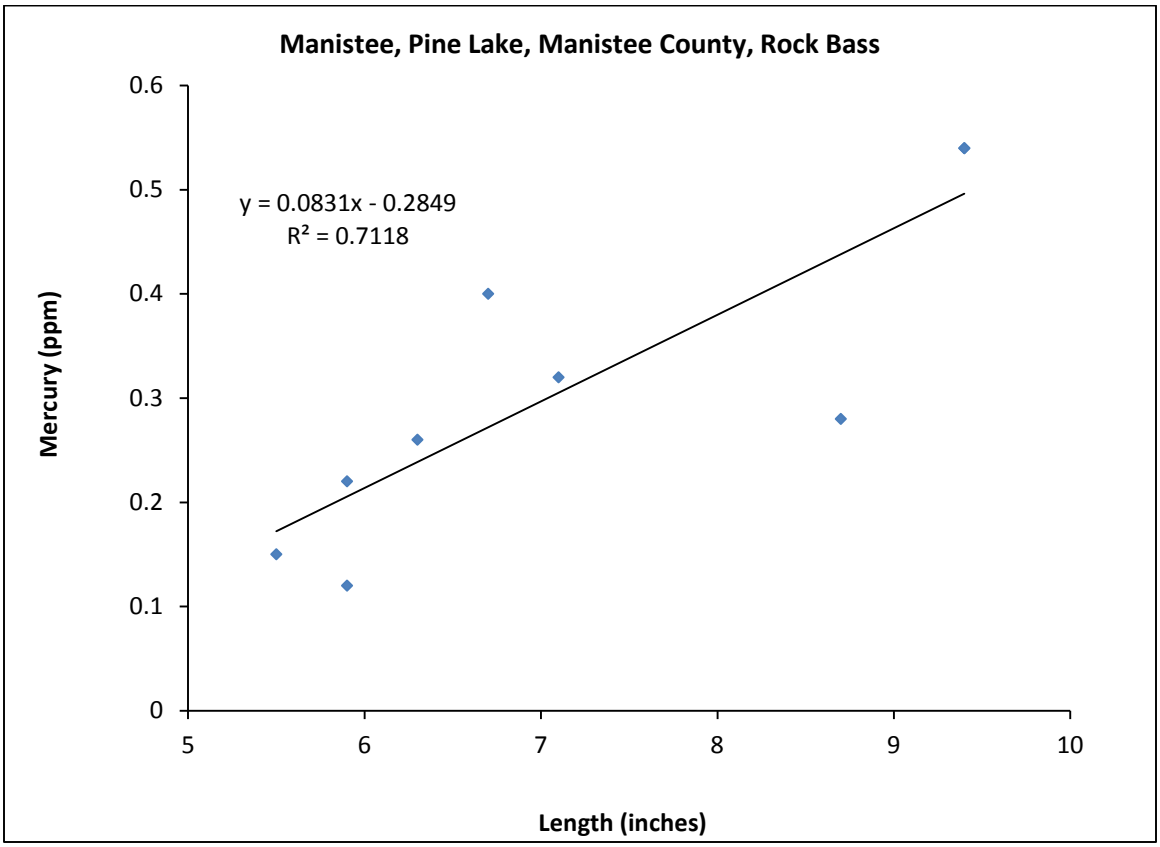
Final meal category based on UCL: 2

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

Recommendation: No one should eat more than 2 meals per month of Pine Lake rock bass less than 9 inches or more than 1 meal per month of rock bass larger than 9 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
5	0.13	4
6	0.21	4
7	0.30	2
8	0.38	2
9	0.46	2
10	0.55	1
11	0.63	1
12	0.71	1
13	0.80	1

Shaded area denotes extrapolated estimates


Manistee, Pine Lake, Manistee County, Rock Bass
y = 0.0831x - 0.2849
R² = 0.7118
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
5
6
7
8
9
10
Length (inches)

Carp **Portage Lake** **Manistee 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	16.7	na	16.7	33

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.13	0.08	0.15	0.15	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.149	0.184

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	2004	10	16.7	na	16.7	33

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.15	0.005	0.37	0.24	0.5
DDT	10	0.20	0.01	0.36	0.28	4
Chlordane	10	0.02	0.001	0.03	0.02	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.448	0.818
DDT	0.288	0.623
Chlordane	0.507	0.759
Toxaphene	--	--

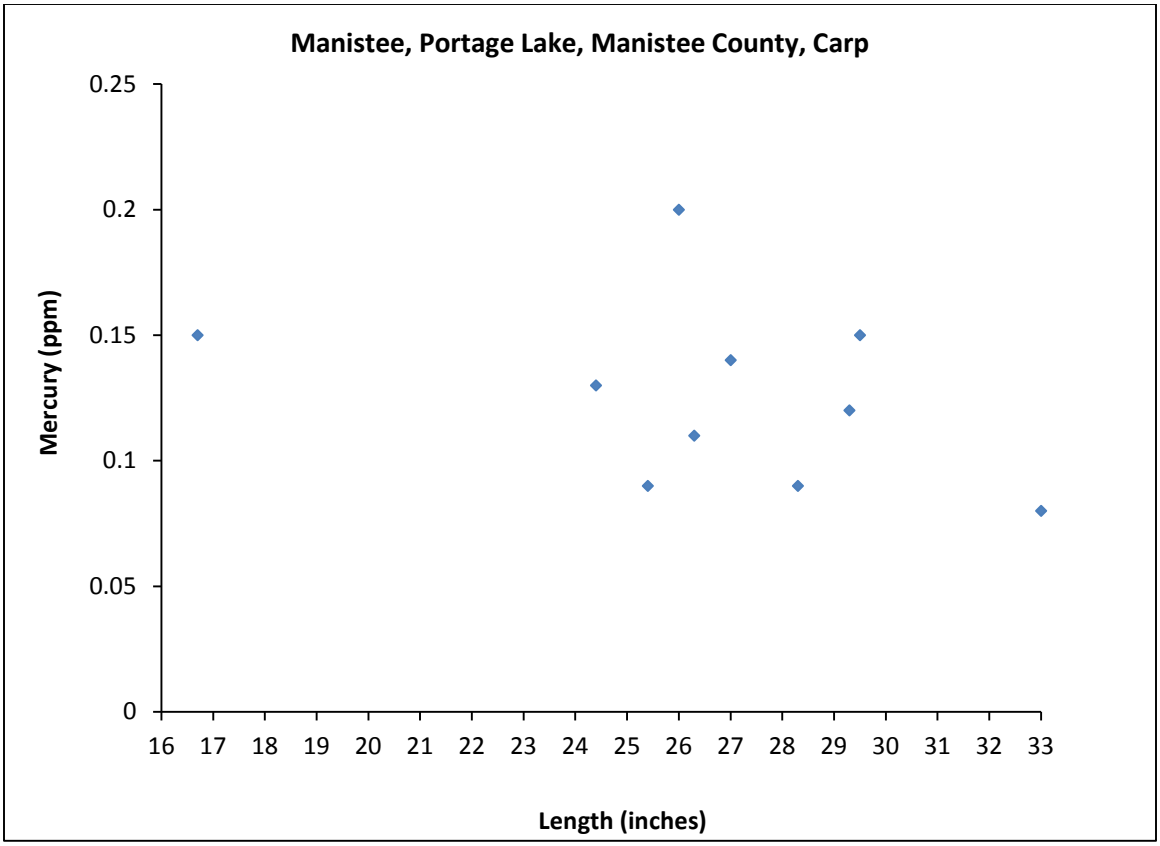
Final meal category based on UCL: 0.5

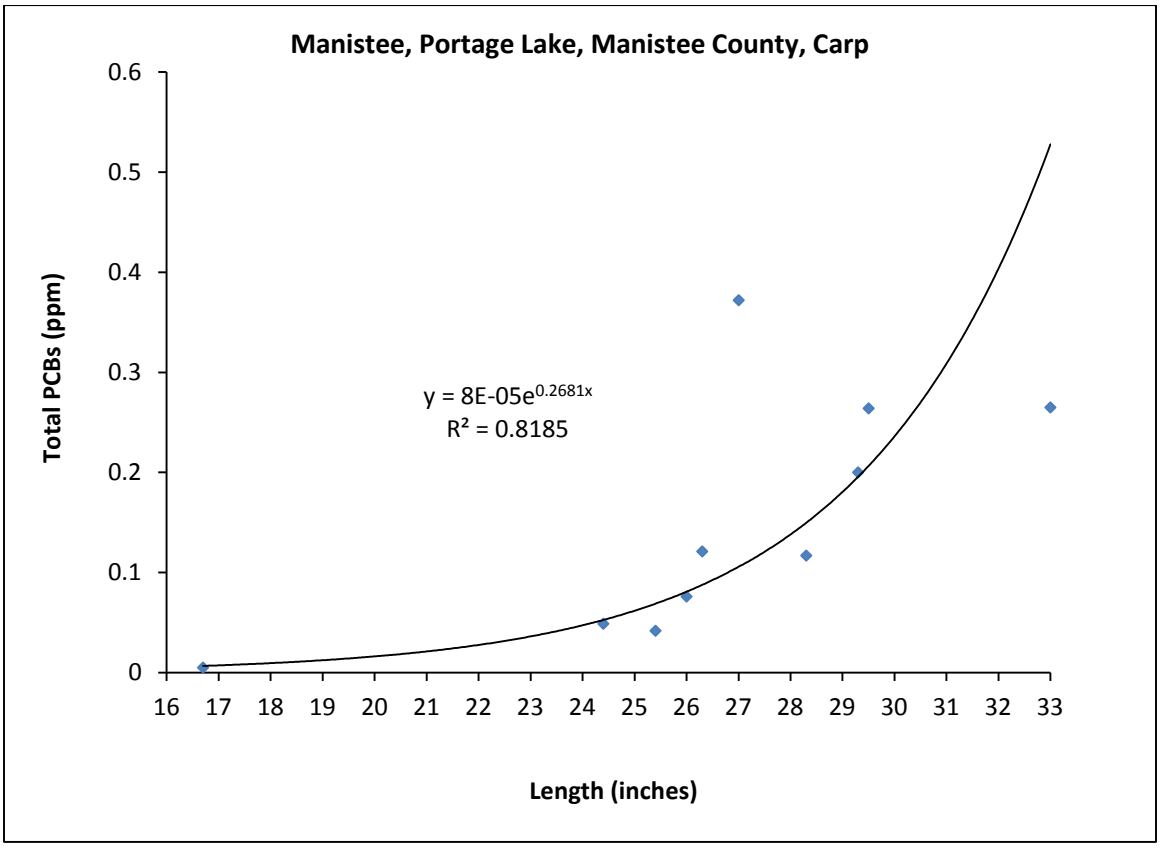
Existing Advisory: Women and children should not eat more than one meal per month of Portage Lake carp greater than 26 inches due to PCBs.

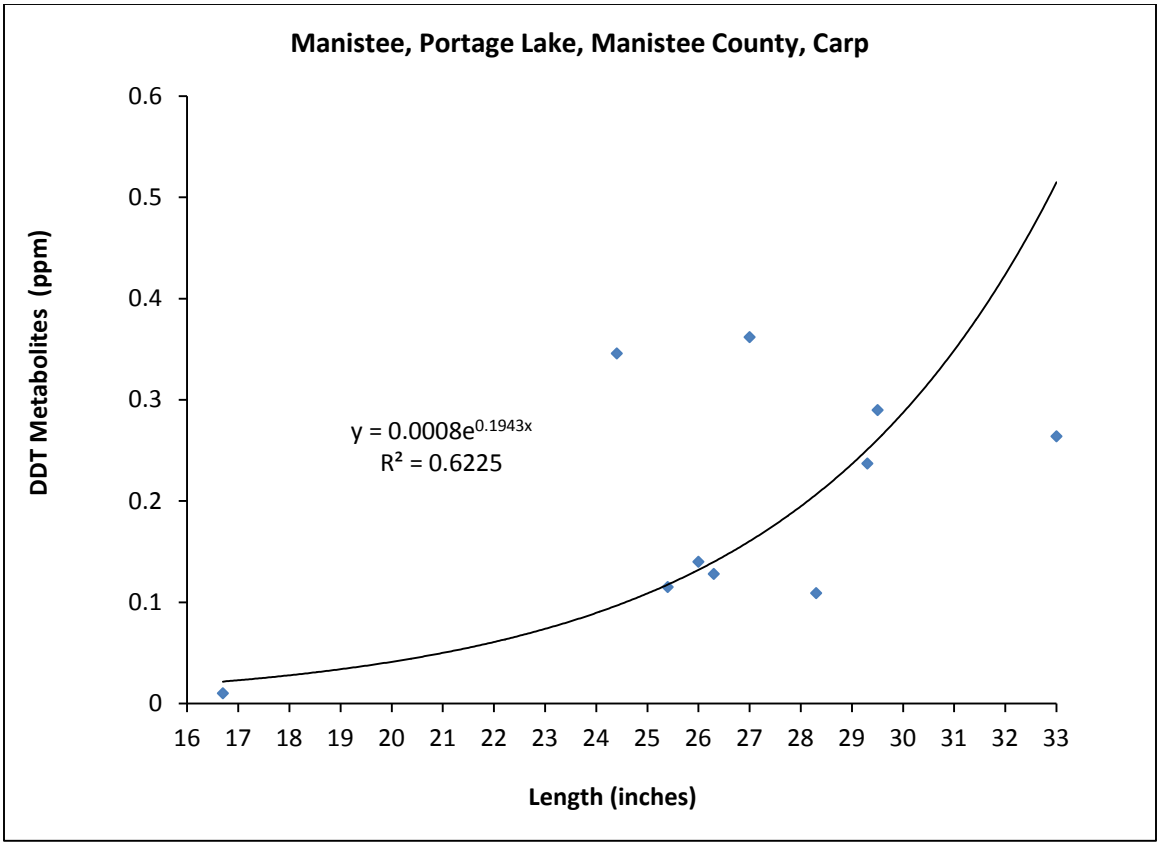
Recommendation: No one should eat more than 4 meals per month of Portage Lake carp smaller than 24 inches due to mercury and PCBs or more than 1 meal per month of those fish larger than 24 inches due to PCBs. DDT would cause an advisory.

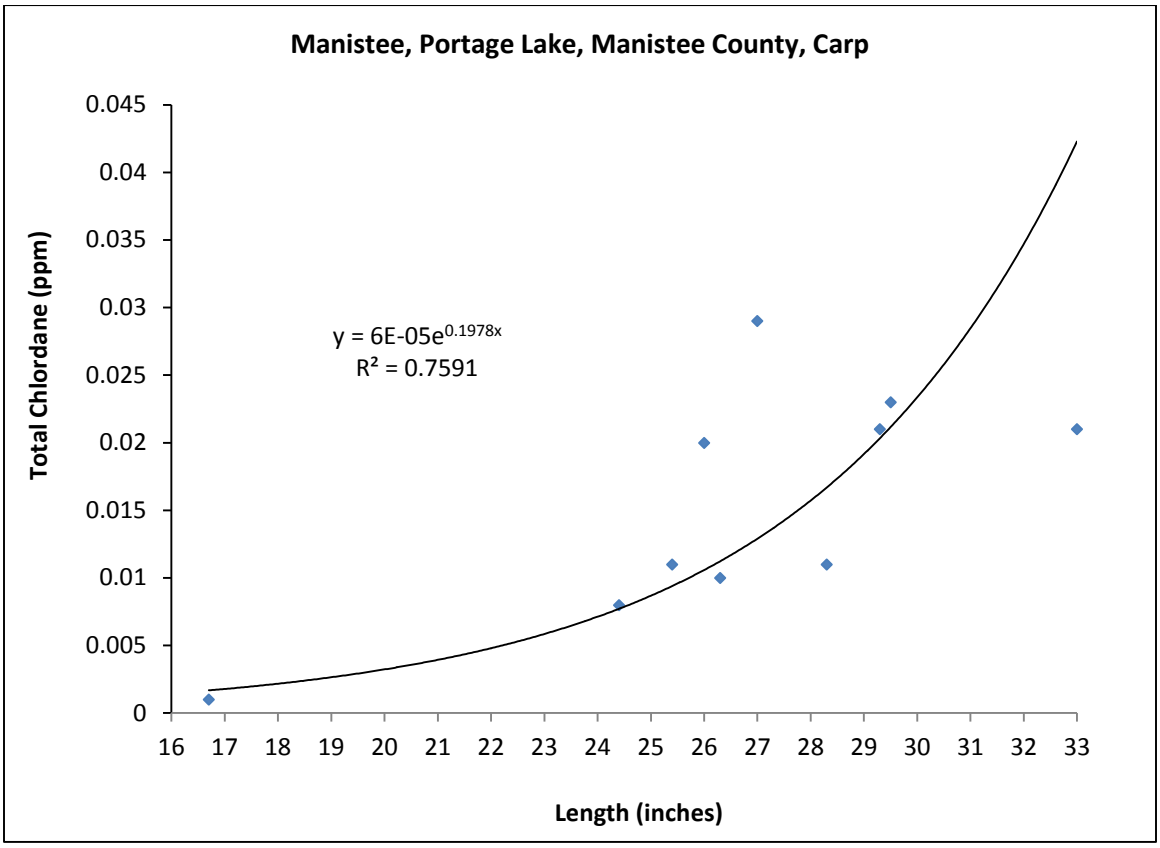
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category	DDT Regression Equation Estimate (ppm)	Meal Category
16	0.01	16	0.01	16
20	0.02	12	0.04	16
23	0.04	4	0.08	16
24	0.05	4	0.10	16
26	0.08	2	0.14	12
27	0.11	1	0.17	8
28	0.15	1	0.20	8
29	0.19	1	0.24	4
30	0.25	0.5	0.28	4

Shaded area denotes extrapolated estimates


Manistee, Portage Lake, Manistee County, Carp
Mercury (ppm)
0.25
0.2
0.15
0.1
0.05
0
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Length (inches)


Manistee, Portage Lake, Manistee County, Carp
Total PCBs (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
y = 8E-05e^0.2681x
R² = 0.8185
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Length (inches)


Manistee, Portage Lake, Manistee County, Carp
DDT Metabolites (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
y = 0.0008e^0.1943x
R² = 0.6225
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Length (inches)


Manistee, Portage Lake, Manistee County, Carp
Total Chlordane (ppm)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
y = 6E-05e^0.1978x
R² = 0.7591
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Length (inches)

Largemouth & Smallmouth Bass | **Portage Lake** | **Manistee 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	2004	25	12	14	13.5	20.3

Datasets available: 1990, 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	20	0.30	0.12	0.58	0.36	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.801	0.721

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	2004	10	13.5	14	13.5	20.3

Datasets available: 1990, 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.04	0.01	0.11	0.06	2
DDT	10	0.03	0.01	0.10	0.05	16
Chlordane	10	0.003	0.001	0.009	0.01	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.713	0.617
DDT	0.785	0.654
Chlordane	0.600	0.548
Toxaphene	--	--

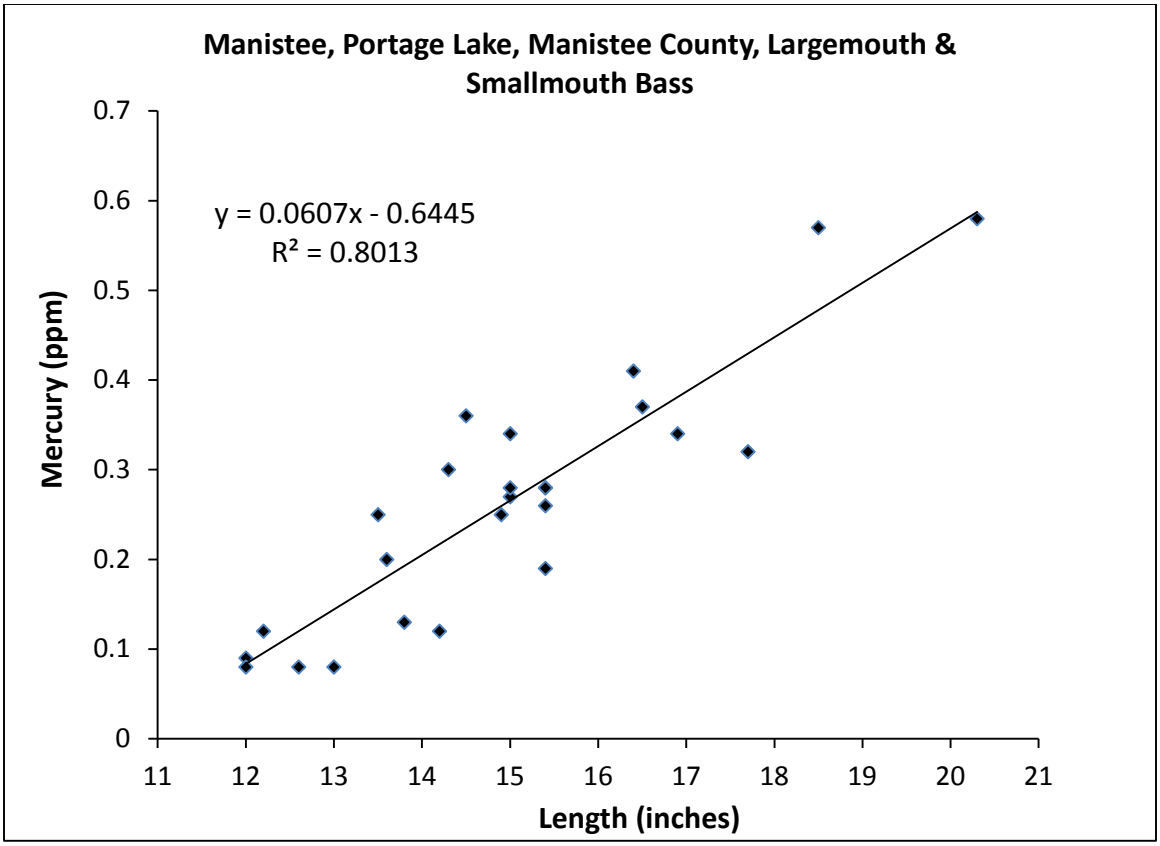
Final meal category based on UCL: 2

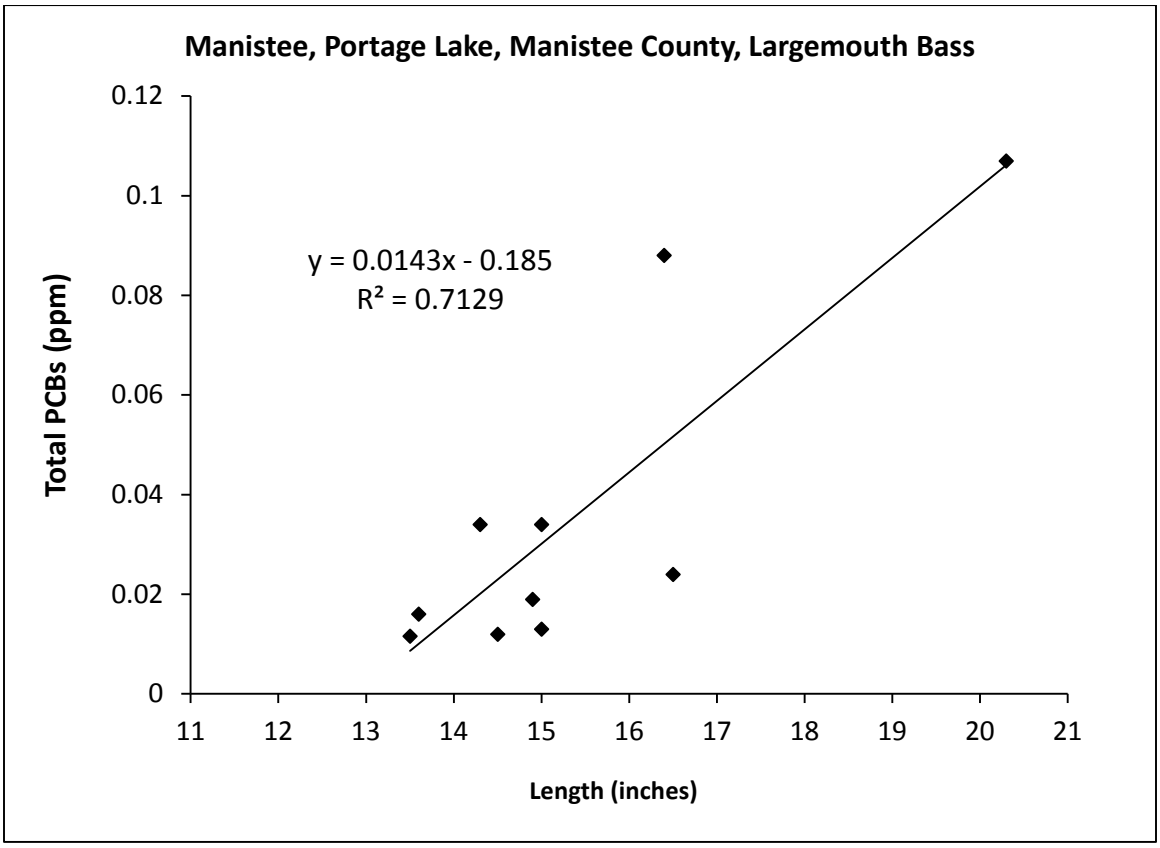
Existing Advisory: Women and children should not eat more than one meal per week of Portage Lake largemouth bass smaller than 18 inches or more than one meal per month of those fish larger than 18 inches due to mercury and PCBs.

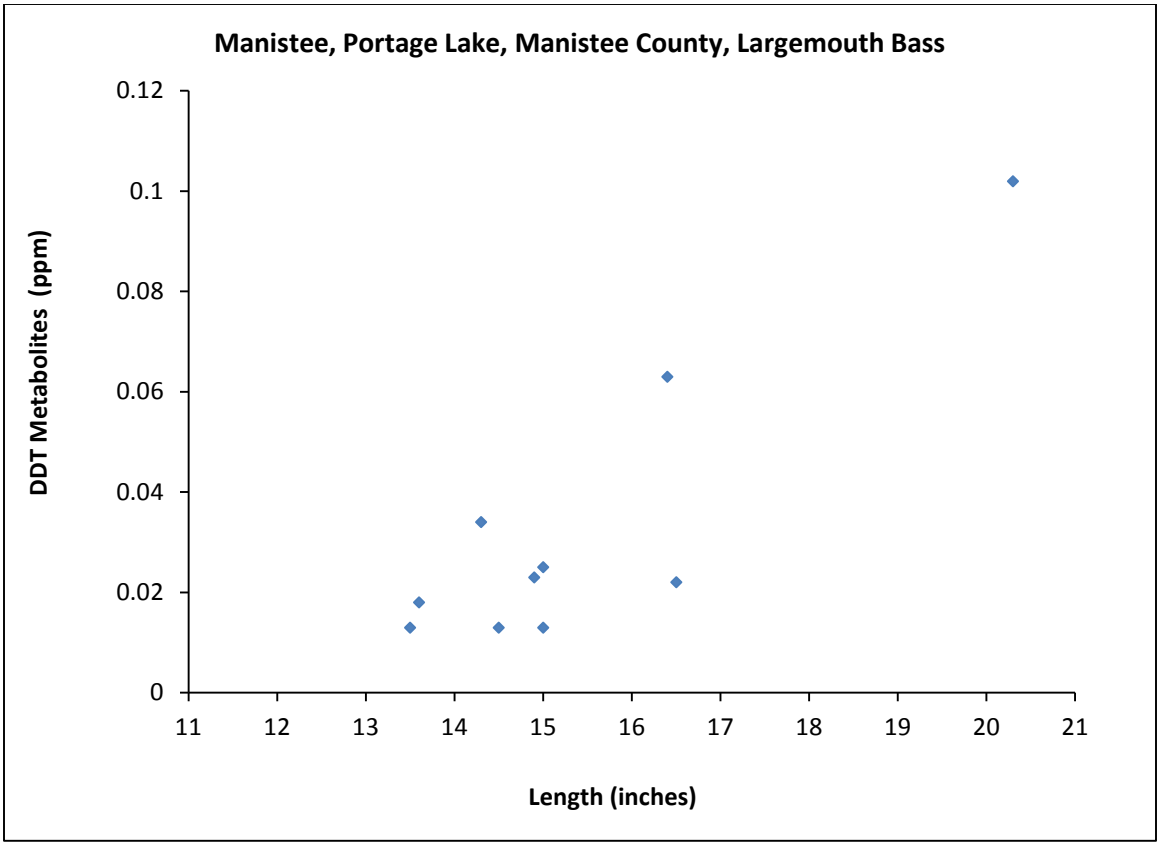
Recommendation: No one should eat more than 2 meals per month of Portage Lake largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury and PCBs.

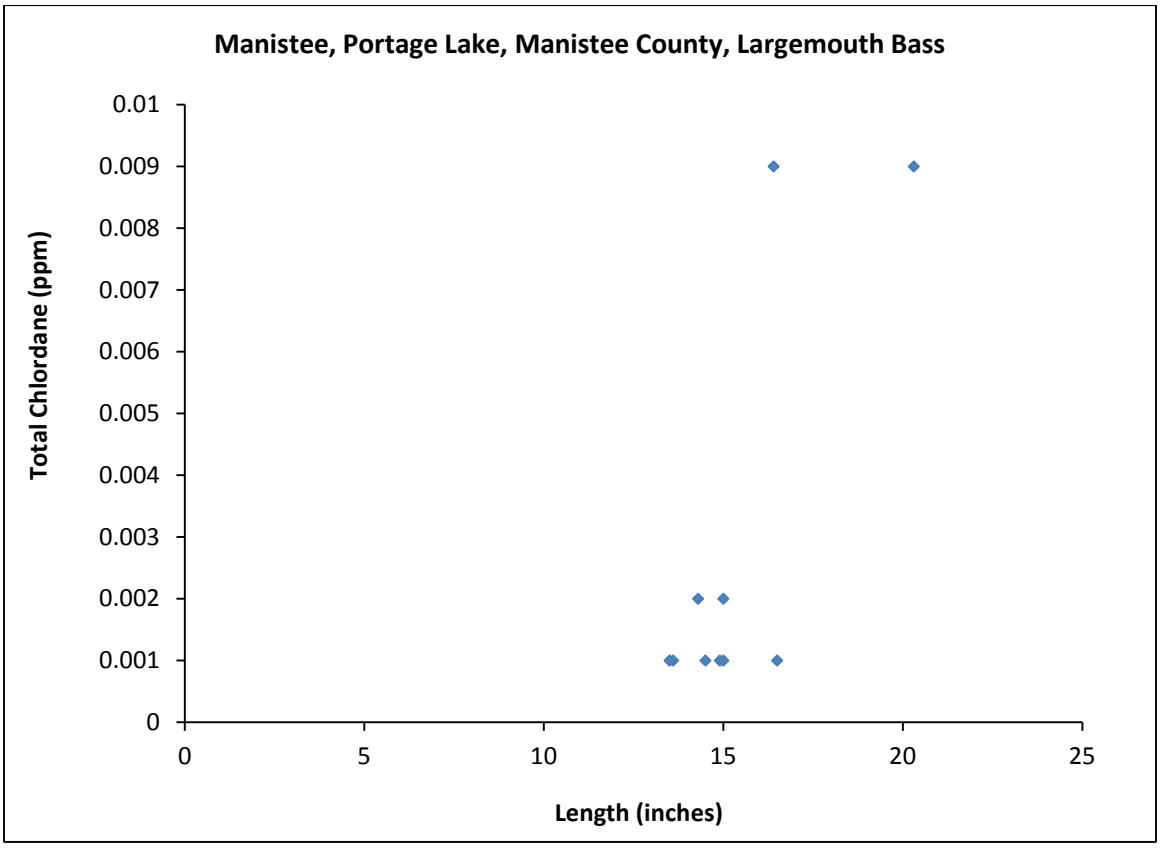
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category	PCB Regression Equation Estimate (ppm)	Meal Category
13	0.14	4	0.00	16
14	0.21	4	0.02	12
15	0.27	4	0.03	8
16	0.33	2	0.04	4
17	0.39	2	0.06	2
18	0.45	2	0.07	2
20	0.57	1	0.10	2
22	0.69	1	0.13	1
24	0.81	1	0.16	1

Shaded area denotes extrapolated estimates


Manistee, Portage Lake, Manistee County, Largemouth & Smallmouth Bass
y = 0.0607x - 0.6445
R² = 0.8013
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Manistee, Portage Lake, Manistee County, Largemouth Bass
y = 0.0143x - 0.185
R² = 0.7129
Total PCBs (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Manistee, Portage Lake, Manistee County, Largemouth Bass
DDT Metabolites (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Manistee, Portage Lake, Manistee County, Largemouth Bass
Total Chlordane (ppm)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0
5
10
15
20
25
Length (inches)

Northern Pike **Portage Lake** **Manistee 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	2004	20	22	24	23.7	37

Datasets available: 1990, 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	18	0.26	0.17	0.46	0.30	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.820	0.766

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	2004	10	23.7	24	23.7	30.4

Datasets available: 1990, 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.03	0.02	0.05	0.04	4
DDT	10	0.03	0.01	0.06	0.04	16
Chlordane	10	0.003	0.001	0.006	0.004	--
Toxaphene	10	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.206	0.170
DDT	0.104	0.125
Chlordane	0.190	0.242
Toxaphene	--	--

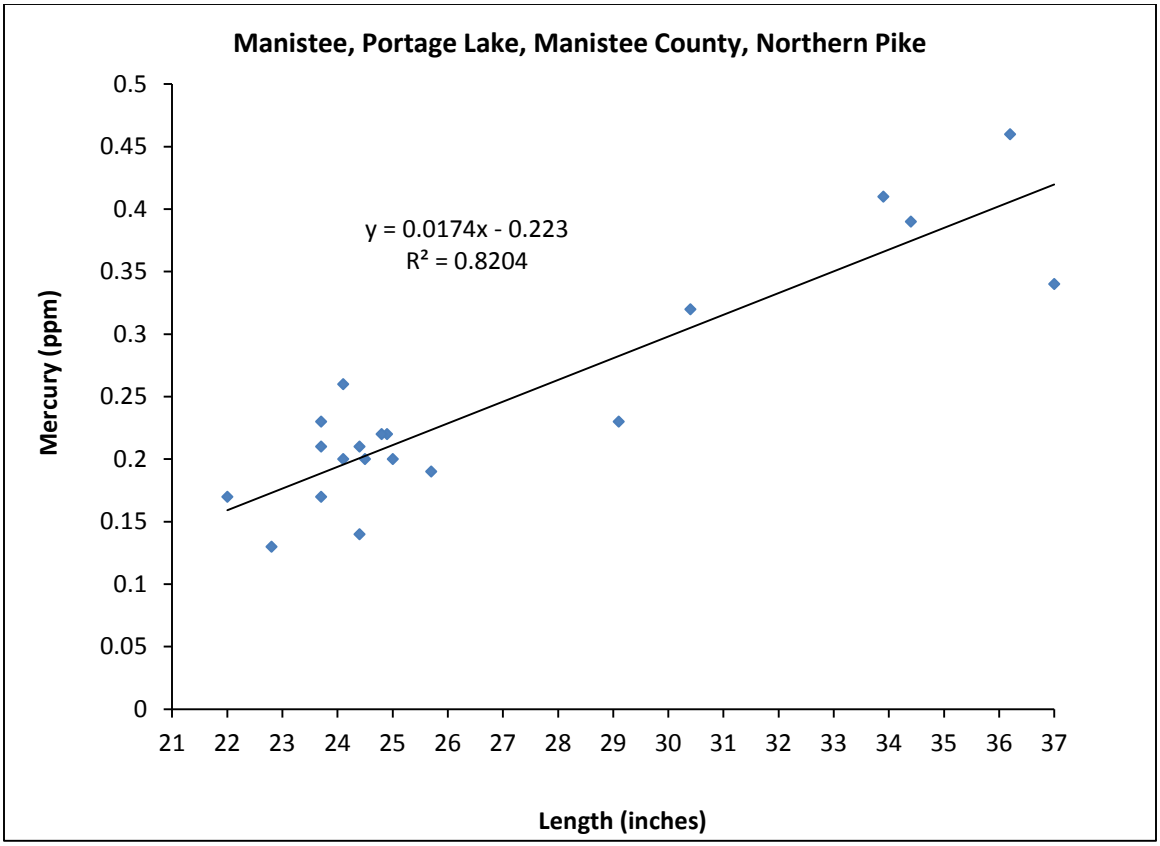
Final meal category based on UCL: 2

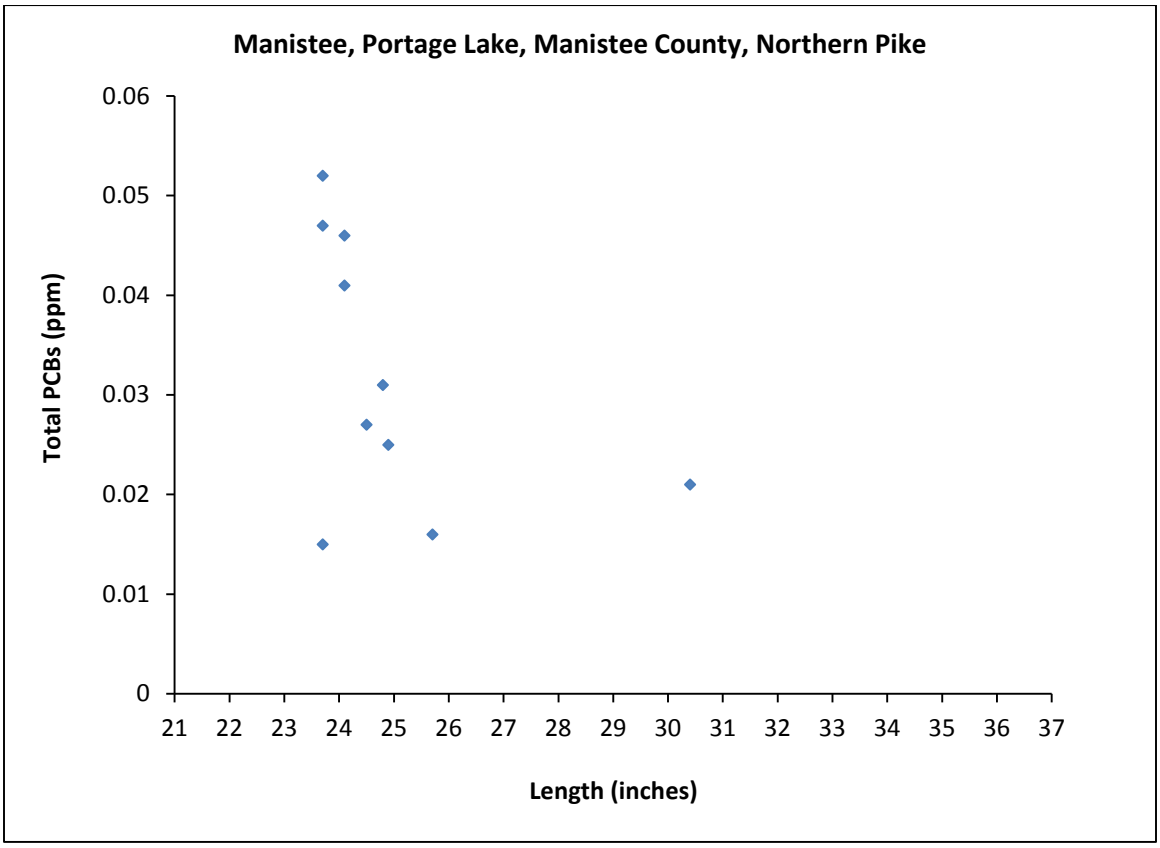
Existing Advisory: Women and children should not eat more than one meal per month of Portage Lake northern pike greater than 30 inches due to PCBs.

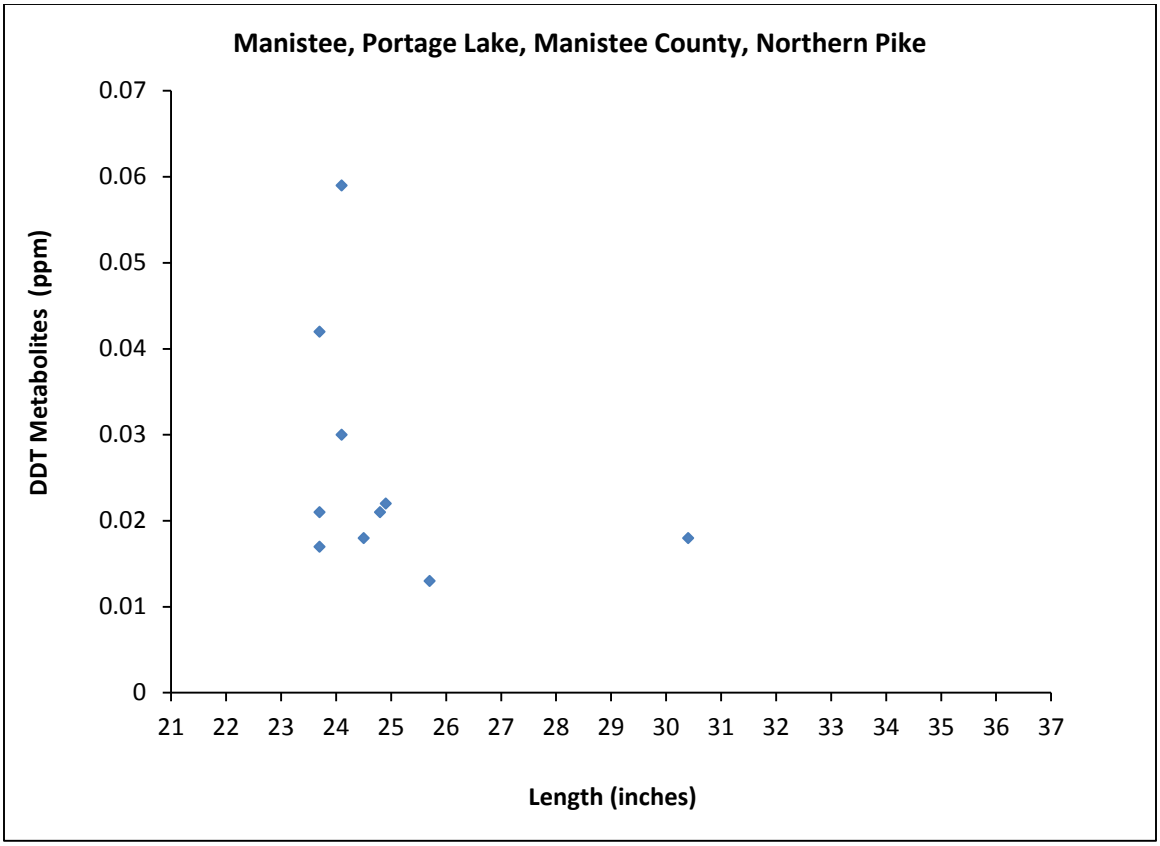
Recommendation: No one should eat more than 4 meals per month of Portage Lake northern pike smaller than 30 inches due to PCBs and mercury or more than 2 meals per month of those fish larger than 30 inches due to mercury.

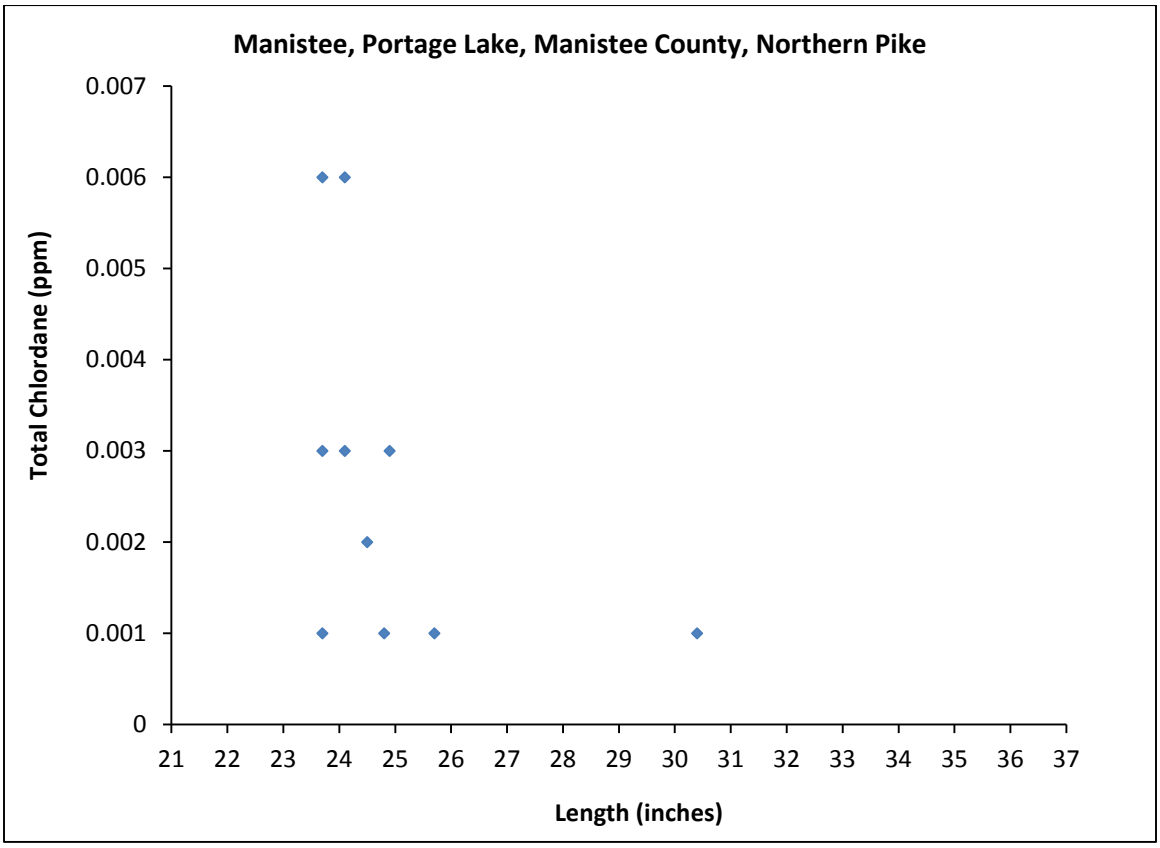
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
22	0.160	4
24	0.195	4
26	0.229	4
28	0.264	4
30	0.299	2
32	0.334	2
34	0.369	2
36	0.403	2
38	0.438	2

Shaded area denotes extrapolated estimates


Manistee, Portage Lake, Manistee County, Northern Pike
y = 0.0174x - 0.223
R² = 0.8204
Mercury (ppm)
Length (inches)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37


Manistee, Portage Lake, Manistee County, Northern Pike
Total PCBs (ppm)
Length (inches)
0.06
0.05
0.04
0.03
0.02
0.01
0
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37


Manistee, Portage Lake, Manistee County, Northern Pike
DDT Metabolites (ppm)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Length (inches)


Manistee, Portage Lake, Manistee County, Northern Pike
Total Chlordane (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
Length (inches)

Mason County

Black Crappie **Hamlin Lake** **Mason 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	10	8.7	na	8.7	9.8

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.11	0.08	0.15	0.12	8

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.025	0.039

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	10	8.7	na	8.7	9.8

Datasets available: 1991

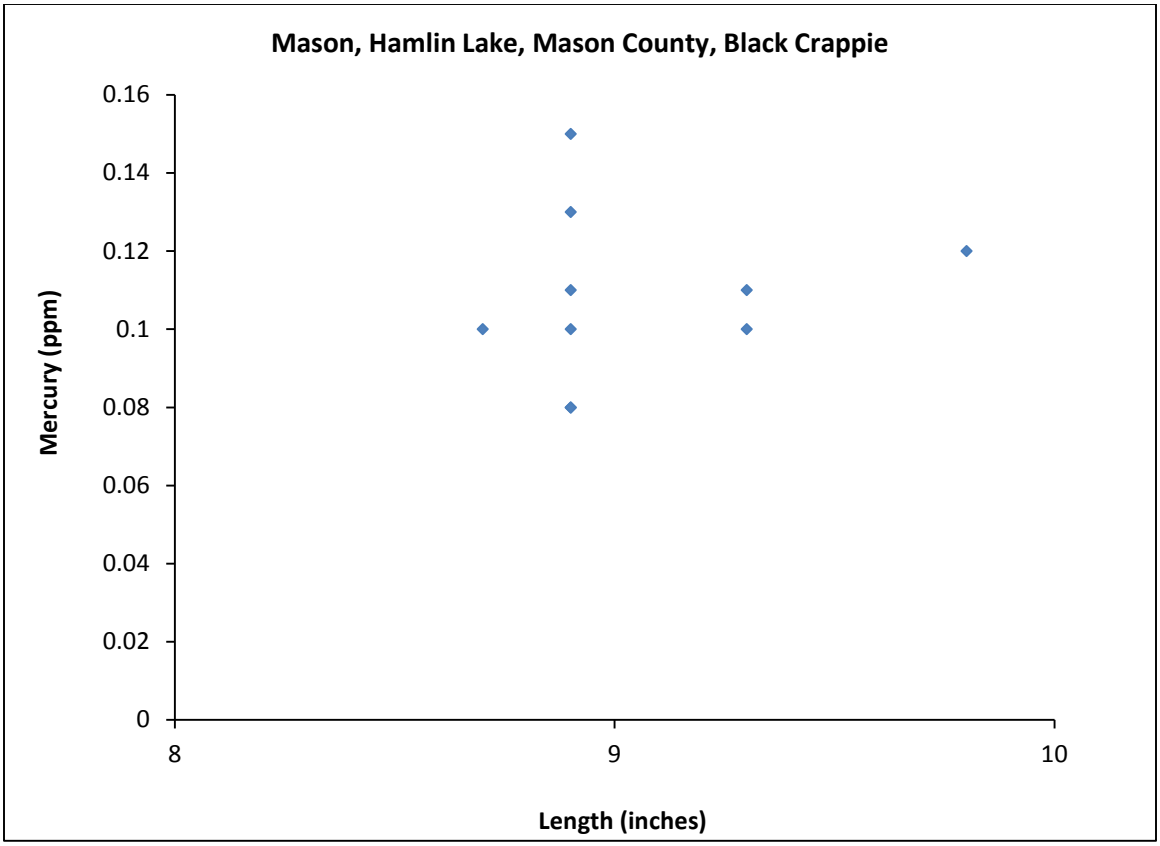
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	ND	--	--	--	--
DDT	10	0.006	0.003	0.01	0.01	16
Chlordane	10	ND	--	--	--	--
Toxaphene	10	ND	--	--	--	--

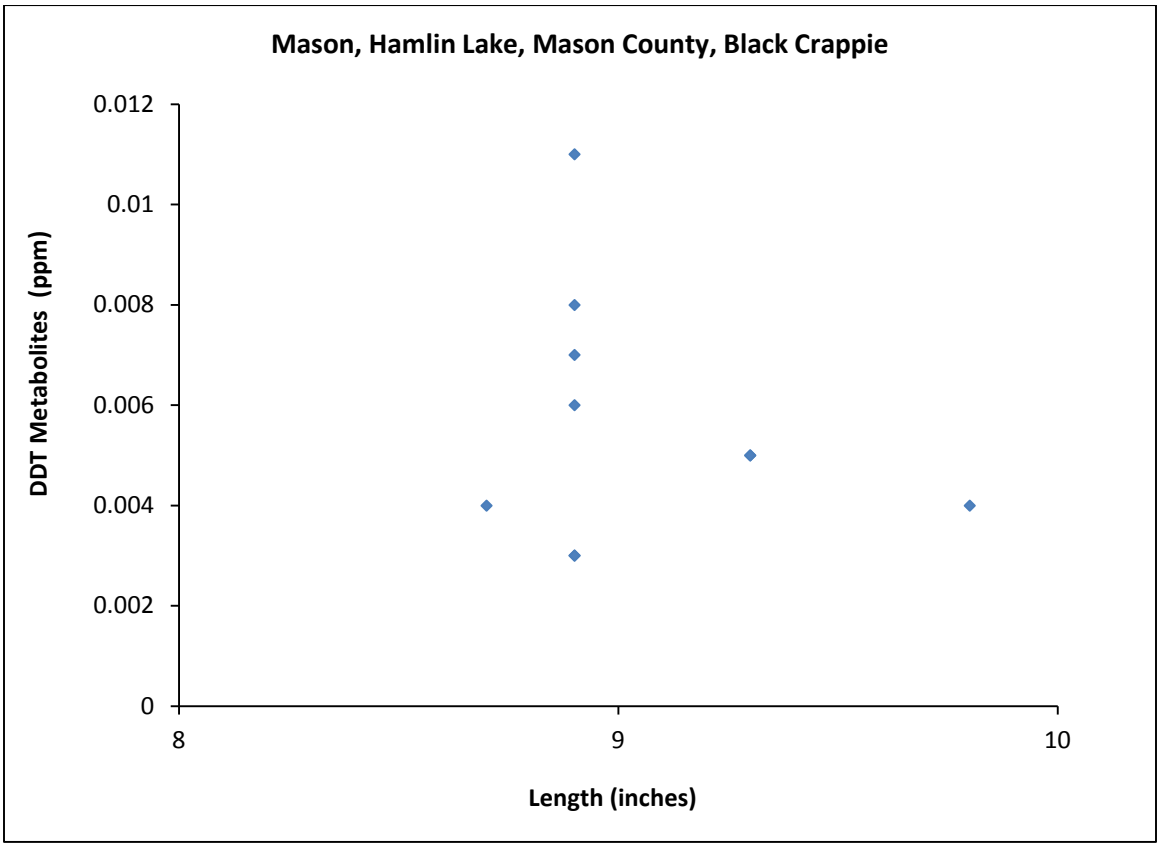
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.048	0.027
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 8

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

Recommendation: No one should eat more than 8 meals per month of Hamlin Lake crappie due to mercury.


Mason, Hamlin Lake, Mason County, Black Crappie
Mercury (ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
9
10
Length (inches)


Mason, Hamlin Lake, Mason County, Black Crappie
DDT Metabolites (ppm)
0.012
0.01
0.008
0.006
0.004
0.002
0
8
9
10
Length (inches)

Largemouth Bass **Hamlin Lake** **Mason 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	12.7	14	13.5	14.9

Datasets available: 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	8	0.48	0.35	0.79	0.61	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.305	0.326

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: --

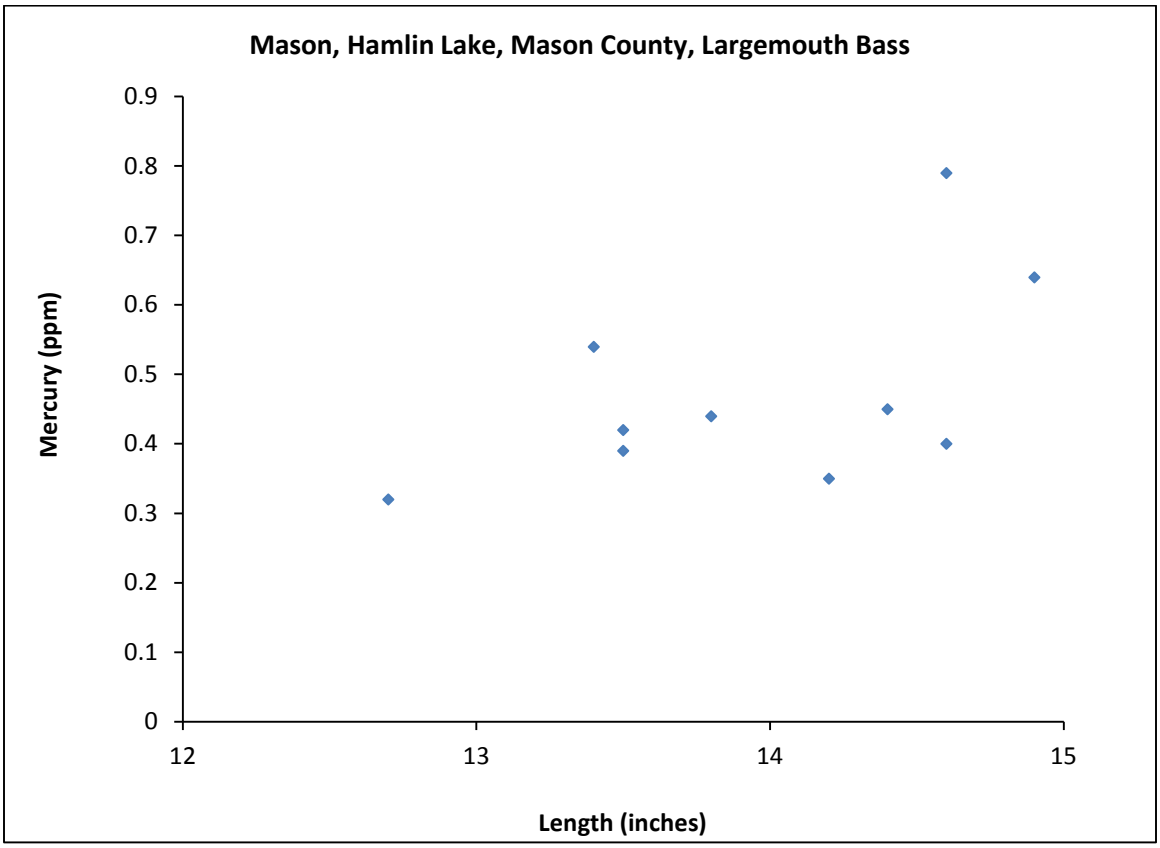
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per week of Hamlin 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. The statewide length break was applied as the size range of fish was limited.


Mason, Hamlin Lake, Mason County, Largemouth Bass
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
12
13
14
15
Length (inches)

Northern Pike **Hamlin Lake** **Mason 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	10	19.3	24	25	27.6

Datasets available: 1991

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.56	0.43	0.61	0.65	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.597	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
1991	1991	10	19.3	24	25	27.6

Datasets available: 1991

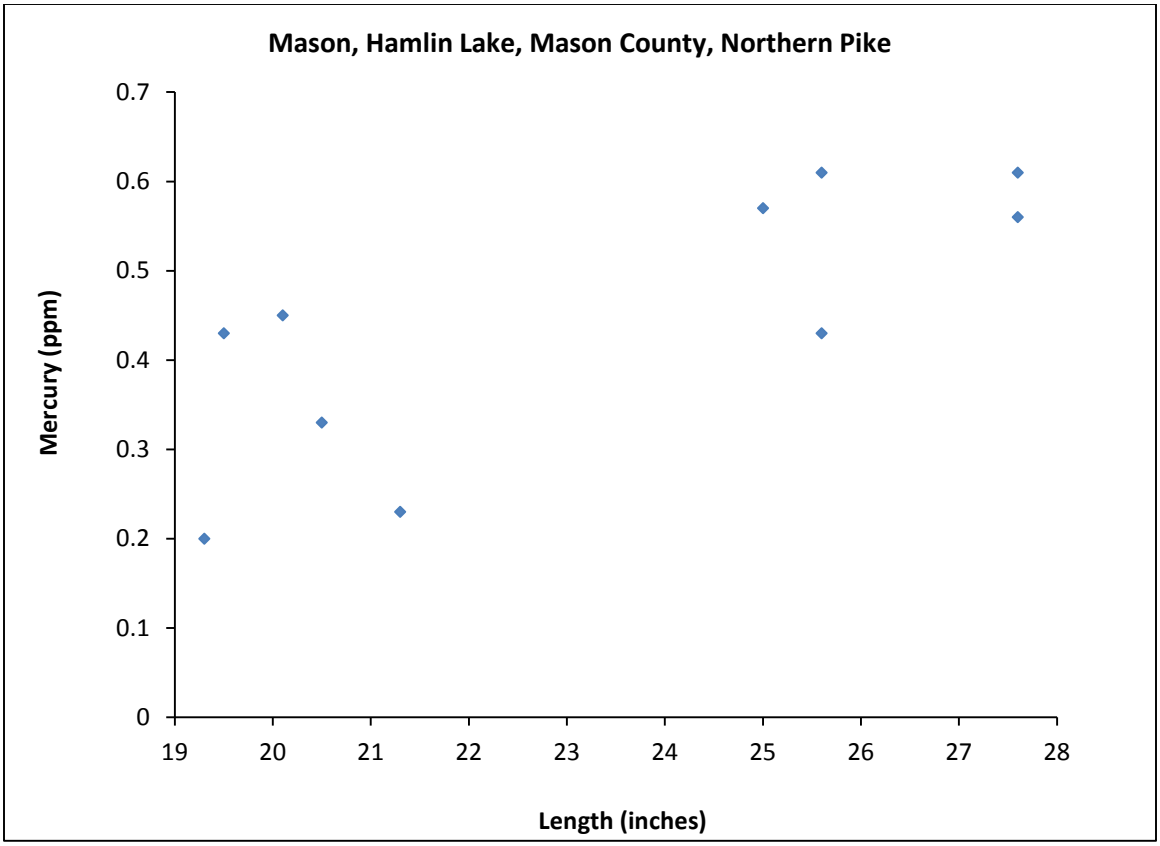
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	ND	--	--	--	--
DDT	5	0.008	0.003	0.01	0.01	16
Chlordane	5	ND	--	--	--	--
Toxaphene	5	ND	--	--	--	--

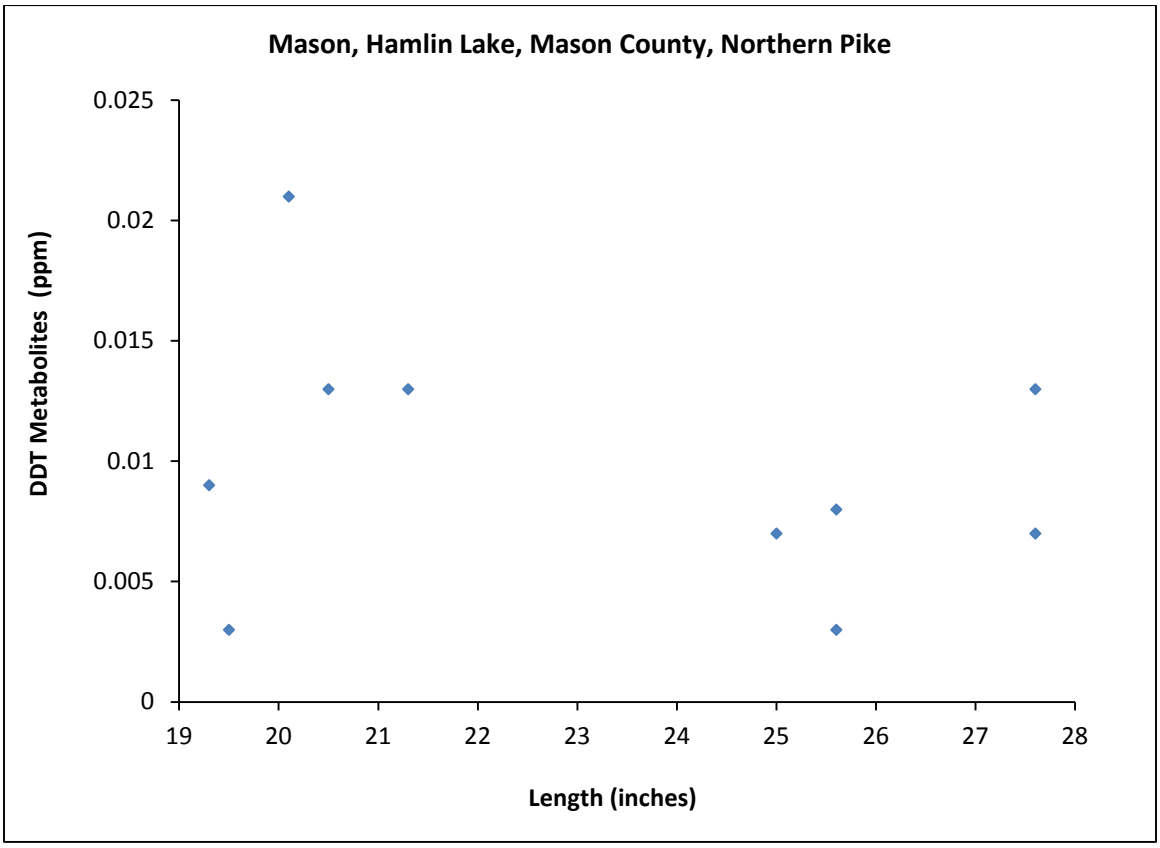
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.074	0.026
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 1 meal per month of Hamlin Lake northern pike smaller than 30 inches or more than 6 meals per year of those fish larger than 30 inches due to mercury. The statewide length break was applied as the size range of fish was limited.


Mason, Hamlin Lake, Mason County, Northern Pike
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
19
20
21
22
23
24
25
26
27
28
Length (inches)


Mason, Hamlin Lake, Mason County, Northern Pike
DDT Metabolites (ppm)
0.025
0.02
0.015
0.01
0.005
0
19
20
21
22
23
24
25
26
27
28
Length (inches)

Walleye **Hamlin Lake** **Mason 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	15.4	15	15.4	23.6

Datasets available: 2010

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.52	0.39	0.81	0.63	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.799	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
--	--	--	--	--	--	--

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	--	--

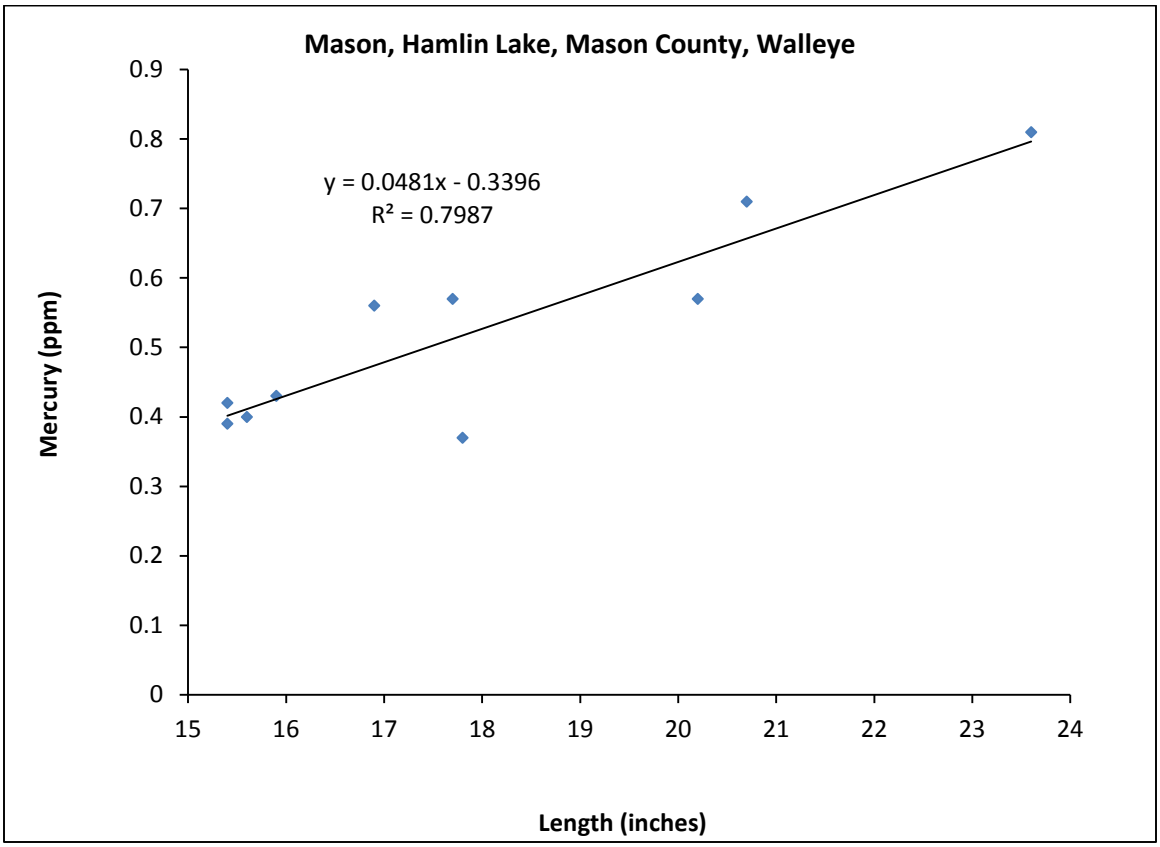
Final meal category based on UCL: 1

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

Recommendation: No one should eat more than 2 meals per month of Hamlin Lake walleye smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
15	0.382	2
16	0.430	2
17	0.478	2
18	0.526	2
19	0.574	1
20	0.622	1
21	0.671	1
22	0.719	1
23	0.767	1

Shaded area denotes extrapolated estimates


Mason, Hamlin Lake, Mason County, Walleye
y = 0.0481x - 0.3396
R² = 0.7987
Mercury (ppm)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
15
16
17
18
19
20
21
22
23
24
Length (inches)

Osceola County

Brown Trout **Hersey River** **Osceola 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	1998	22	7.9	8	7.9	21.9

Datasets available: 1986, 1998

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	15†	0.17	0.04	1.17	0.27	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.767	0.614

Slope of regression determine by single data point.

† - includes 2composite samples (1998)

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
1986	1986	12	9.4	8	9.4	16.1

Datasets available: 1985, 1986, 1998†

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	12	0.08	0.03	0.15	0.10	2*
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.125	0.123
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2*

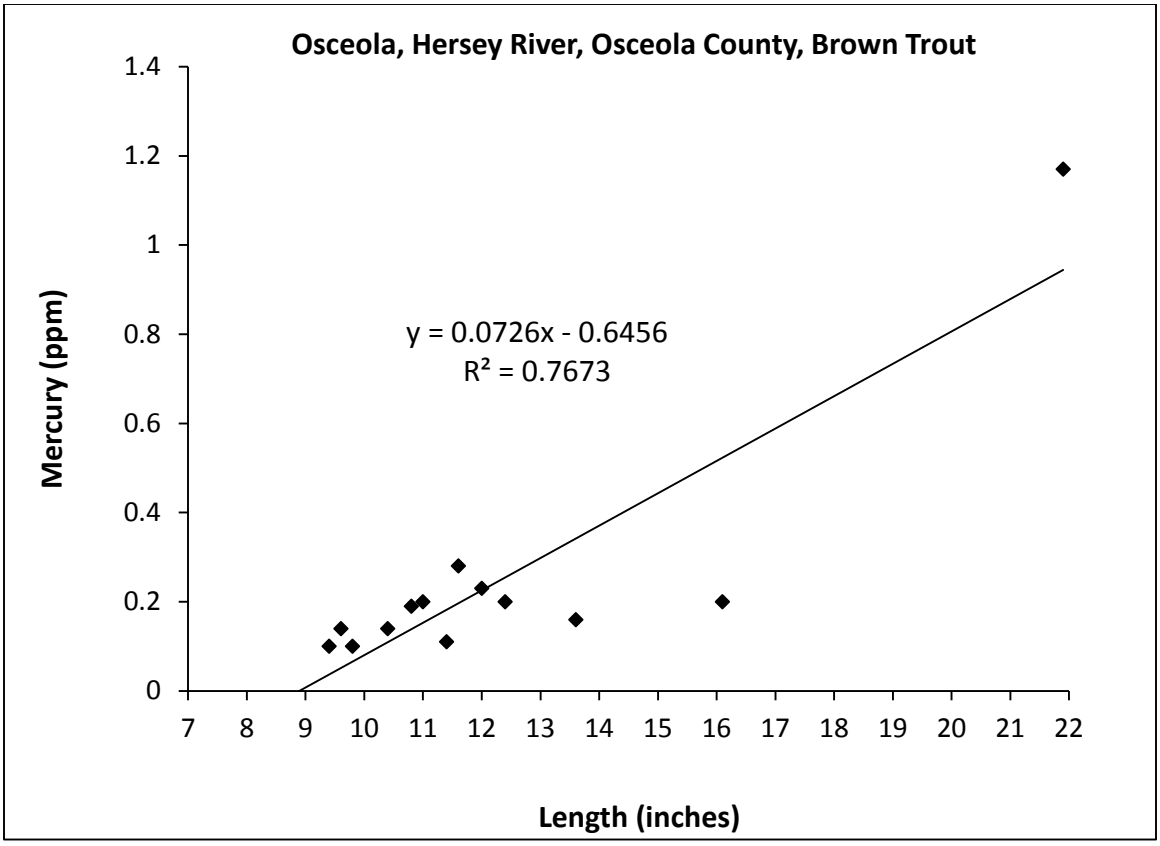
† - 1998 samples analyzed as composites (N= 2)

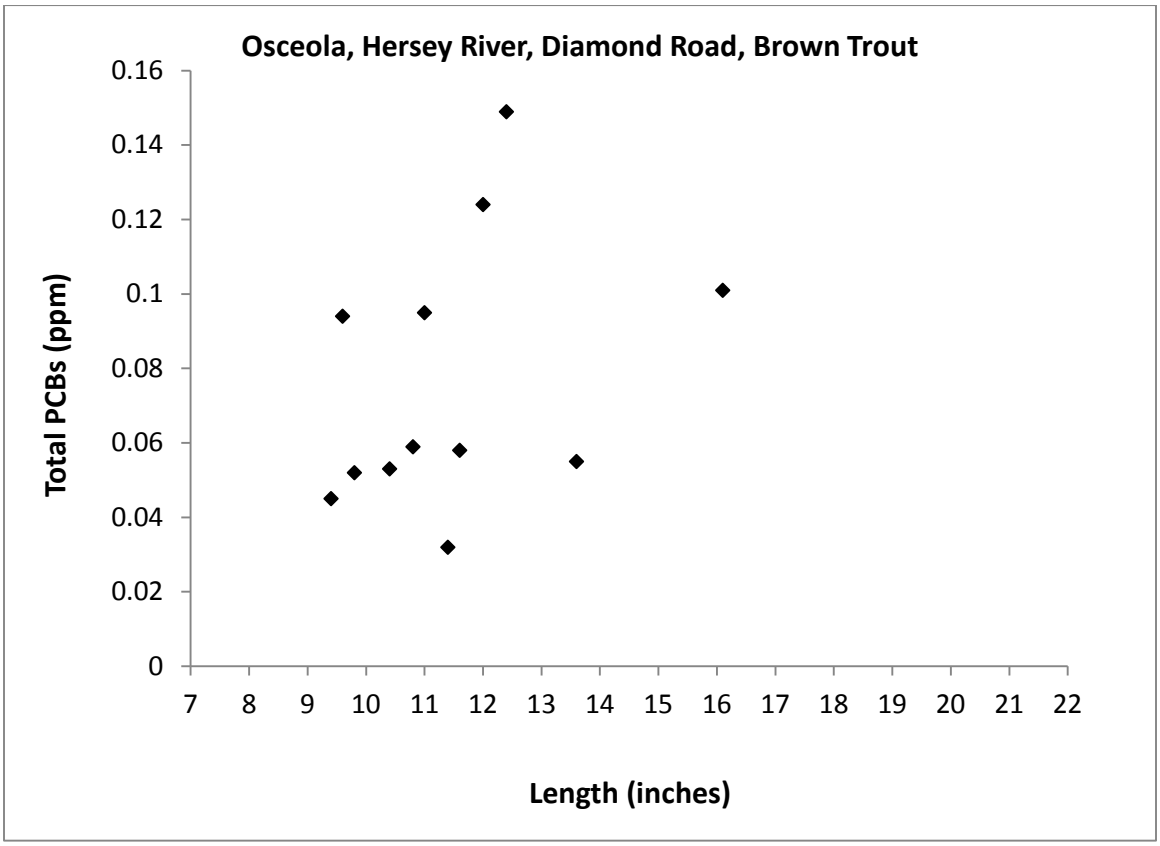
Existing Advisory: There are no current consumption advisories for Hersey River brown trout.

Recommendation: No one should eat more than 4 meals per month of Hersey River brown trout due to PCBs and mercury. The quality of this dataset is limited due to the age of the data. *Based on the MDEQ 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. Slope of the regression is determined by one point and was not used to set the guideline recommendation.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
8	0	16
10	0.08	12
12	0.23	4
14	0.37	2
16	0.52	2
18	0.66	1
20	0.81	1
22	0.95	1
24	1.10	1

Shaded area denotes extrapolated estimates


Osceola, Hersey River, Osceola County, Brown Trout
Mercury (ppm)
Length (inches)
y = 0.0726x - 0.6456
R² = 0.7673
0
0.2
0.4
0.6
0.8
1
1.2
1.4
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22


Osceola, Hersey River, Diamond Road, Brown Trout
Total PCBs (ppm)
Length (inches)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

Northern Pike **Hersey River** **Osceola 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	1986	1	28.9	24	28.9	28.9

Datasets available: 1986

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	1	0.79	--	--	--	--

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
1986	1986	1	28.9	24	28.9	28.9

Datasets available: 1986

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	1	0.053	--	--	--	--
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 Hersey River northern pike.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. The statewide advice due to mercury applies: 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 northern pike larger than 30 inches.

White Sucker **Hersey River** **Osceola 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	1986	10	10.7	na	10.7	17.3

Datasets available: 1986

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.16	0.10	0.37	0.22	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.468	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
1985	1986	10	10.7	na	10.7	17.3

Datasets available: 1985, 1986

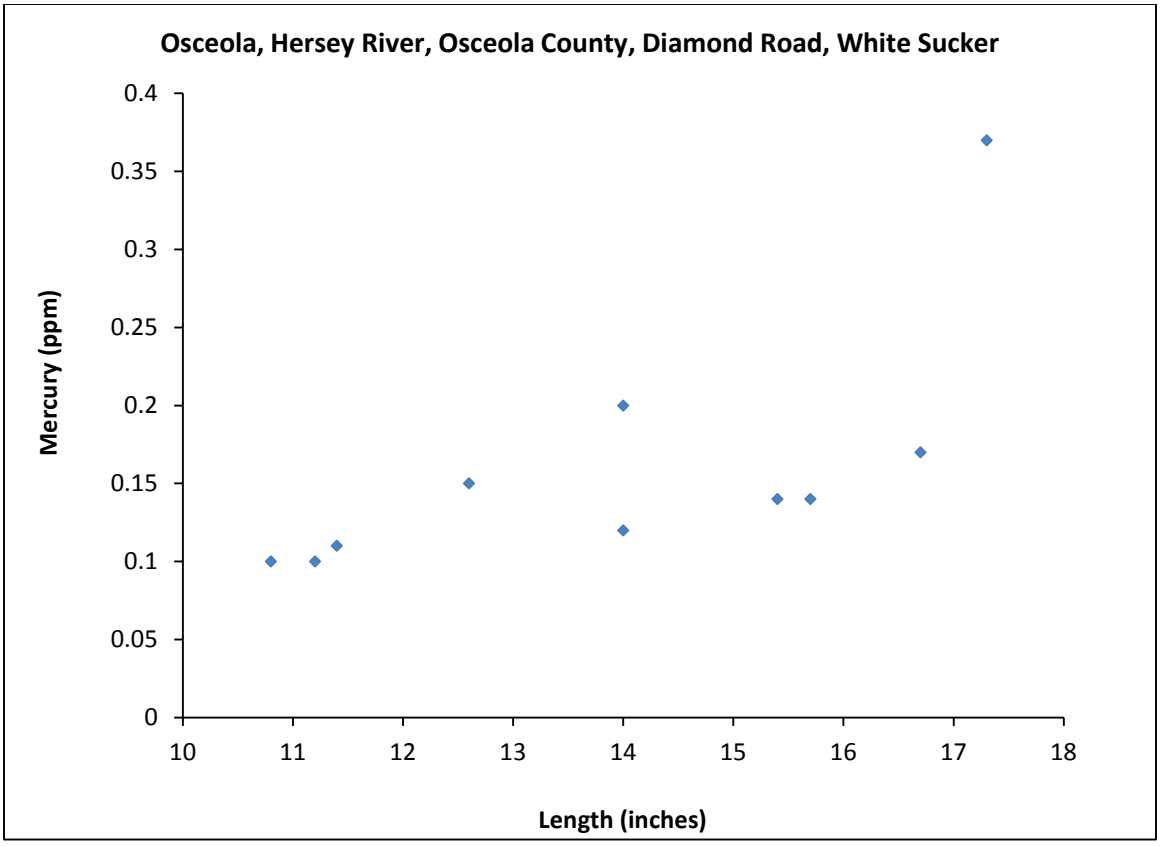
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	13	0.02	0.005	0.02	0.04	4*
DDT	3	0.01	0.001	0.03	0.06	16
Chlordane	3	0.003	0.001	0.007	0.010	--
Toxaphene	0	--	--	--	--	--

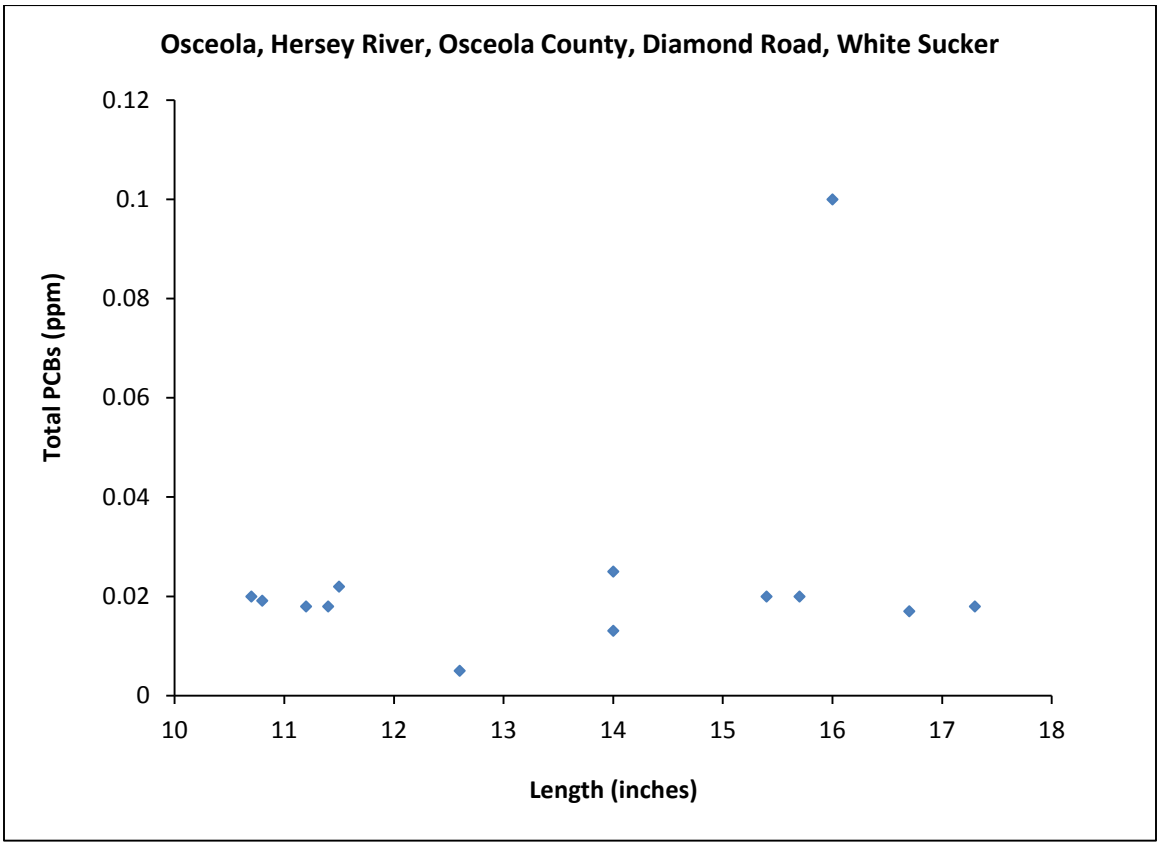
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.085	0.067
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 4

Existing Advisory: There are no current consumption advisories for Hersey River white sucker.

Recommendation: No one should eat more than 4 meals per month of Hersey River sucker due to mercury. PCBs would cause an advisory. *Based on the MDEQ 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.


Osceola, Hersey River, Osceola County, Diamond Road, White Sucker
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
11
12
13
14
15
16
17
18
Length (inches)


Osceola, Hersey River, Osceola County, Diamond Road, White Sucker
Total PCBs (ppm)
0.12
0.1
0.08
0.06
0.04
0.02
0
10
11
12
13
14
15
16
17
18
Length (inches)

Northern Pike **Todd Lake** **Osceola 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	7	22	24	22	33.9

Datasets available: 1987

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.903	0.620	1.320	1.150	0.5

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.013	0.031

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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	--	--	--	--	--

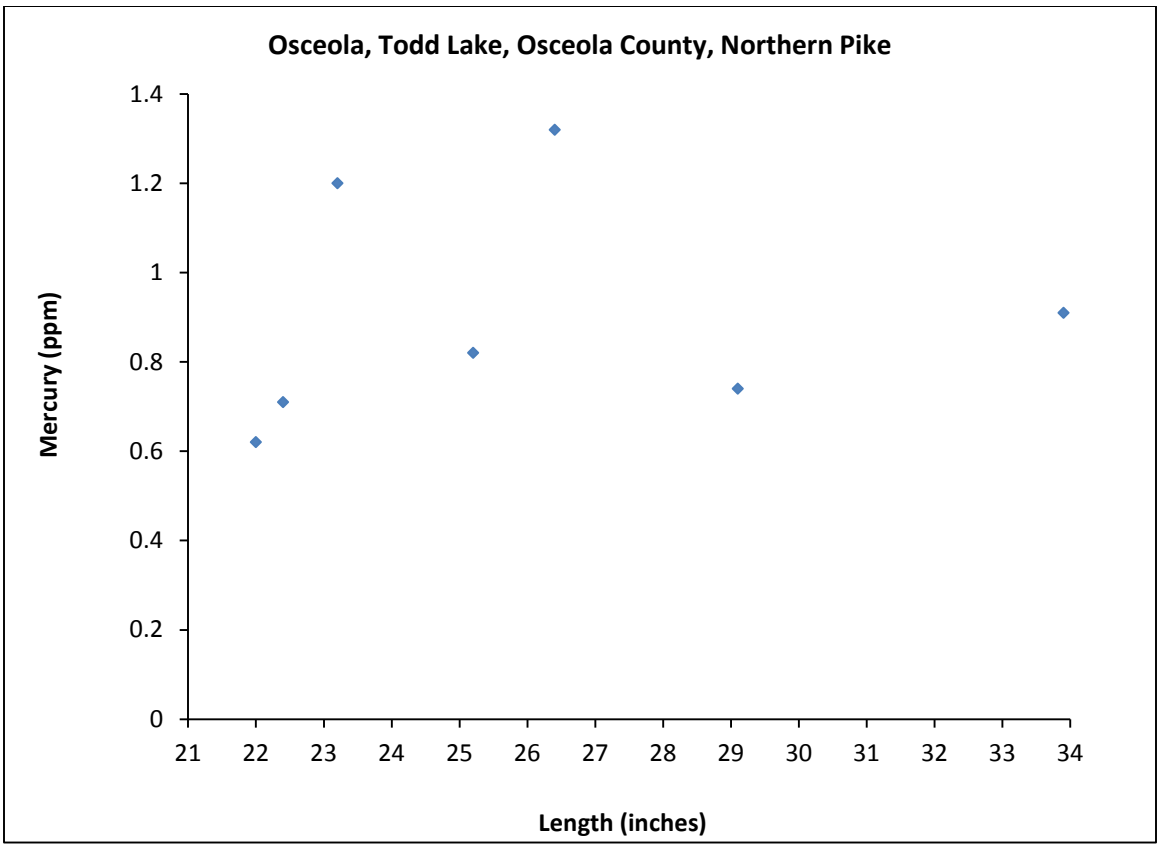
Chemical	Linear Regression	LN Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 0.5

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

Recommendation: No one should eat more than 6 meals per year of Todd Lake northern pike due to mercury.

Note: Evaluation includes 3 fish less than the legal minimum size but there is no apparent relationship between fish length and mercury concentration.


Osceola, Todd Lake, Osceola County, Northern Pike
Mercury (ppm)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
21
22
23
24
25
26
27
28
29
30
31
32
33
34
Length (inches)

Largemouth Bass **Todd Lake** **Osceola 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	8	8.3	14	13.8	18.9

Datasets available: 1987

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.84	0.52	1.48	1.30	0.5

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.795	0.871

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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	LN Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

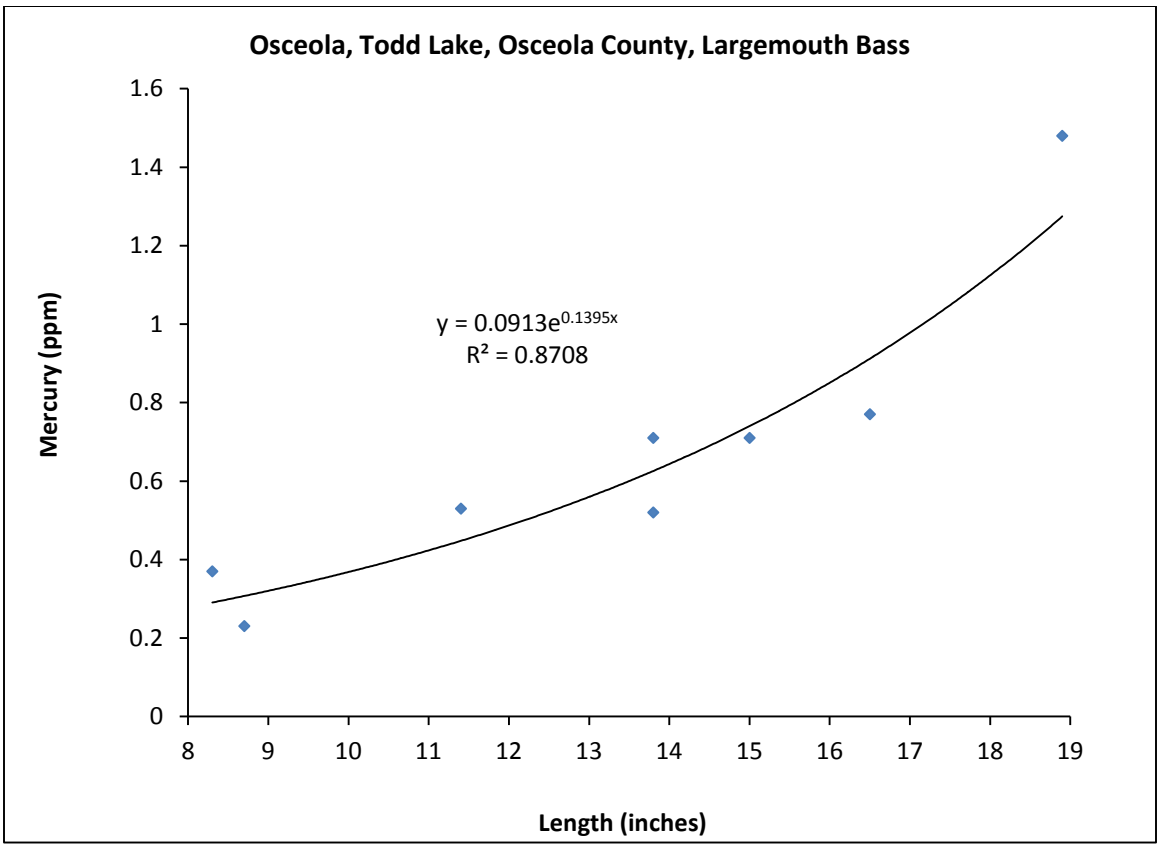
Final meal category based on UCL: 0.5

Existing Advisory: Todd 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 from Todd Lake smaller than 18 inches or more than 6 meals per year of those fish larger than 18 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.64	1
15	0.74	1
16	0.85	1
17	0.98	1
18	1.12	0.5
19	1.29	0.5
20	1.49	0.5
21	1.71	0.5
22	1.96	0.5

Shaded area denotes extrapolated estimates


Osceola, Todd Lake, Osceola County, Largemouth Bass
Mercury (ppm)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
y = 0.0913e^0.1395x
R² = 0.8708
8
9
10
11
12
13
14
15
16
17
18
19
Length (inches)

Northern Pike **Wells Lake** **Osceola 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
2006	2006	7	10.9	na*	10.9	21.9

Datasets available: 2006

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	7	0.23	0.12	0.29	0.28	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.761	0.728

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All 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	LN Regression
	R^2	R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--

Final meal category based on UCL: 2

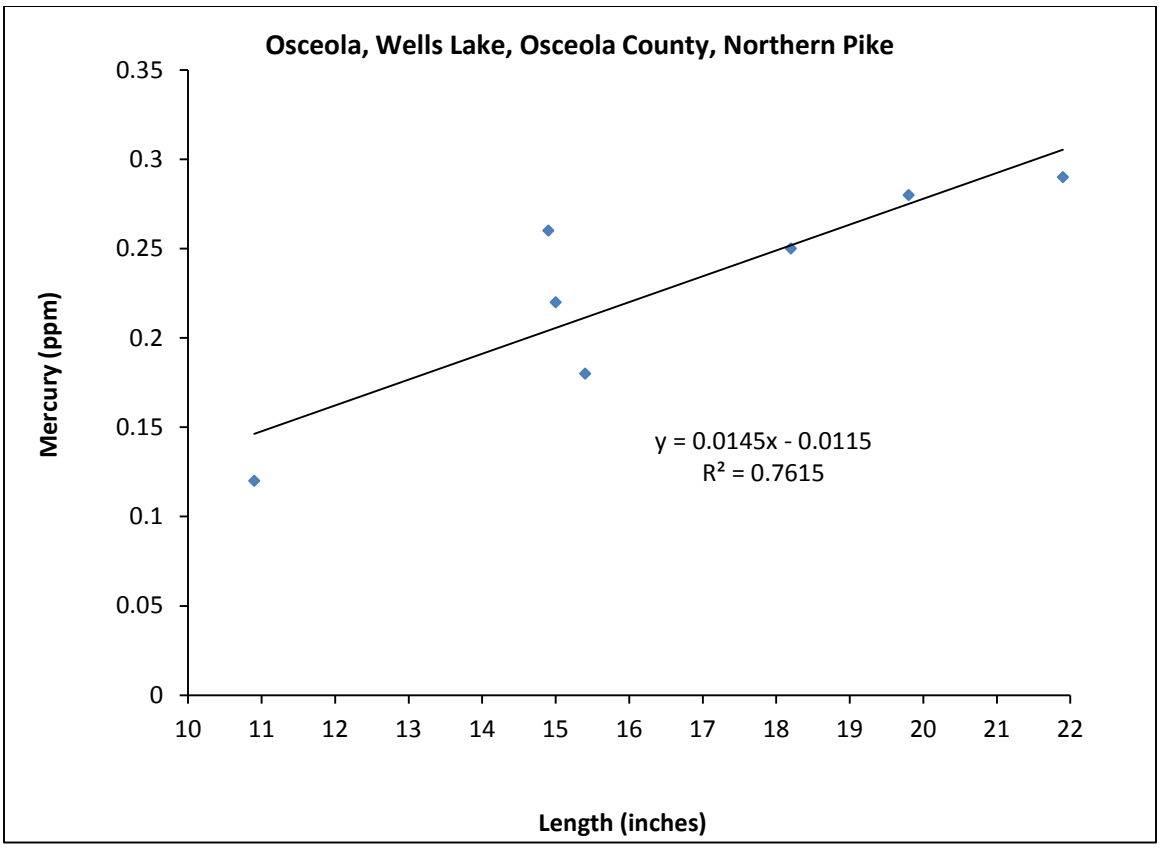
***** - there is no minimum legal size on Wells Lake northern pike

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

Recommendation: No one should eat more than 4 meals per month of Wells Lake northern pike smaller than 20 inches or more than 2 meals per month of those fish larger than 20 inches due to mercury.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
12	0.16	4
14	0.19	4
16	0.22	4
18	0.25	4
20	0.28	2
22	0.31	2
24	0.34	2

Shaded area denotes extrapolated estimates


Osceola, Wells Lake, Osceola County, Northern Pike
Mercury (ppm)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
10
11
12
13
14
15
16
17
18
19
20
21
22
Length (inches)
y = 0.0145x - 0.0115
R² = 0.7615

Pere Marquette River
Lake, Mason, Newaygo, and Oceana Counties

Brown Trout | **Pere Marquette River** | **Lake, Mason, Newaygo, & Oceana Counties**

Hg Analysis:

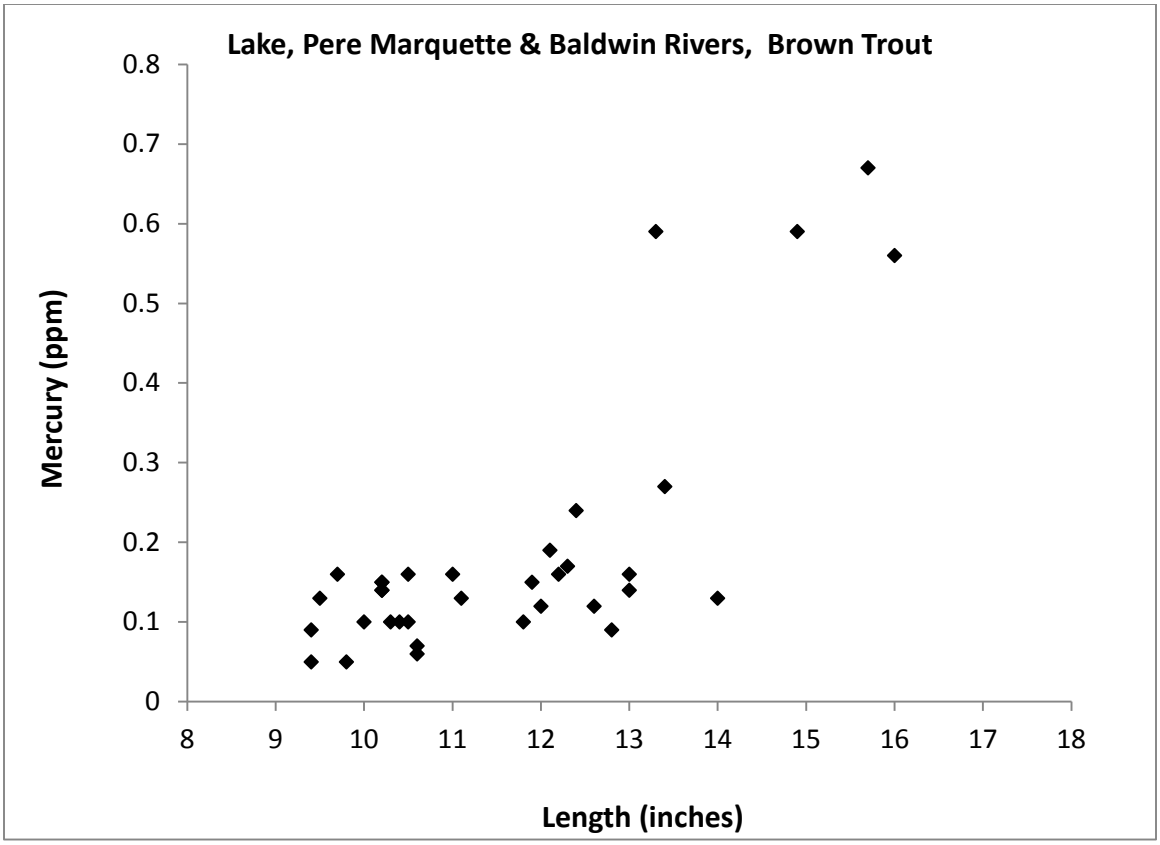
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
1993	2005	35	9.4	8	9.4	16.0	
Datasets available: 1993, 2004, 2005							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	35	0.18		0.05	0.67	0.24	4
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
Mercury	0.571	0.564					

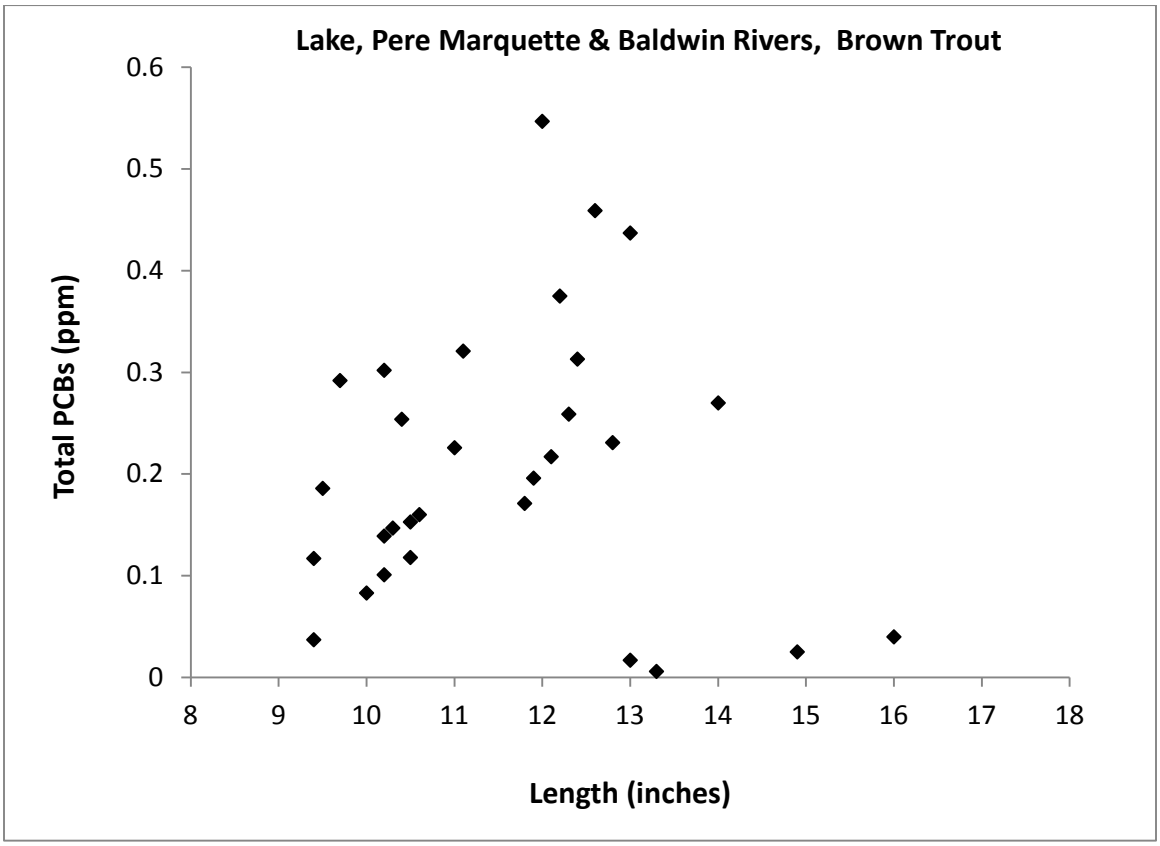
Organics Analysis:

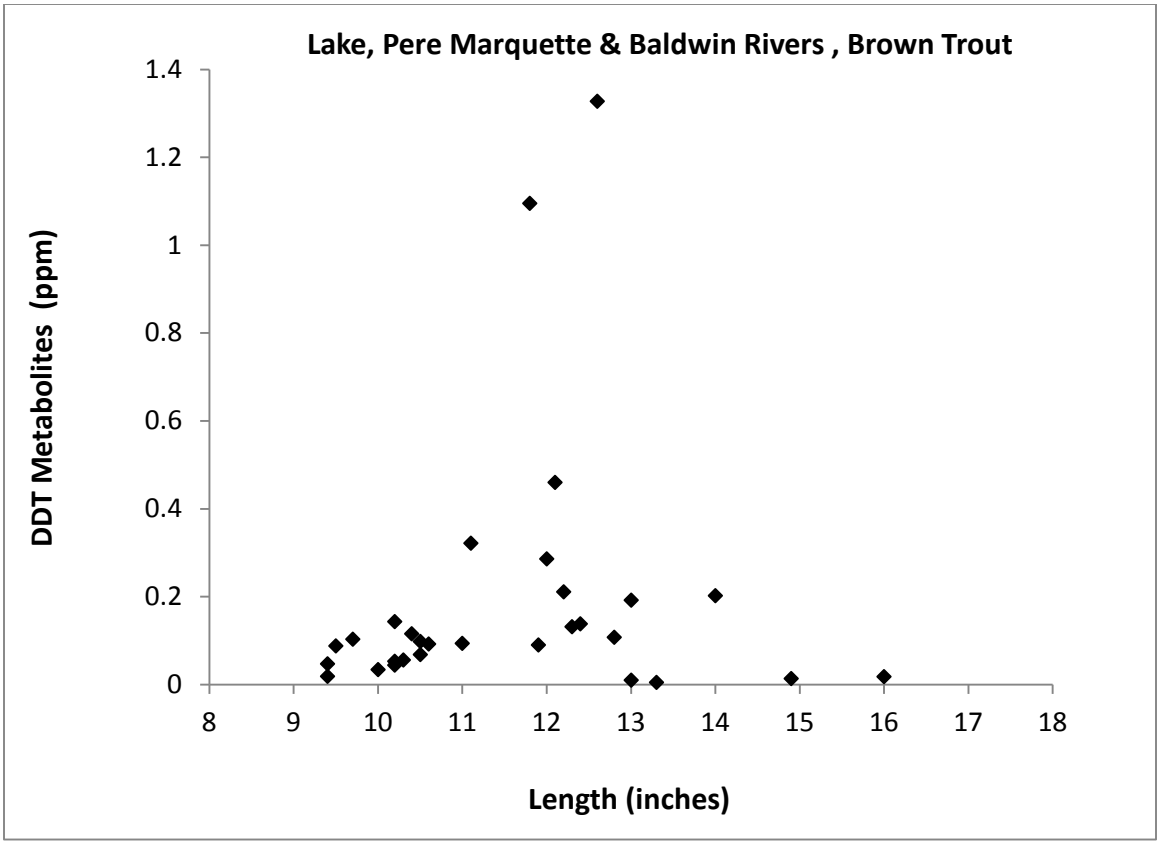
Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples		
Earliest	Most Recent				Min	Max	
2004	2005	30	9.4	8	9.4	16.0	
Datasets available: 1993, 2004, 2005							
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	30	0.21		0.01	0.55	0.26	0.5
DDT	30	0.19		0.01	1.33	0.30	4
Chlordane	30	0.01		0.00	0.04	0.02	--
Toxaphene	30	ND		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	0.000	0.057					
DDT	0.016	0.008					
Chlordane	0.000	0.067					
Toxaphene	--	--		**Final meal category based on UCL:**			**0.5**

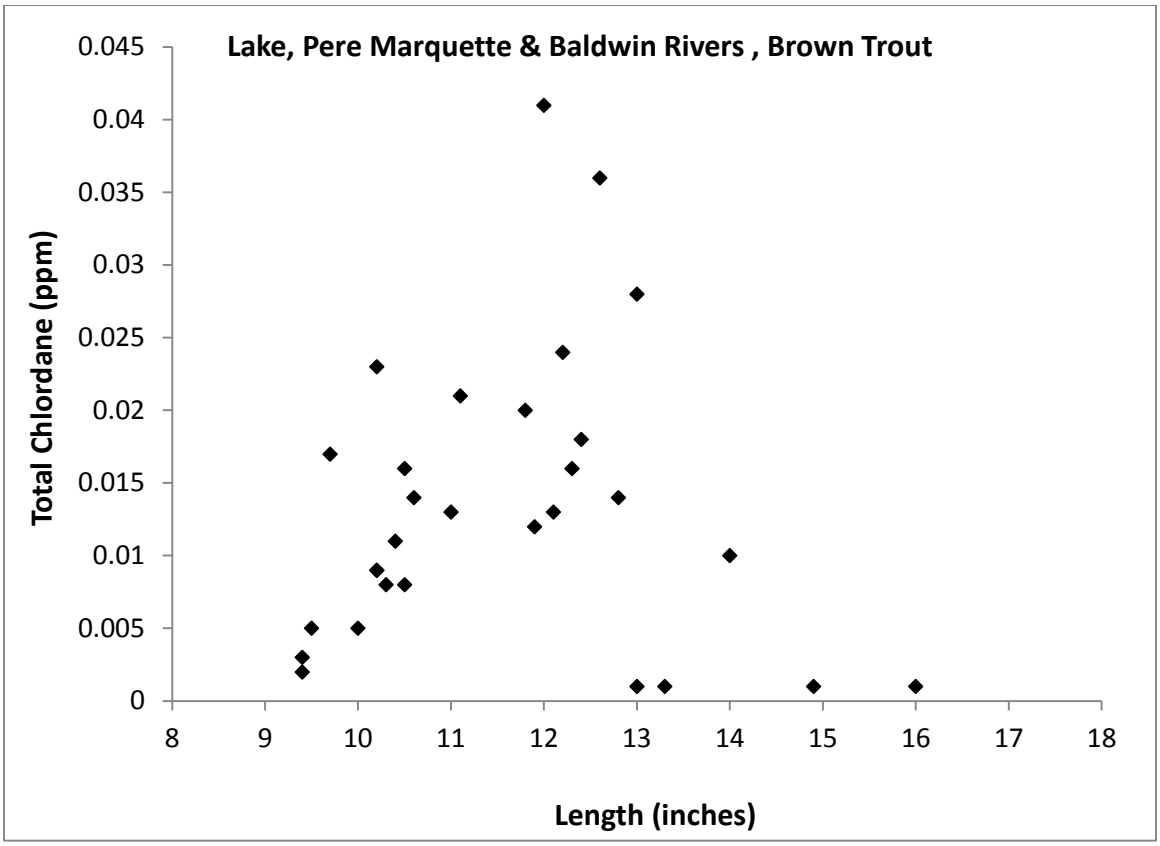
Existing Advisory: Women and children should not eat more than 1 meal per month of brown trout from the Pere Marquette River or its tributaries due to mercury and PCBs.

Recommendation: No one should eat more than 6 meals per year of brown trout from the Pere Marquette Lake or Pere Marquette River due to PCBs. Mercury and DDT would cause advisories.


Lake, Pere Marquette & Baldwin Rivers, Brown Trout
Mercury (ppm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
8
9
10
11
12
13
14
15
16
17
18
Length (inches)


Lake, Pere Marquette & Baldwin Rivers, Brown Trout
Total PCBs (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
8
9
10
11
12
13
14
15
16
17
18
Length (inches)


Lake, Pere Marquette & Baldwin Rivers , Brown Trout
DDT Metabolites (ppm)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
8
9
10
11
12
13
14
15
16
17
18
Length (inches)


Lake, Pere Marquette & Baldwin Rivers , Brown Trout
Total Chlordane (ppm)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
8
9
10
11
12
13
14
15
16
17
18
Length (inches)

Largemouth Bass | **Pere Marquette River (Pere Marquette Lake)** | **Lake, Mason, Newaygo, & Oceana 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	
1989	1989	1	15.7	14	15.7	15.7	
Datasets available:	1989						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
Mercury	1	0.49		--	--	--	--
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	1	15.7	14	15.7	15.7	
Datasets available:	1989						
Chemical	**Sample Size (Legal)**	**Mean (ppm)**		**Min. Conc. (ppm)**	**Max Conc. (ppm)**	**95%UCL (ppm)**	**Meal Category**
PCB	1	0.15		--	--	--	--
DDT	1	0.07		--	--	--	--
Chlordane	1	0.02		--	--	--	--
Toxaphene	1	0.05		--	--	--	--
Chemical	**Linear Regression**	**Exponential Regression**					
	R^2	**R^2**					
PCB	--	--					
DDT	--	--					
Chlordane	--	--					
Toxaphene	--	--		**Final meal category based on UCL:**			**--**

Existing Advisory: Pere Marquette Lake largemouth bass are covered by the statewide mercury advisory.

Recommendation: A dataset of less than five data points for a given chemical, species and waterbody is considered insufficient for evaluation using the standard evaluation method. Statewide guidelines apply: 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.

Northern Pike | **Pere Marquette River (Pere Marquette Lake)** | **Lake, Mason, Newaygo, & Oceana 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
1989	2007	24	13.2	24	23.9	32.3

Datasets available: 1989, 2003, 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.30	0.19	0.52	0.37	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.369	0.434

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	2007	20	13.2	24	23.9	32.3

Datasets available: 1989, 2003, 2007

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	0.08	0.03	0.21	0.14	1
DDT	7	0.03	0.01	0.07	0.05	16
Chlordane	7	0.01	0.002	0.02	0.01	--
Toxaphene	7	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.516	0.681
DDT	0.484	0.566
Chlordane	0.552	0.644
Toxaphene	--	--

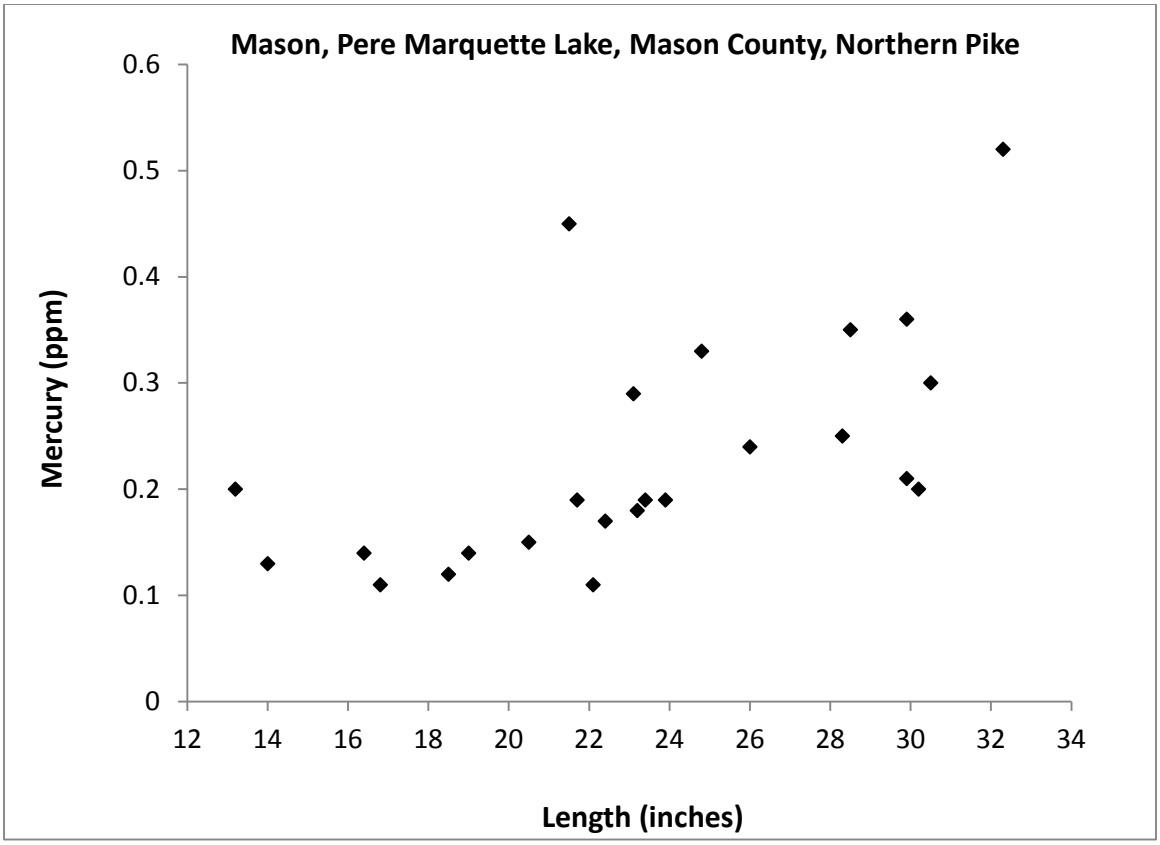
Final meal category based on UCL: 1

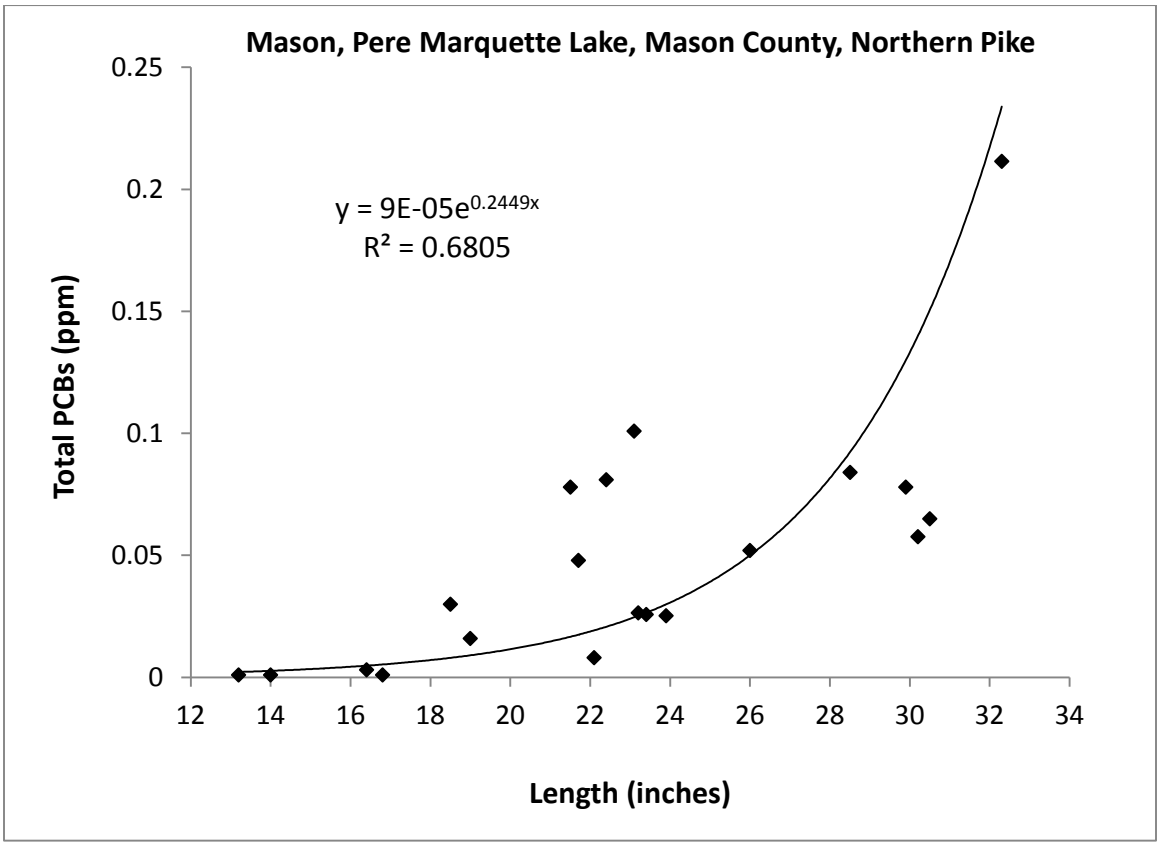
Existing Advisory: Women and children should not eat more than 1 meal per month of northern pike from Pere Marquette Lake due to PCBs.

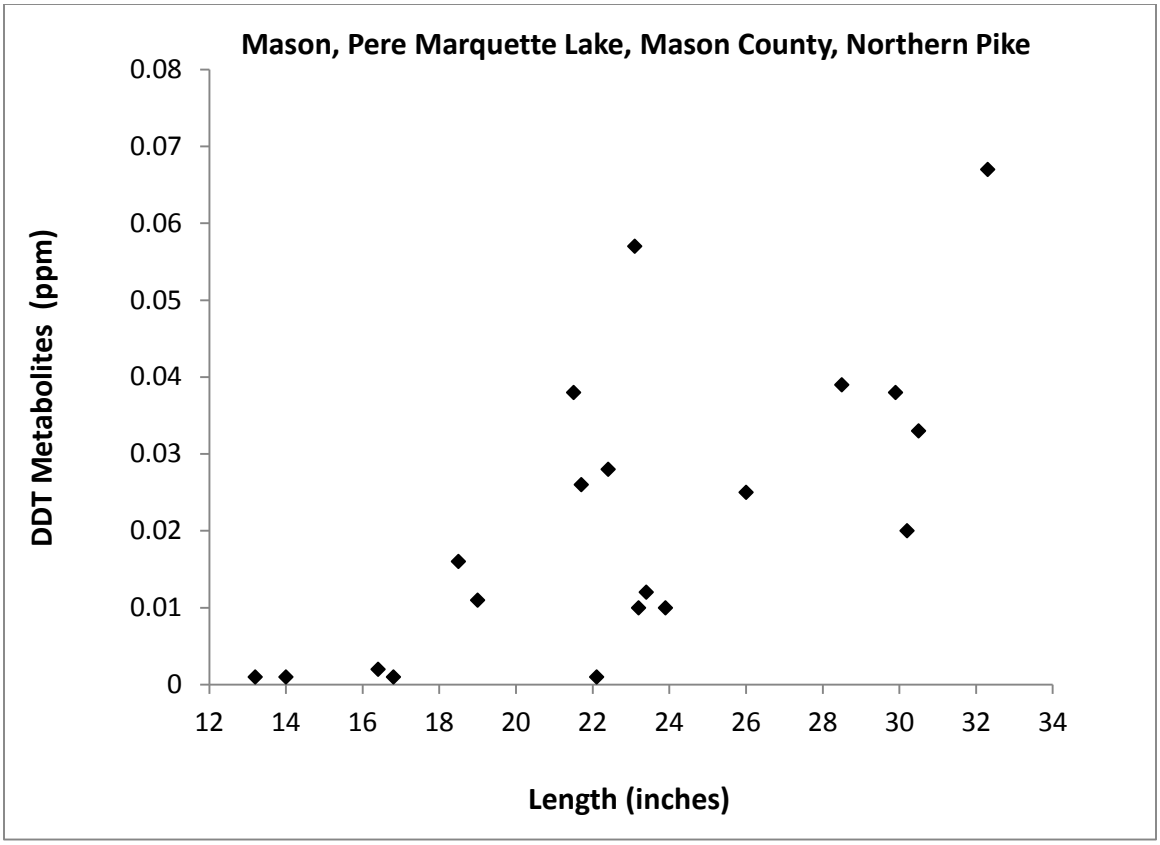
Recommendation: No one should eat more than 2 meals per month of Pere Marquette Lake or Pere Marquette River northern pike smaller than 30 inches due to mercury and PCBs or more than 6 meals per year of those fish larger than 30 inches due to PCBs.

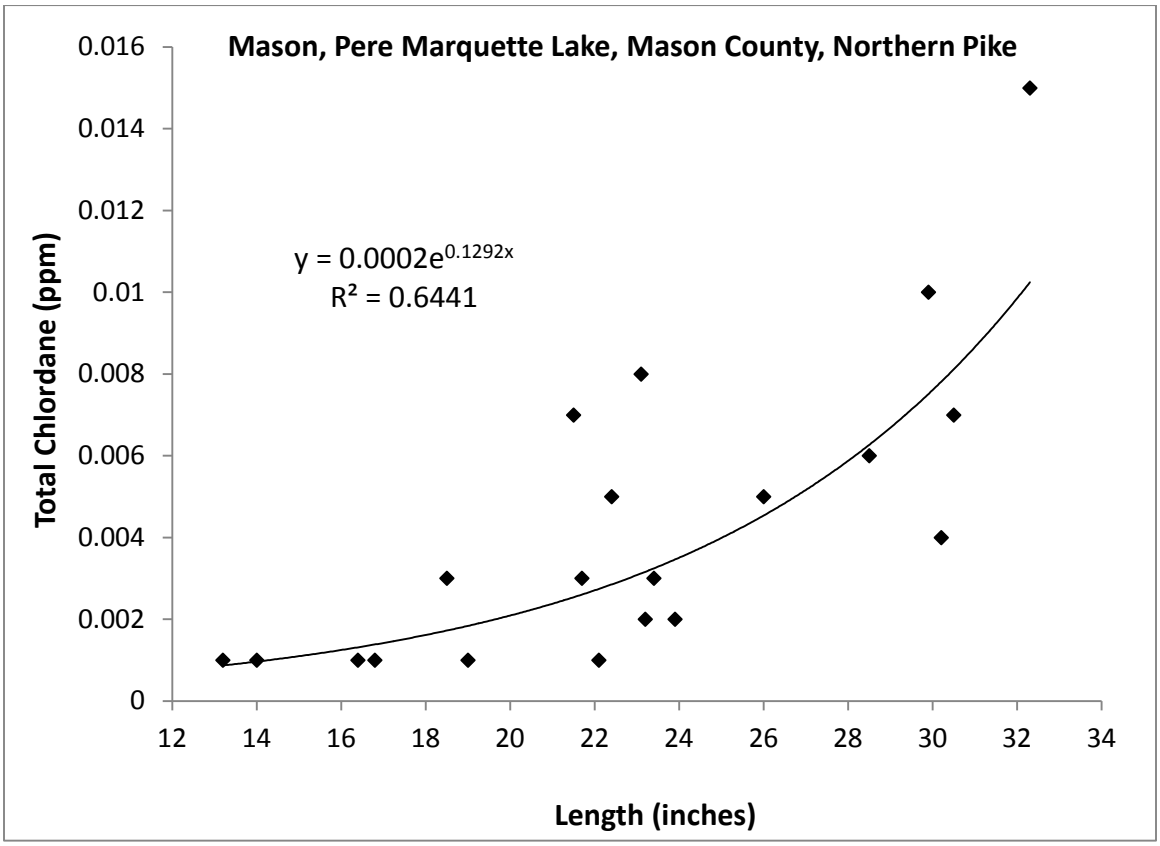
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
22	0.02	12
24	0.03	8
26	0.05	4
28	0.09	2
30	0.14	1
32	0.23	0.5
34	0.37	0.5
36	0.61	Limited

Shaded area denotes extrapolated estimates


Mason, Pere Marquette Lake, Mason County, Northern Pike
Mercury (ppm)
0.6
0.5
0.4
0.3
0.2
0.1
0
12
14
16
18
20
22
24
26
28
30
32
34
Length (inches)


Mason, Pere Marquette Lake, Mason County, Northern Pike
y = 9E-05e^0.2449x
R² = 0.6805
Total PCBs (ppm)
0.25
0.2
0.15
0.1
0.05
0
12
14
16
18
20
22
24
26
28
30
32
34
Length (inches)


Mason, Pere Marquette Lake, Mason County, Northern Pike
DDT Metabolites (ppm)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
12
14
16
18
20
22
24
26
28
30
32
34
Length (inches)


Mason, Pere Marquette Lake, Mason County, Northern Pike
Total Chlordane (ppm)
y = 0.0002e^0.1292x
R² = 0.6441
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
12
14
16
18
20
22
24
26
28
30
32
34
Length (inches)

Redhorse & White Sucker | **Pere Marquette River** | **Lake, Mason, Newaygo, & Oceana 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
2003	2004	17	9.9	na	8.9	20.1

Datasets available: 1993, 2003, 2004 *

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	17	0.14	0.08	0.37	0.18	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.321	0.441

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	2004	17	9.9	na	8.9	20.1

Datasets available: 1993, 2003, 2004 *

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	17	0.09	0.001	0.41	0.15	1
DDT	17	0.04	0.002	0.18	0.07	16
Chlordane	17	0.01	0.001	0.03	0.01	--
Toxaphene	17	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.381	0.880
DDT	0.384	0.803
Chlordane	0.256	0.564
Toxaphene	--	--

Final meal category based on UCL: 1

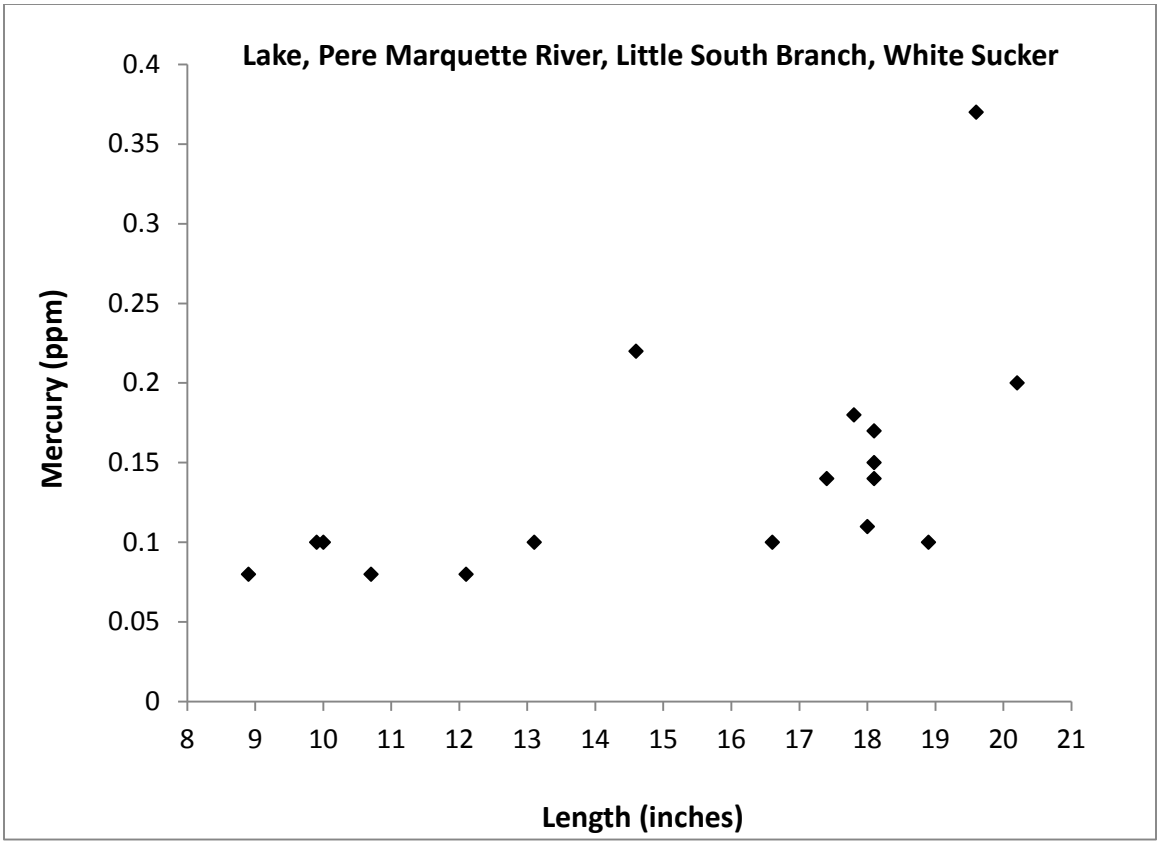
* - 1993 samples analyzed as 1 composite, results not used in evaluation

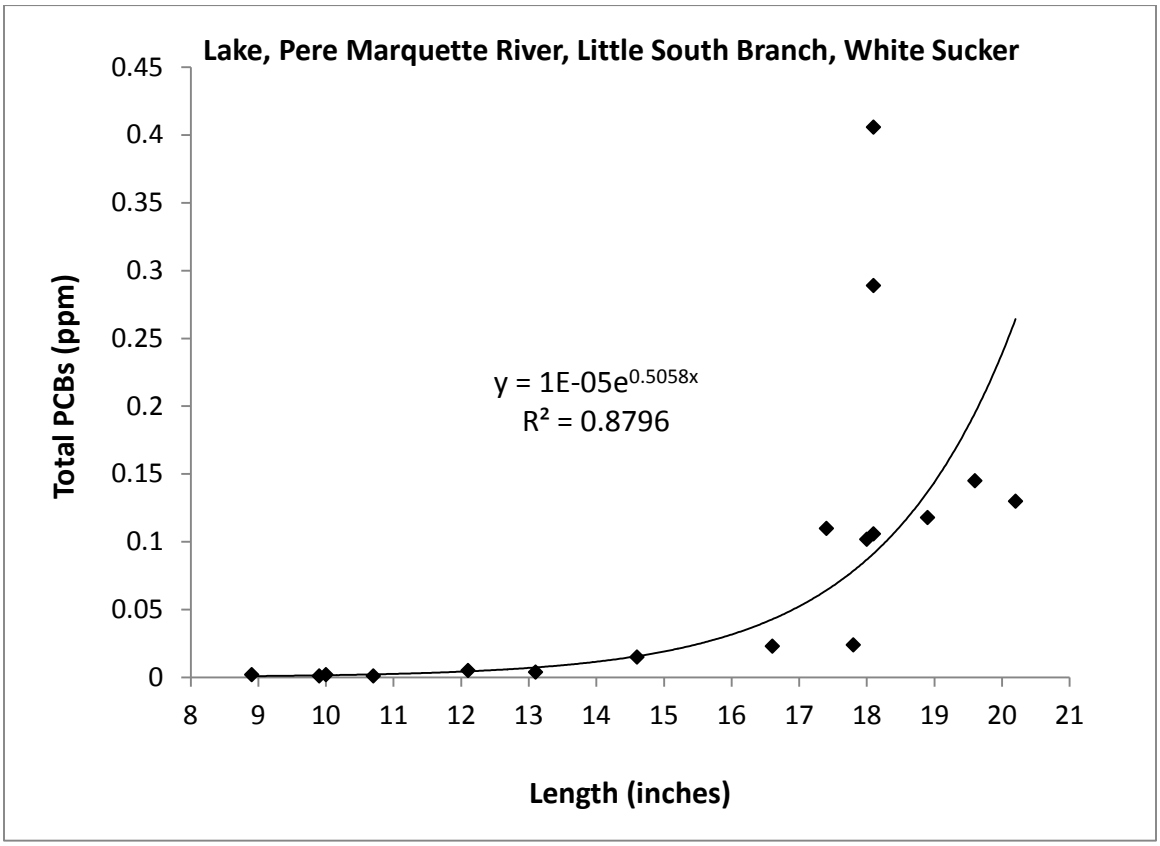
Existing Advisory: Women and children should not eat more than 1 meal per month of sucker from the Pere Marquette Lake or Pere Marquette River due to PCBs.

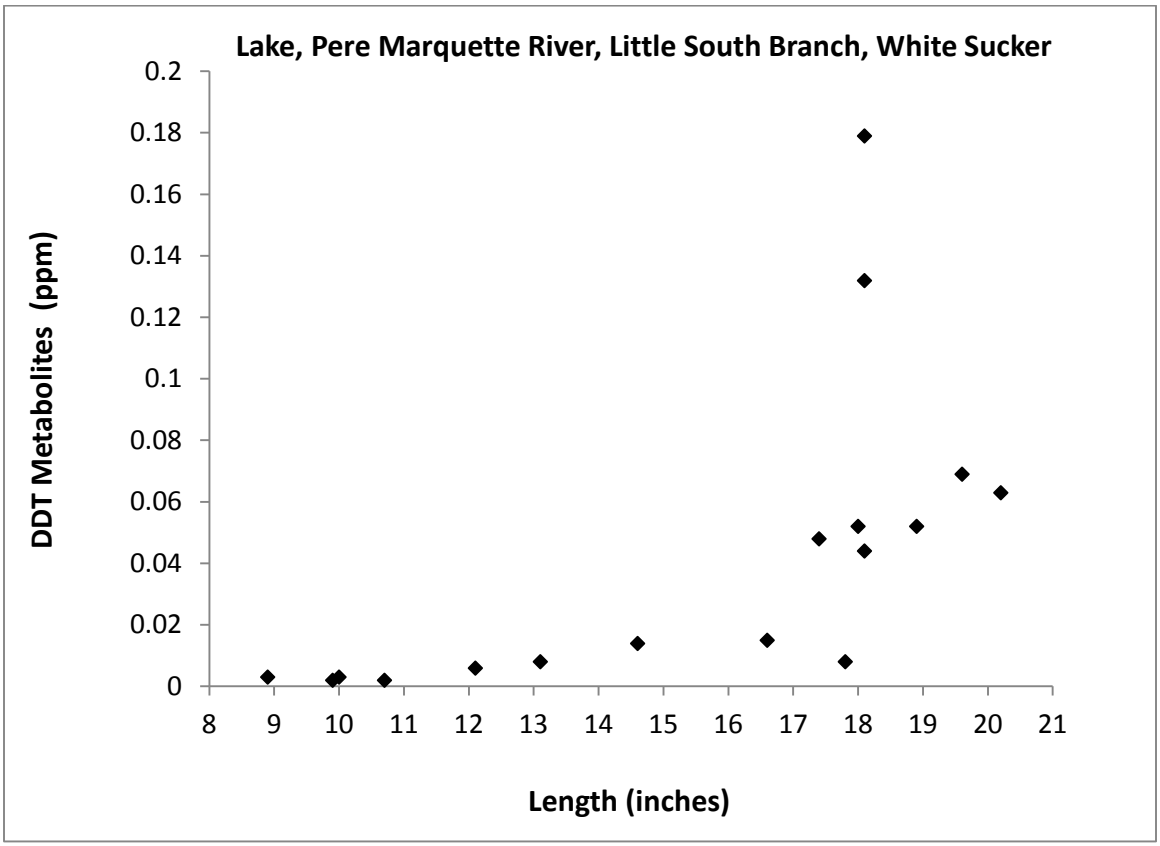
Recommendation: No one should eat more than 4 meals per month of sucker from the Pere Marquette Lake or Pere Marquette River smaller than 18 inches due to mercury and PCBs or more than 6 meals per year of those fish larger than 18 inches due to PCBs.

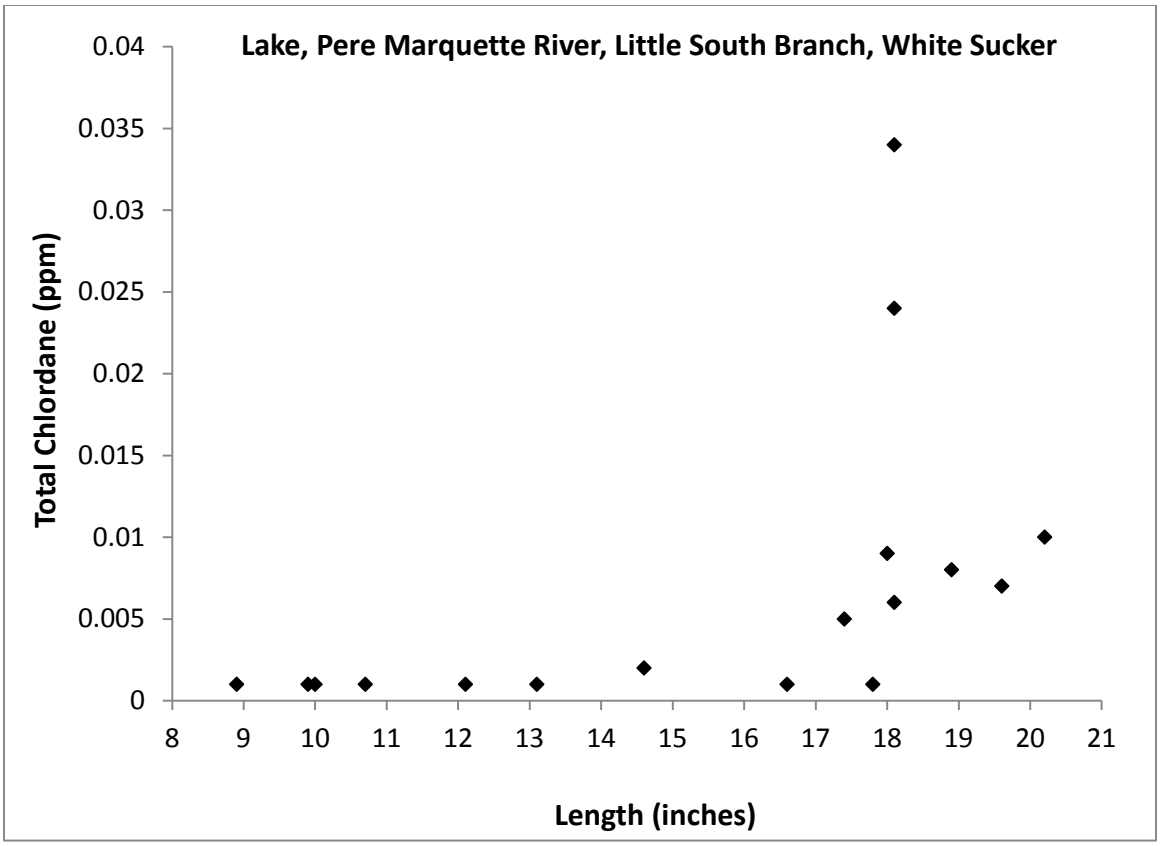
Length (Inches)	PCB Regression Equation Estimate (ppm)	Meal Category
8	0.001	16
10	0.002	16
12	0.004	16
14	0.01	12
16	0.03	4
18	0.09	2
20	0.25	0.5
22	0.68	Limited
24	1.87	Limited

Shaded area denotes extrapolated estimates


Lake, Pere Marquette River, Little South Branch, White Sucker
Mercury (ppm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Lake, Pere Marquette River, Little South Branch, White Sucker
Total PCBs (ppm)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
y = 1E-05e^0.5058x
R² = 0.8796
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Lake, Pere Marquette River, Little South Branch, White Sucker
DDT Metabolites (ppm)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Length (inches)


Lake, Pere Marquette River, Little South Branch, White Sucker
Total Chlordane (ppm)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Length (inches)

Wexford County

Northern Pike **Lake Cadillac** **Wexford 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
2004	2004	5	22.5	24	22.5	26.9

Datasets available: 2004

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.12	0.10	0.15	0.14	4

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.614*	0.640*

* negative slope on regression

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
2004	2004	5	22.5	24	22.5	26.9

Datasets available: 2004

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.007	0.003	0.01	0.01	16
DDT	5	0.008	0.004	0.02	0.01	16
Chlordane	5	na	--	--	--	--
Toxaphene	5	na	--	--	--	--

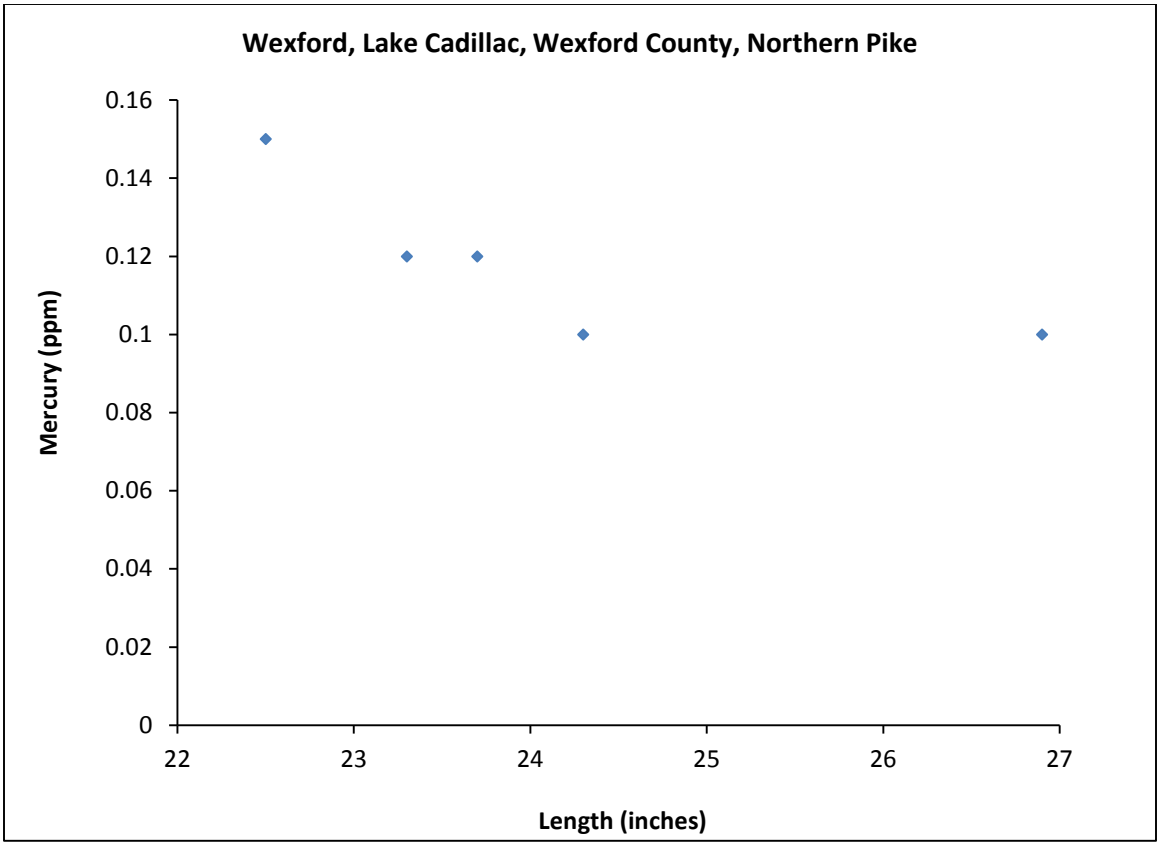
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.307	0.242
DDT	0.629*	0.690*
Chlordane	--	--
Toxaphene	--	--

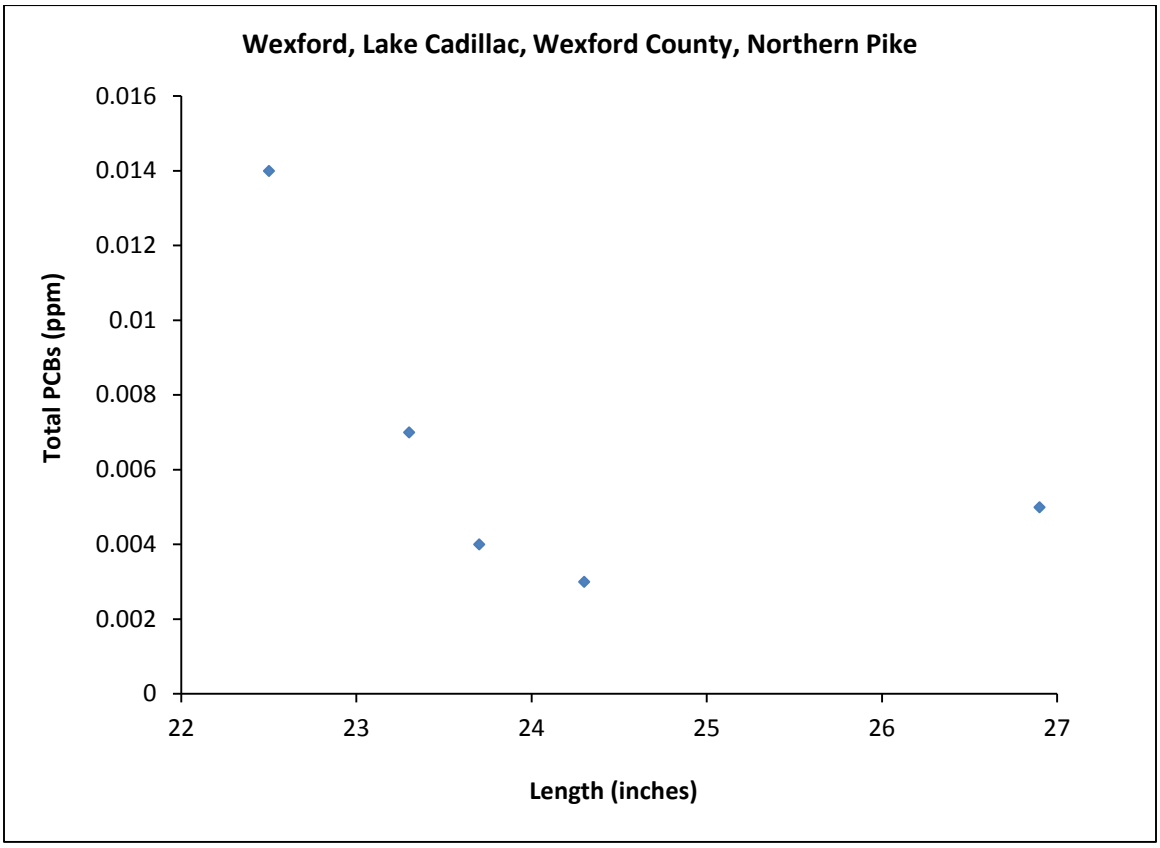
* negative slope on regression

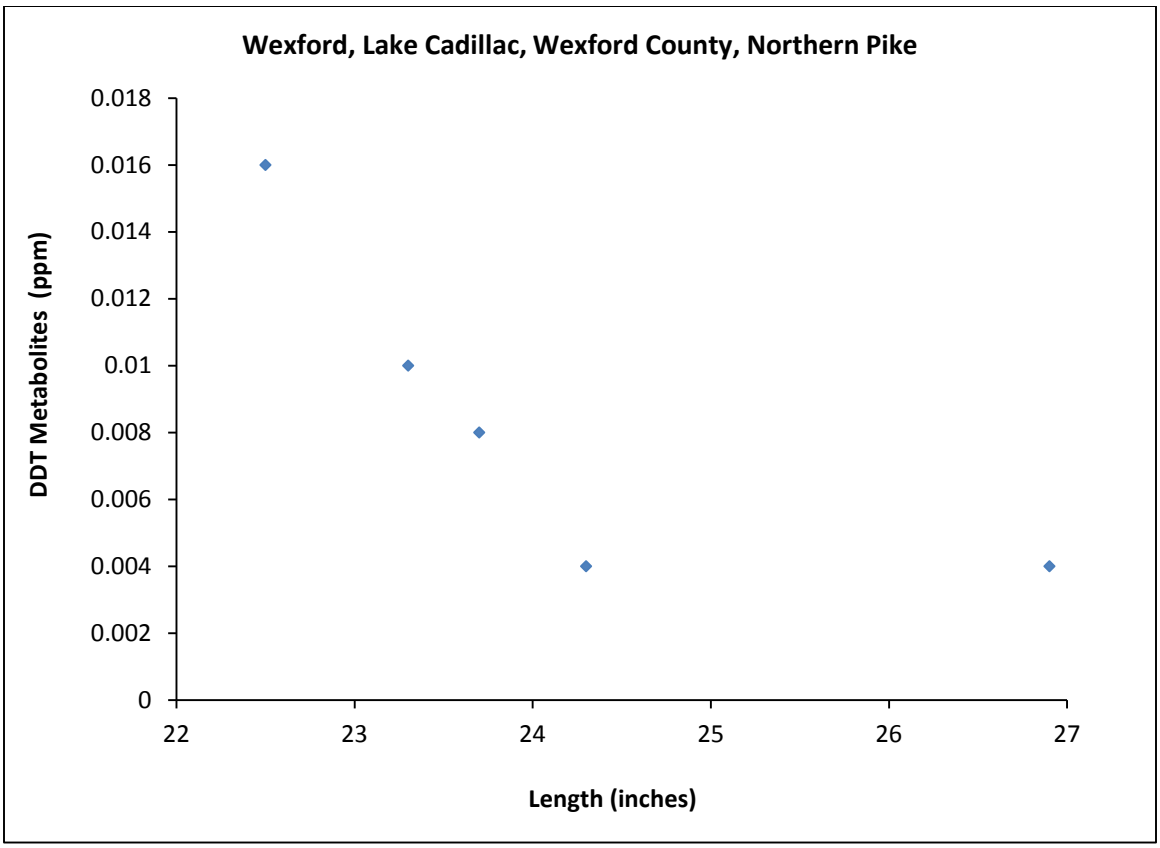
Final meal category based on UCL: 4

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

Recommendation: No one should eat more than 4 meals per month of Lake Cadillac northern pike smaller than 30 inches or more than 2 meals per month of those fish larger than 30 inches due to mercury. The statewide length break was applied as the size range of fish was limited.


Wexford, Lake Cadillac, Wexford County, Northern Pike
Mercury (ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
22
23
24
25
26
27
Length (inches)


Wexford, Lake Cadillac, Wexford County, Northern Pike
Total PCBs (ppm)
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
22
23
24
25
26
27
Length (inches)


Wexford, Lake Cadillac, Wexford County, Northern Pike
DDT Metabolites (ppm)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
22
23
24
25
26
27
Length (inches)

Smallmouth Bass **Lake Cadillac** **Wexford 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	13.6	14	13.6	18.5

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	5	0.30	0.21	0.59	0.51	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.965*	0.960*

* - regression driven by one point

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	2004	5	13.6	14	13.6	18.5

Datasets available: 2004

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	5	0.02	0.003	0.06	0.05	4
DDT	5	0.02	0.007	0.03	0.03	16
Chlordane	5	0.002	0.001	0.006	0.005	--
Toxaphene	5	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.005	0.076
DDT	0.042	0.021
Chlordane	0.033	0.033
Toxaphene	--	-

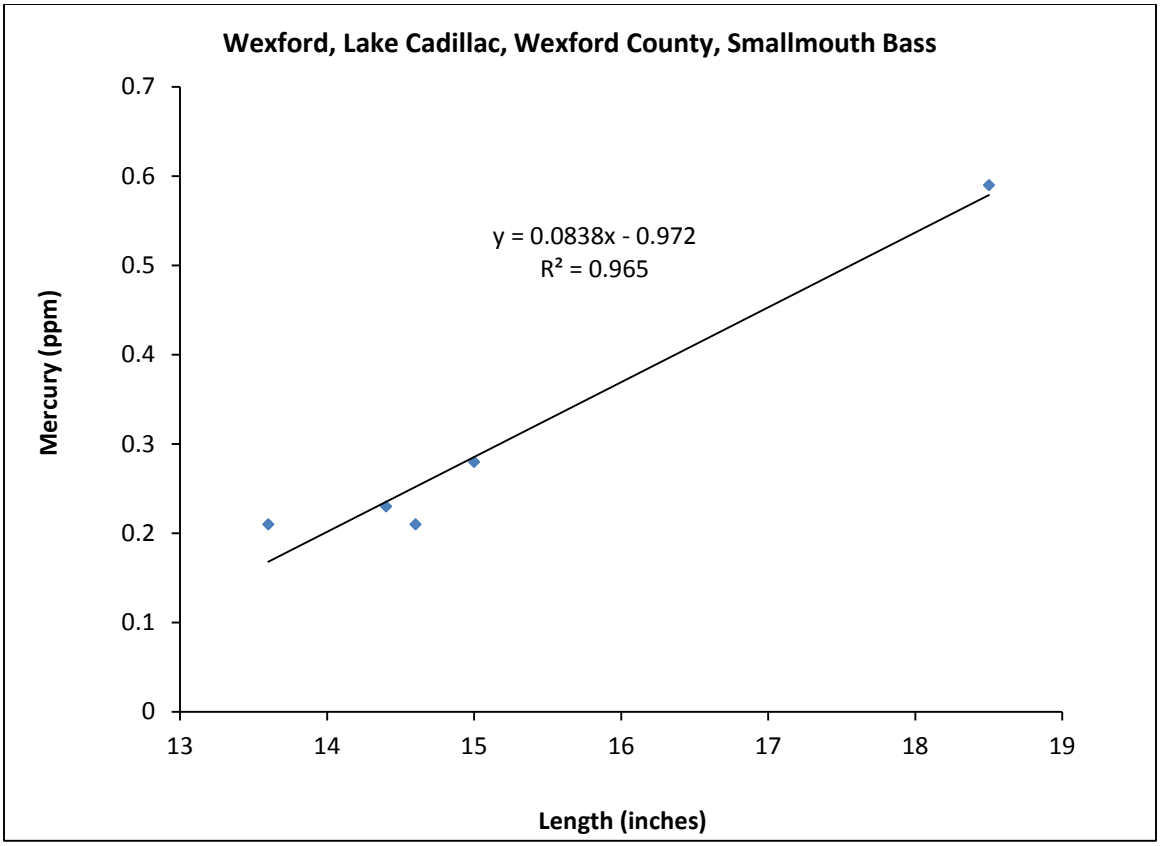
Final meal category based on UCL: 2

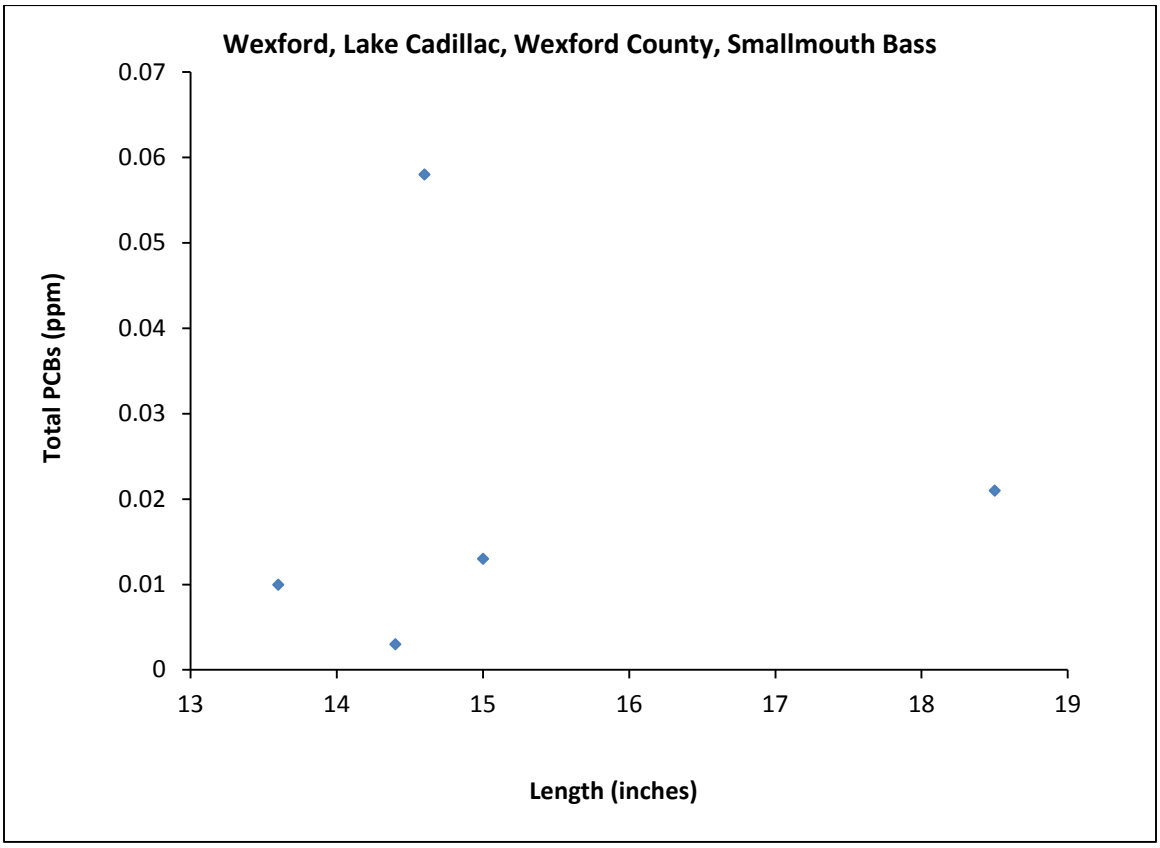
Existing Advisory: Lake Cadillac smallmouth bass are covered under the statewide mercury consumption advisory.

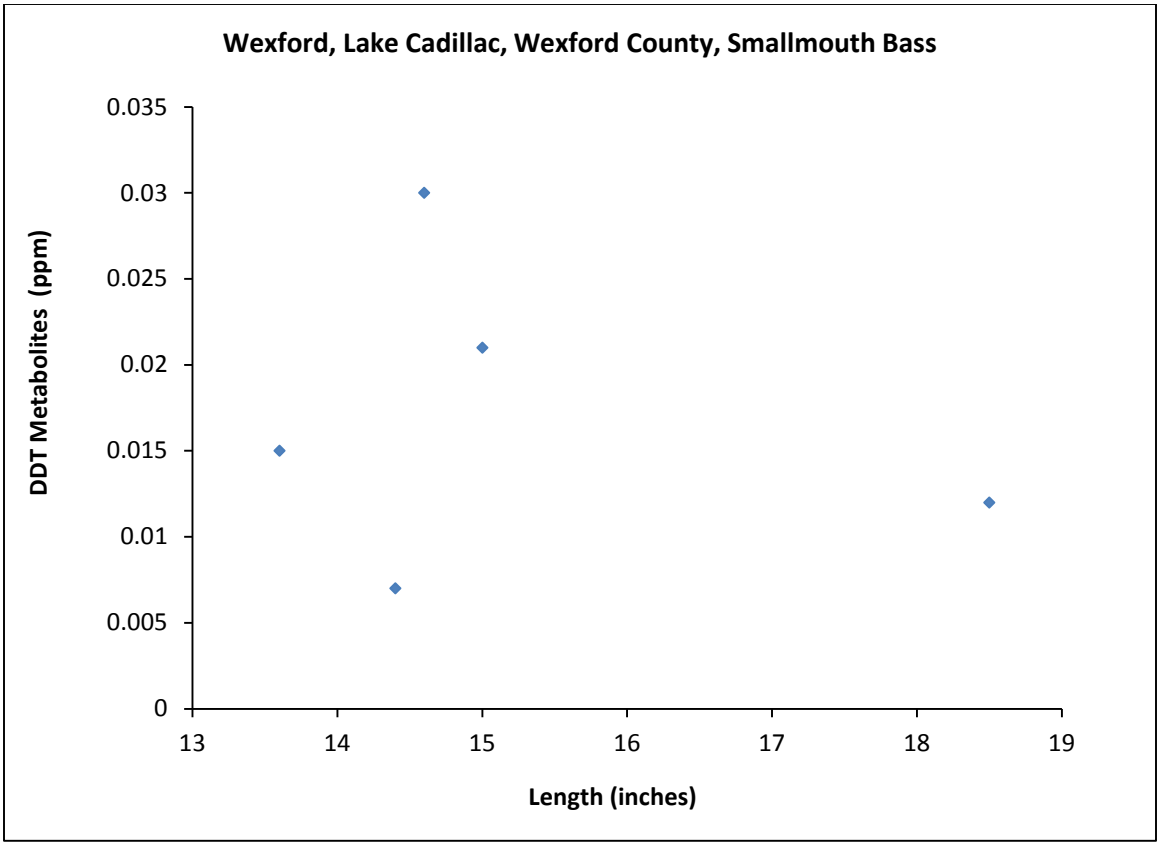
Recommendation: No one should eat more than 2 meals per month of Lake Cadillac largemouth or smallmouth bass smaller than 18 inches or more than 1 meal per month of those fish larger than 18 inches due to mercury. The statewide length break was applied as the size range of the fish was limited.

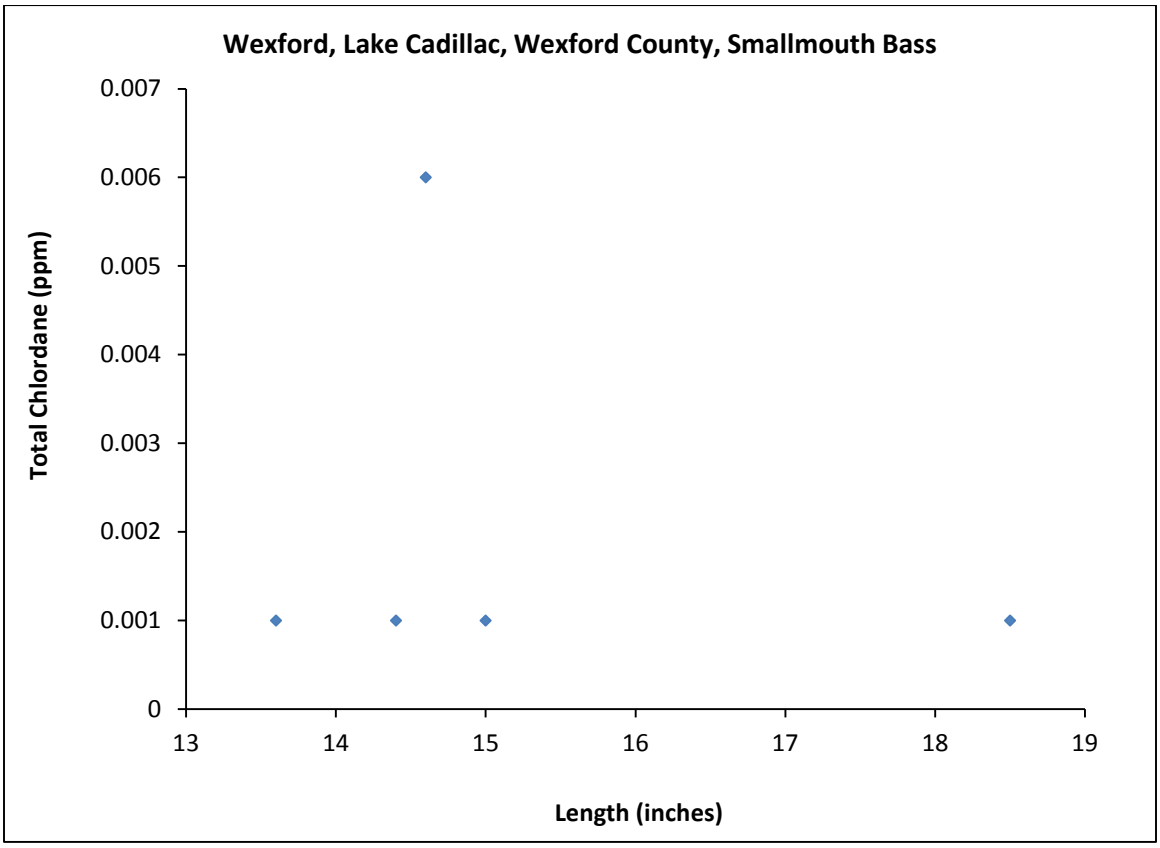
Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.20	4
15	0.28	2
16	0.37	2
17	0.45	2
18	0.54	1
19	0.62	1
20	0.70	1
21	0.79	1
22	0.87	1

Shaded area denotes extrapolated estimates


Wexford, Lake Cadillac, Wexford County, Smallmouth Bass
y = 0.0838x - 0.972
R² = 0.965
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
13
14
15
16
17
18
19
Length (inches)


Wexford, Lake Cadillac, Wexford County, Smallmouth Bass
Total PCBs (ppm)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
13
14
15
16
17
18
19
Length (inches)


Wexford, Lake Cadillac, Wexford County, Smallmouth Bass
DDT Metabolites (ppm)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
13
14
15
16
17
18
19
Length (inches)


Wexford, Lake Cadillac, Wexford County, Smallmouth Bass
Total Chlordane (ppm)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
13
14
15
16
17
18
19
Length (inches)

Largemouth Bass **Lake Mitchell** **Wexford 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
1989	2003	17	11.8	14	13.9	17

Datasets available: 1989, 2003

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	12	0.36	0.25	0.58	0.44	2

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.683	0.741

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Size Range of All Samples	
Earliest	Most Recent				Min	Max
1989	1989	7	11.8	14	11.8	17

Datasets available: 1989

Chemical	Sample Size (All)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	7	ND	--	--	--	--
DDT	7	0.01	0.003	0.02	0.0	16
Chlordane	7	ND	--	--	--	--
Toxaphene	7	ND	--	--	--	--

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	--	--
DDT	0.040	0.001
Chlordane	--	--
Toxaphene	--	--

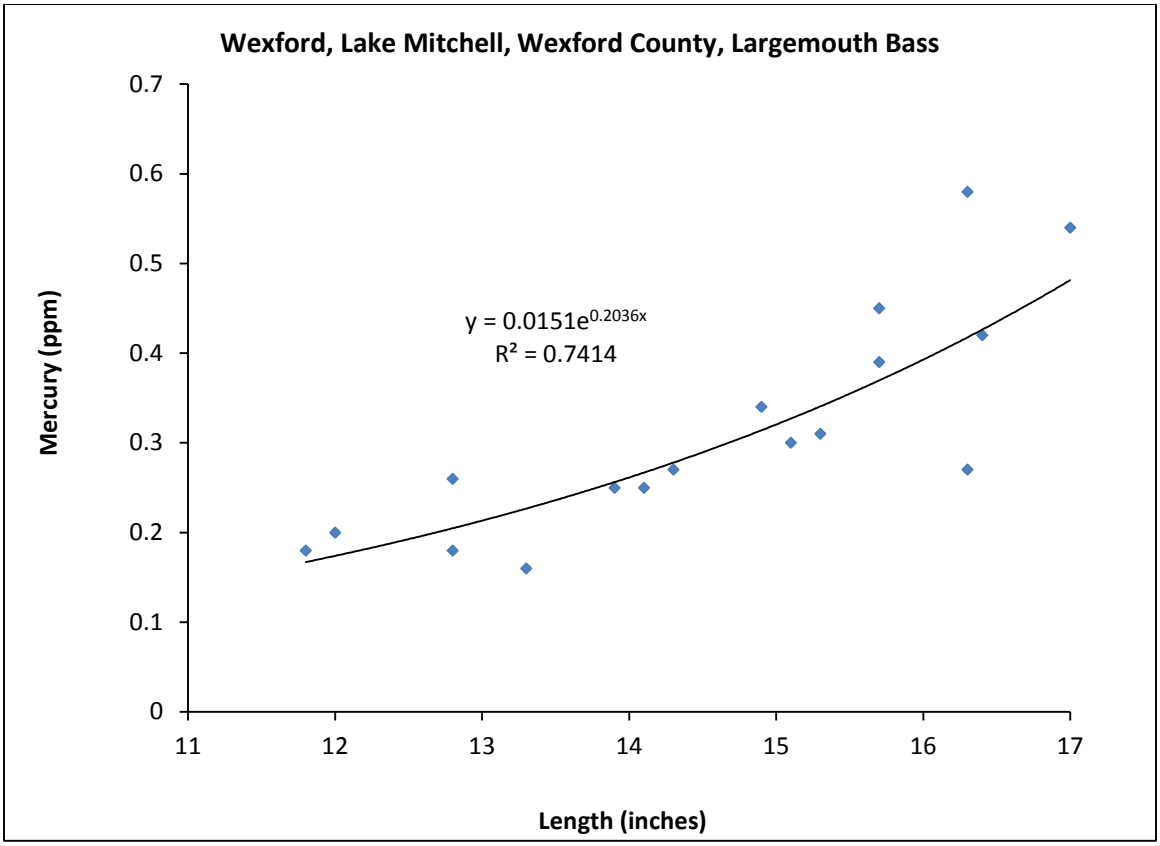
Final meal category based on UCL: 2

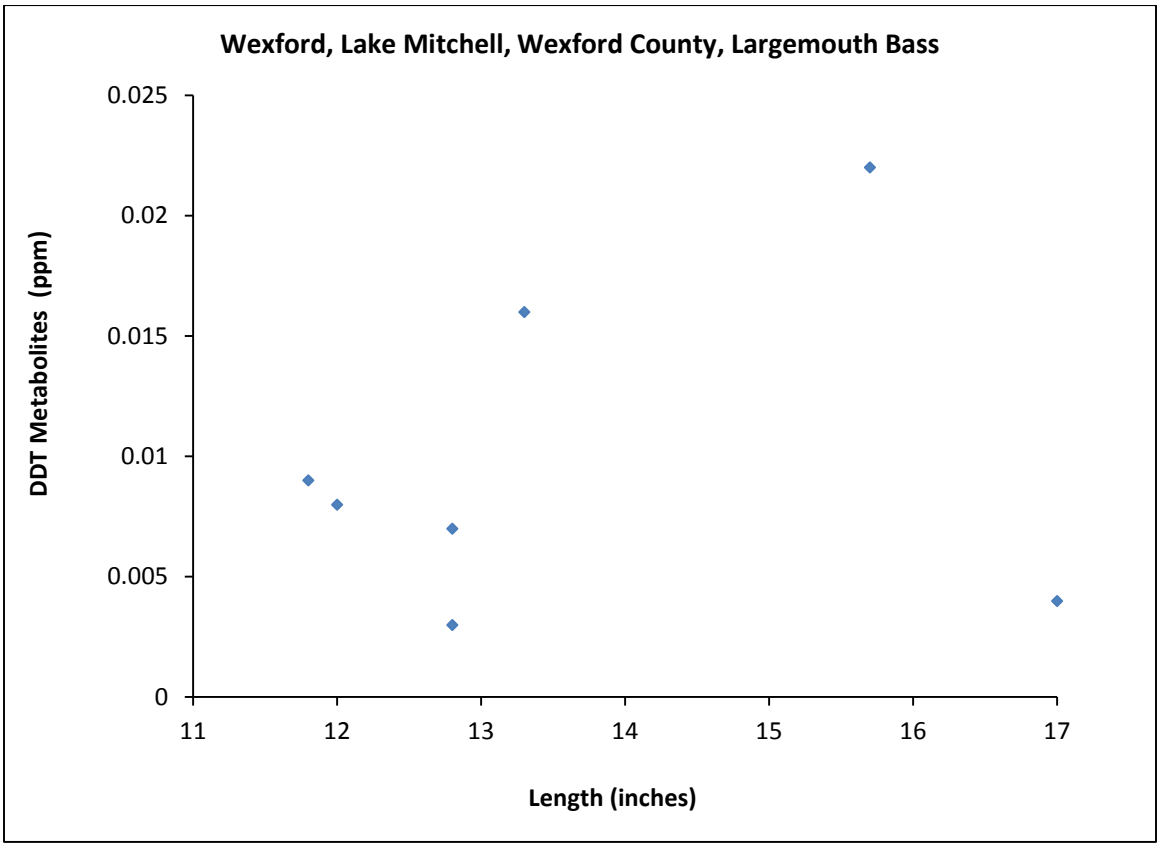
Existing Advisory: Women and children should not eat more than one meal per week of Lake Mitchell largemouth bass smaller than 18 inches in length or more than one meal per month of those fish larger than 18 inches due to mercury.

Recommendation: No one should eat more than 2 meals per month of Lake Mitchell 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.

Length (Inches)	Hg Regression Equation Estimate (ppm)	Meal Category
14	0.261	4
15	0.320	2
16	0.392	2
17	0.481	2
18	0.590	1
19	0.723	1
20	0.886	1
21	1.086	1
22	1.331	0.5

Shaded area denotes extrapolated estimates


Wexford, Lake Mitchell, Wexford County, Largemouth Bass
Mercury (ppm)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
y = 0.0151e^0.2036x
R² = 0.7414
11
12
13
14
15
16
17
Length (inches)


Wexford, Lake Mitchell, Wexford County, Largemouth Bass
DDT Metabolites (ppm)
0.025
0.02
0.015
0.01
0.005
0
11
12
13
14
15
16
17
Length (inches)

Walleye **Lake Mitchell** **Wexford 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	16.1	15	16.1	24.8

Datasets available: 1989

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
Mercury	10	0.76	0.42	1.29	0.95	1

Chemical	Linear Regression	Exponential Regression
	R^2	R^2
Mercury	0.425	0.406

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	16.1	15	16.1	24.8

Datasets available: 1989

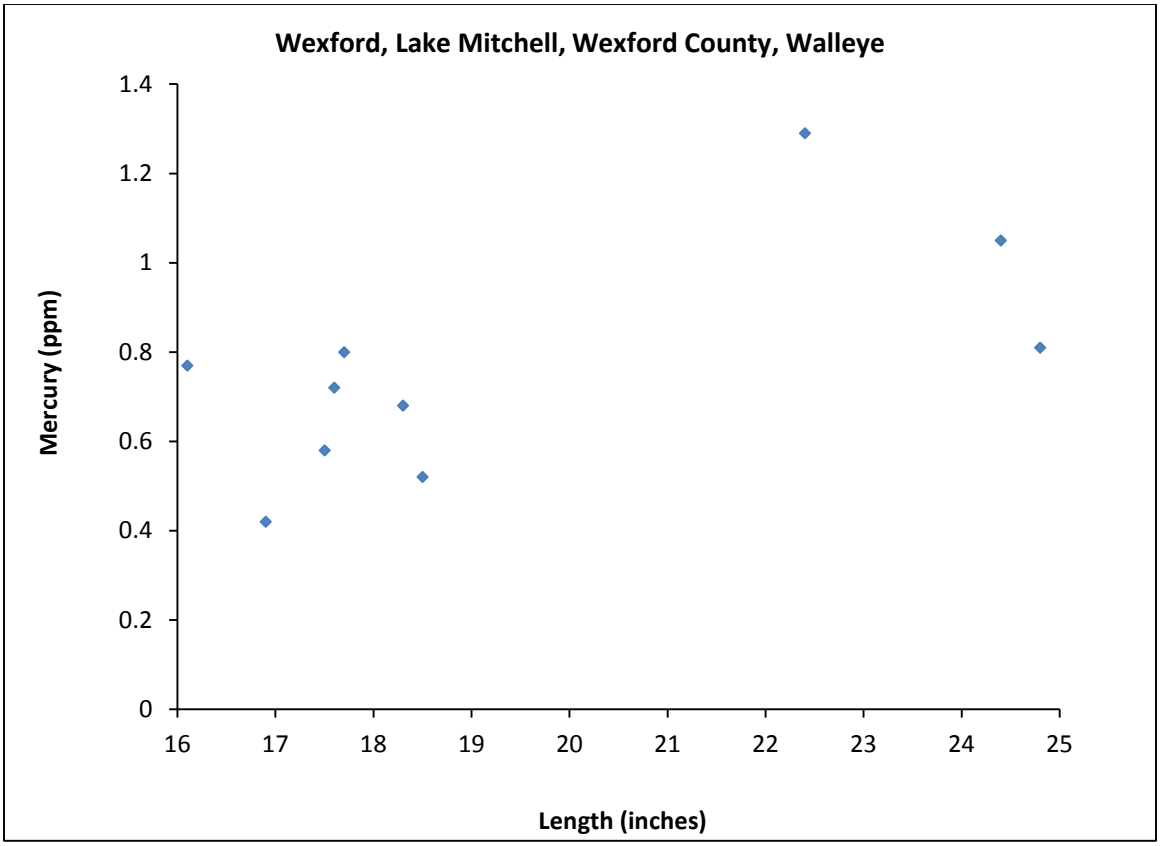
Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	10	0.02	0.02	0.03	0.03	8*
DDT	10	0.01	0.007	0.02	0.02	16
Chlordane	10	0.003	0.003	0.004	0.004	--
Toxaphene	10	ND	--	--	--	--

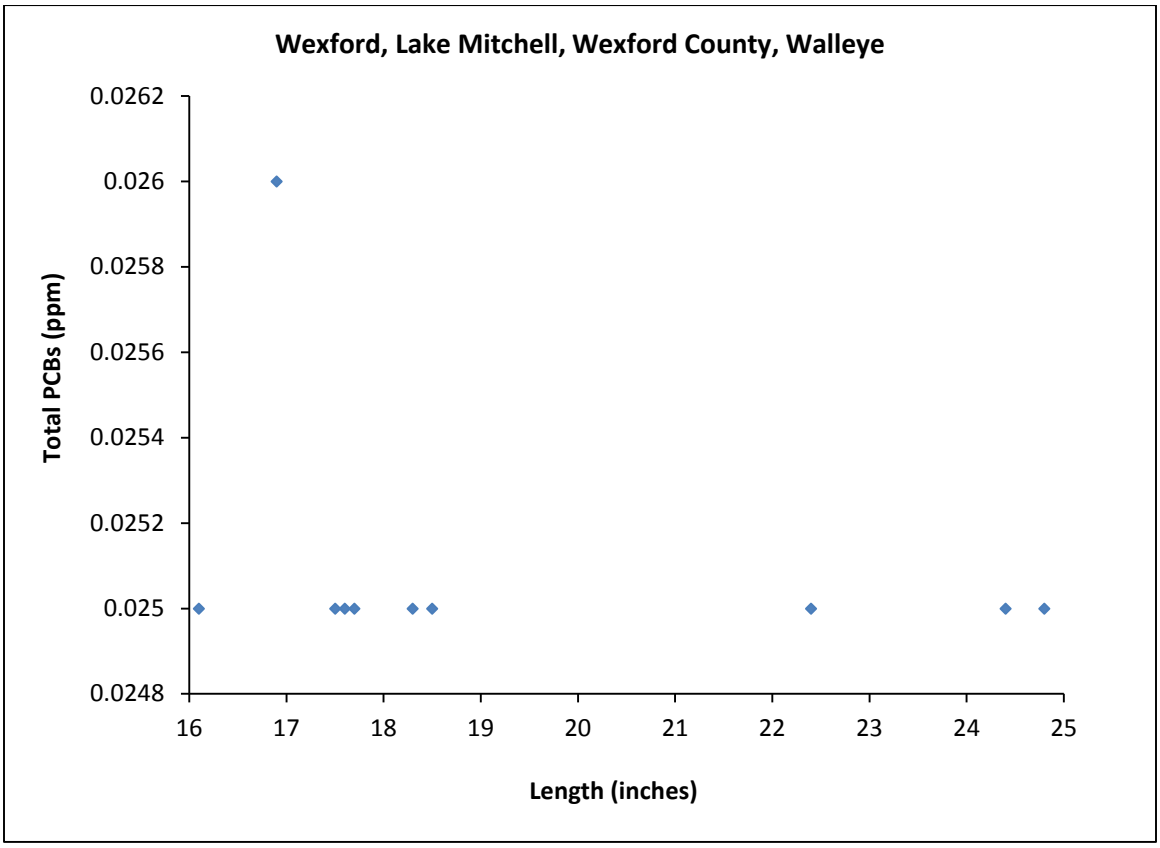
Chemical	Linear Regression	Exponential Regression
	R^2	R^2
PCB	0.077	0.077
DDT	0.087	0.029
Chlordane	0.077	0.077
Toxaphene	--	--

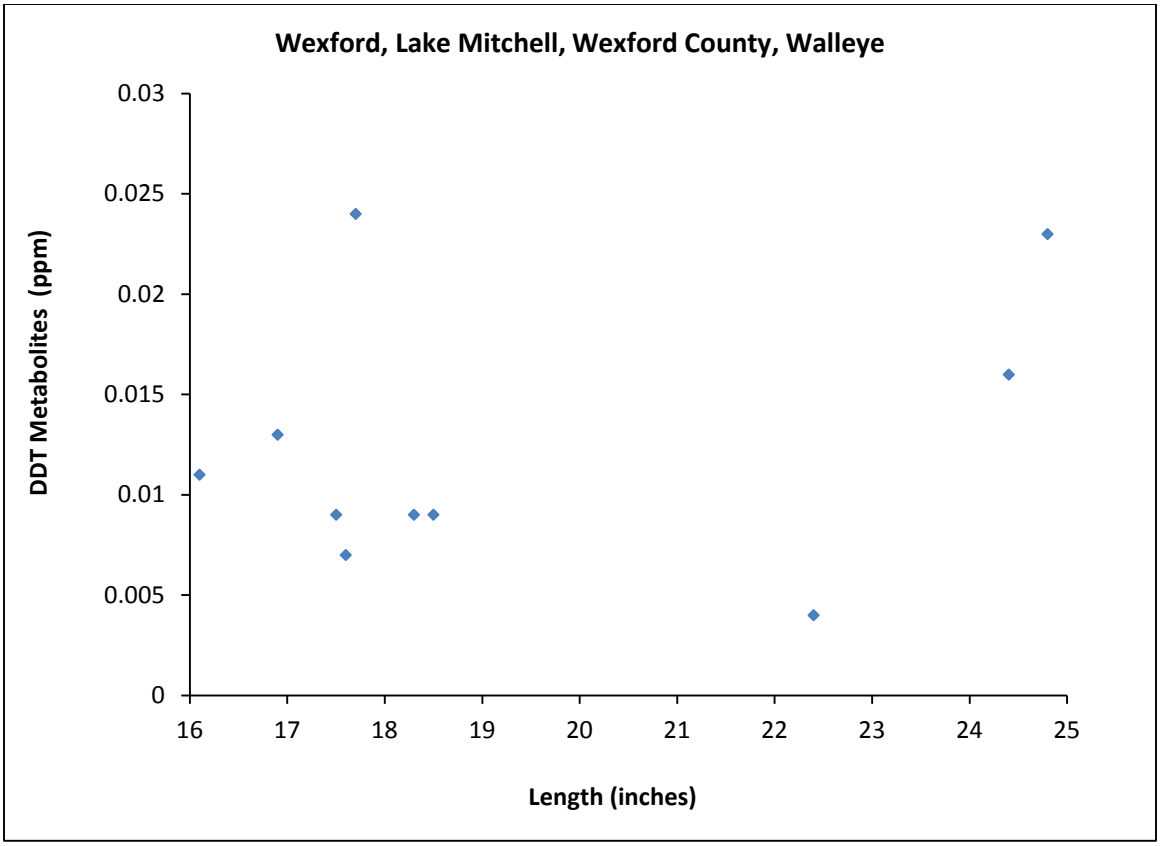
Final meal category based on UCL: 1

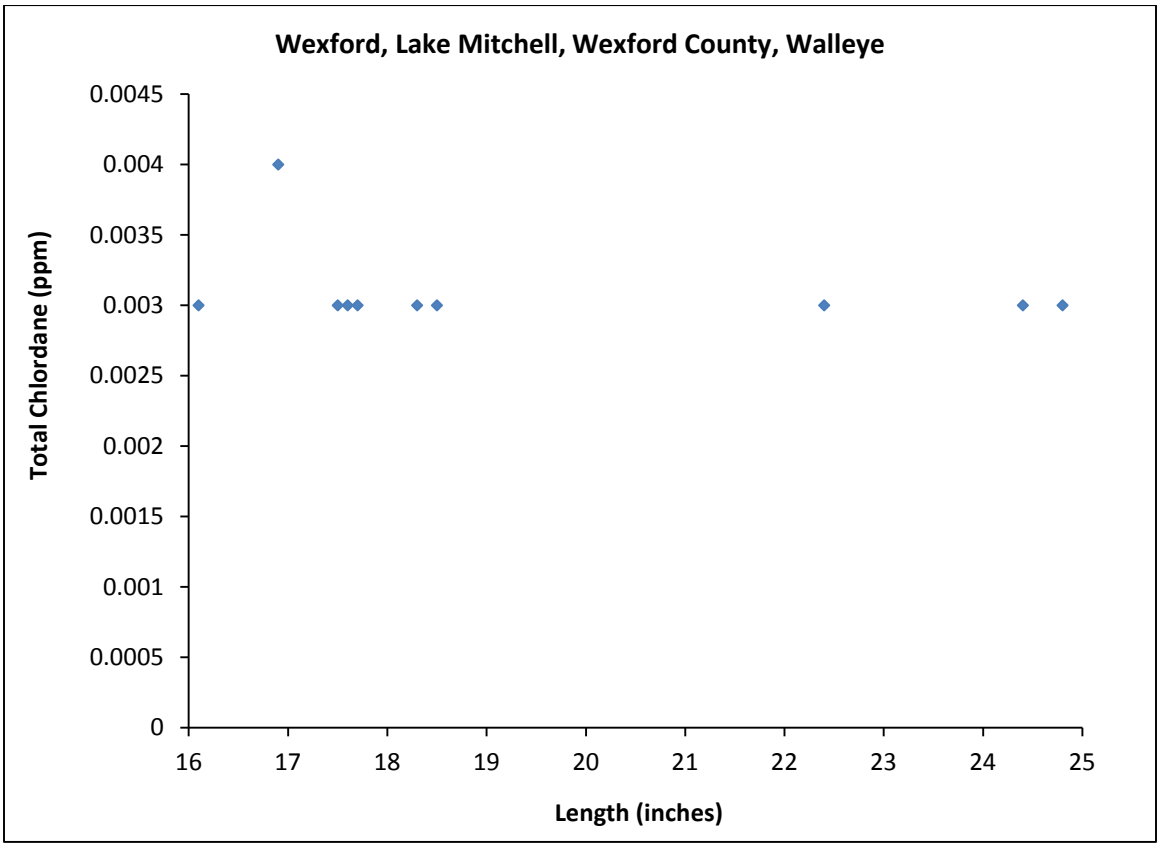
Existing Advisory: Lake Mitchell walleye are covered under the statewide mercury consumption advisory.

Recommendation: No one should eat more than 1 meal per month of Lake Mitchell walleye due to mercury.*PCB concentrations were at or near the reporting level of 0.025 ppm in 1989; based on the MDEQ 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 and are unlikely to cause an advisory in this case.


Wexford, Lake Mitchell, Wexford County, Walleye
Mercury (ppm)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
16
17
18
19
20
21
22
23
24
25
Length (inches)


Wexford, Lake Mitchell, Wexford County, Walleye
Total PCBs (ppm)
0.0262
0.026
0.0258
0.0256
0.0254
0.0252
0.025
0.0248
16
17
18
19
20
21
22
23
24
25
Length (inches)


Wexford, Lake Mitchell, Wexford County, Walleye
DDT Metabolites (ppm)
0.03
0.025
0.02
0.015
0.01
0.005
0
16
17
18
19
20
21
22
23
24
25
Length (inches)


Wexford, Lake Mitchell, Wexford County, Walleye
Total Chlordane (ppm)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
16
17
18
19
20
21
22
23
24
25
Length (inches)