

# Lac du Flambeau Band of Lake Superior Chippewa Indian



Water Quality Data Assessment and Analysis

# LDF

## Reservation

- 260 - lakes
- 71mi - streams
- 24,000ac - wetlands
- 433mi - shoreline

# Lac du Flambeau- Lake of the Flaming Torches



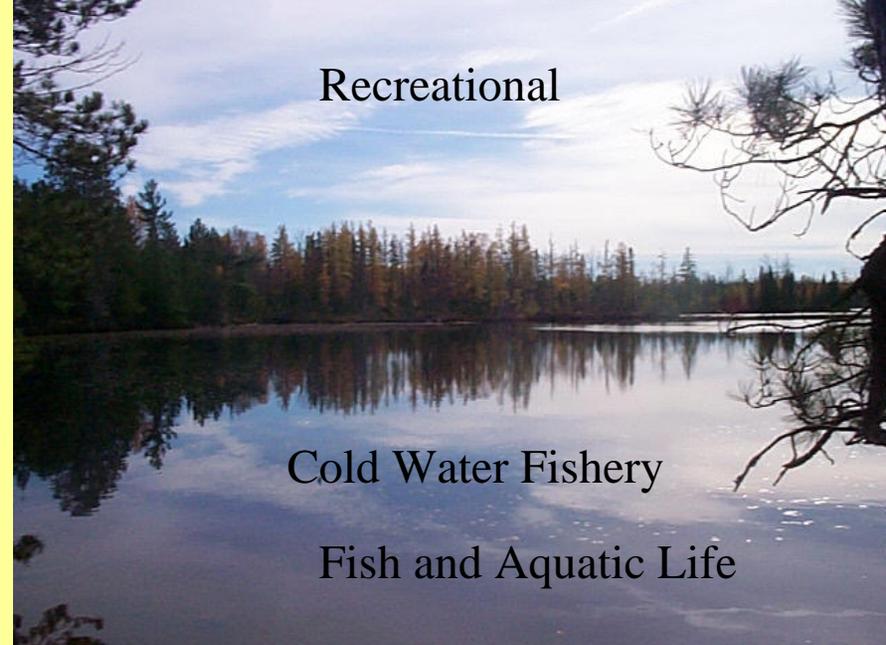
# Tribal Constitution and Treaties

## Powers and Duties

To regulate the use and disposition of tribal property to protect and preserve the tribal property, wildlife and natural resources of the Lac du Flambeau Band of Lake Superior Chippewa Indians, to cultivate Indian arts, crafts, and culture, to administer charity, to protect the health, security, and general welfare of the Tribe



Wildlife



Recreational

Cold Water Fishery

Fish and Aquatic Life



Cultural

# Designated Uses



Water Supply



Wild Rice

# Scope of Assessment

## Comprehensive

Baseline inventory of

**Lakes**

streams

wetlands

## Targeted

**Cranberry operations**

Storm water

Mercury

Shoreland development





# Comprehensive Baseline Inventory of Lakes



# Comparing Data to Water Quality Standards

Tribal Water Quality Standards

Federal Recommended Criteria

State Water Quality Standards

Stress Indicators- pH, DO, Temperature,  
Turbidity, Total Phosphorus, Total Nitrogen,  
Chlorophyll a, and Secchi

# Comparing to Federal Criteria

The screenshot shows a Microsoft Internet Explorer browser window with the title bar "Current National Recommended Water Quality Criteria | US EPA - Microsoft Internet Explorer". The address bar shows the URL "http://www.epa.gov/waterscience/criteria/wqcriteria.html". The page content includes the EPA logo, the heading "U.S. Environmental Protection Agency Water Quality Criteria", a search bar, and a list of links for "Current National Recommended Water Quality Criteria".

**U.S. Environmental Protection Agency**  
**Water Quality Criteria**

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## Current National Recommended Water Quality Criteria

EPA's compilation of national recommended water quality criteria is presented as a summary table containing recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These criteria are published pursuant to Section 304(a) of the Clean Water Act (CWA) and provide guidance for states and tribes to use in adopting water quality standards.

- [Fact Sheet](#) (May 25, 2005) - request a hard copy of the poster or brochure
- [Print version of this table \(PDF, 25 pages, 159 Kb\)](#)
- [Previous versions](#) of national recommended water quality criteria table
- [Chemical Specific Criteria Documents from the 1980's](#)
- [Water quality standards](#)
- [Drinking water maximum contaminant levels \(MCLs\)](#)

[Priority Pollutants](#) | [Non Priority Pollutants](#) | [Organoleptic Effects](#) (e.g., taste and odor) | [Additional Notes](#) | [Gold & Red Bo](#)

- [Appendix A - Conversion Factors for Dissolved Metals](#)
- [Appendix B - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness Dependent](#)

Scroll down to the pollutant you are considering and determine the criteria you should use depending on the designated use of the waterbody

Current National Recommended Water Quality Criteria | US EPA - Microsoft Internet Explorer

Address: <http://www.epa.gov/waterscience/criteria/wqcriteria.html>

34	Diazinon	333415	0.17	0.17	0.82	0.82			71F	
35	Parathion	56382	0.065 <small>↓</small>	0.013 <small>↓</small>					<a href="#">Gold</a>	
36	Pentachlorobenzene	608935					1.4 <small>E</small>	1.5 <small>E</small>	65FR	
37	pH	--		6.5 - 9 <small>E</small>		6.5 - 8.5 <small>E,K</small>	5 - 9		<a href="#">Gold</a>	
38	Phosphorus Elemental	7723140				0.1 <small>E,K</small>			<a href="#">Gold</a>	
39	Nutrients	--	See EPA's <a href="#">Ecoregional criteria</a> for Total Phosphorus, Total Nitrogen, Chlorophyll <i>a</i> and Water Clarity (Secchi depth for lakes; turbidity for streams and rivers) (& Level III Ecoregional criteria)							<small>P</small>
40	Solids Dissolved and Salinity	--					250,000 <small>A</small>		<a href="#">Gold</a>	
41	Solids Suspended and Turbidity	--	NARRATIVE STATEMENT -- SEE DOCUMENT <small>E</small>							<a href="#">Gold</a>
42	Sulfide-Hydrogen Sulfide	7783064		2.0 <small>E</small>		2.0 <small>E</small>			<a href="#">Gold</a>	
43	Tainting Substances	--	NARRATIVE STATEMENT-- SEE DOCUMENT							<a href="#">Gold</a>

Internet

We published 17 ecoregional nutrient criteria documents for lakes and reservoirs, rivers and streams, and wetlands. See below for documents.

- [Fact Sheet](#)
- [Federal Register Notice](#) (January 9, 2001)
- [External Expert Peer Review Comments](#) (PDF, 57K) (June, 2001)
- [Public Comments](#) (PDF, 37K) (June, 2001)

## Criteria Documents

- [Criteria Documents for Lakes & Reservoirs](#)
- [Criteria Documents for Rivers & Streams](#)
- [Criteria Documents for Wetlands](#) (PDF, 257K)
- [Summary Table for the Nutrient Criteria Documents](#) (PDF, 68K) July 2002

These tables present the recommended criteria for each of the aggregate nutrient ecoregions for the following parameters: Total Phosphorus, Total Nitrogen, Chlorophyll a, and Turbidity or Secchi. Criteria are presented for both Lakes & Reservoirs and Rivers & Streams.

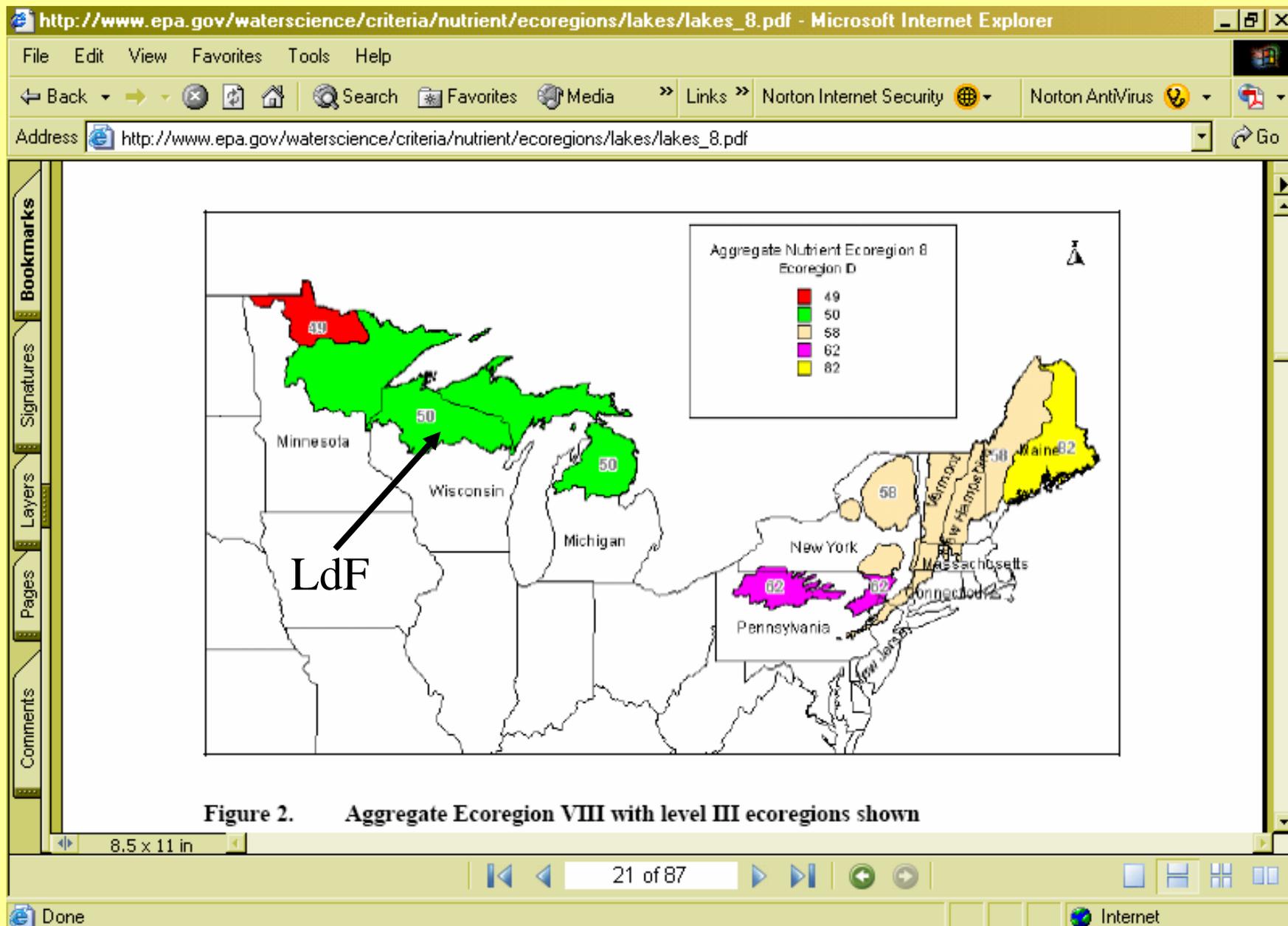
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Last updated on Monday, February 27th, 2006

URL: <http://www.epa.gov/waterscience/criteria/nutrient/ecoregions/>

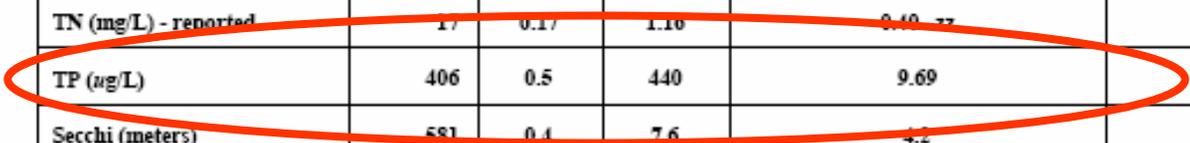
# Chose your Ecoregion and Subcoregion



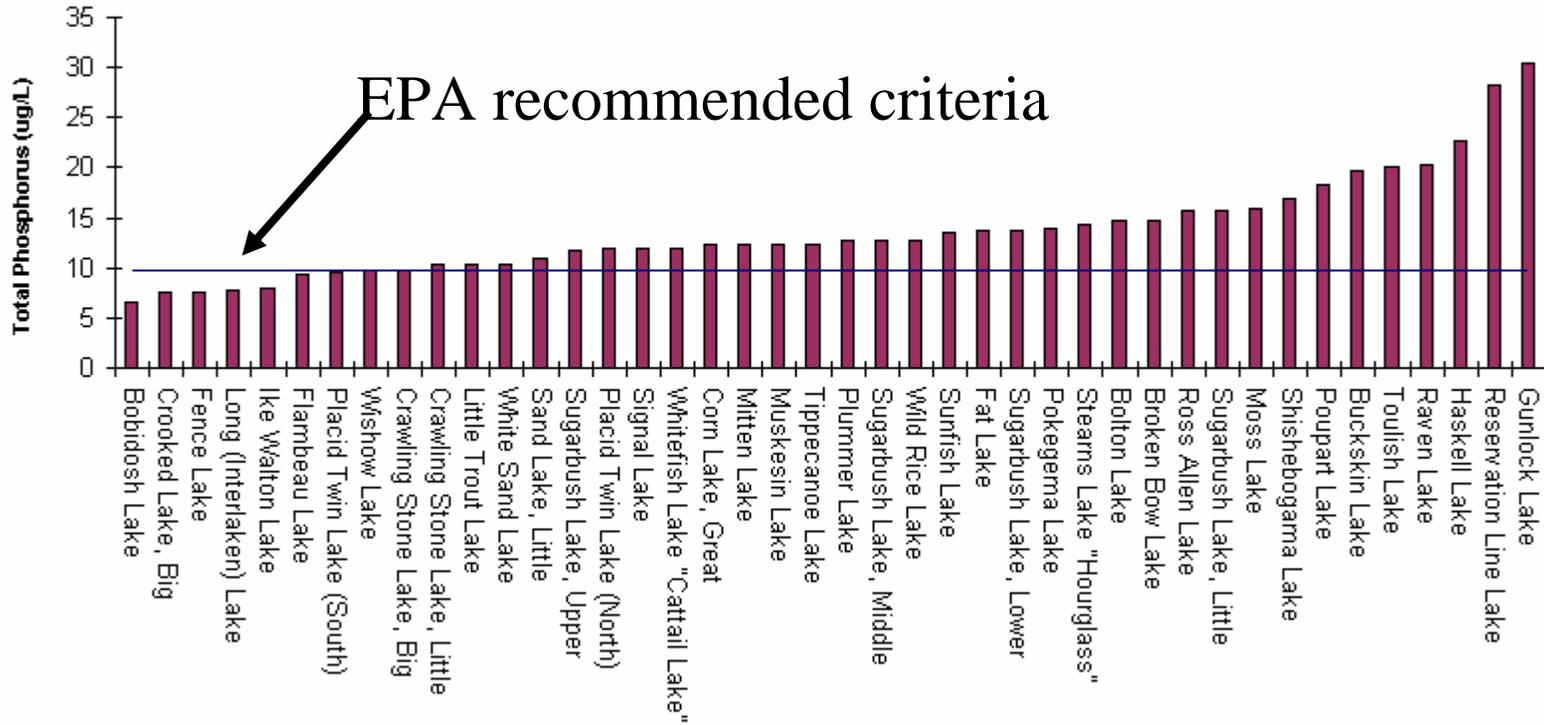
Chlorophyll <i>a</i> (ug/L) - S	21	1.13	8.85	2.70
Chlorophyll <i>a</i> (ug/L) - T				

**Table 3b. Reference conditions for level III ecoregion 50.**

Parameter	No. of Lakes N <sup>++</sup>	Reported values		25 <sup>th</sup> Percentiles based on all seasons data for the Decade	
		Min	Max	P25 <sup>+</sup> all seasons <sup>+</sup>	P75 all seasons
TKN (mg/L)	262	0.025	2.6	0.32	
NO <sub>2</sub> + NO <sub>3</sub> (mg/L)	154	0	0.32	0.003	
TN (mg/L) - calculated	NA	0.25	2.92	0.323	
TN (mg/L) - reported	17	0.17	1.10	0.40	0.77
TP (ug/L)	406	0.5	440	9.69	
Secchi (meters)	581	0.4	7.6	4.2	
Chlorophyll <i>a</i> (ug/L) - F	2	1.38	4.0	1.38	
Chlorophyll <i>a</i> (ug/L) - S	128	0.76	39.03	2.46	
Chlorophyll <i>a</i> (ug/L) - T					



# Total Phosphorus in Reservation Lakes Compared to Federal Criteria



# Comparison of Old Data to New

## Census Data

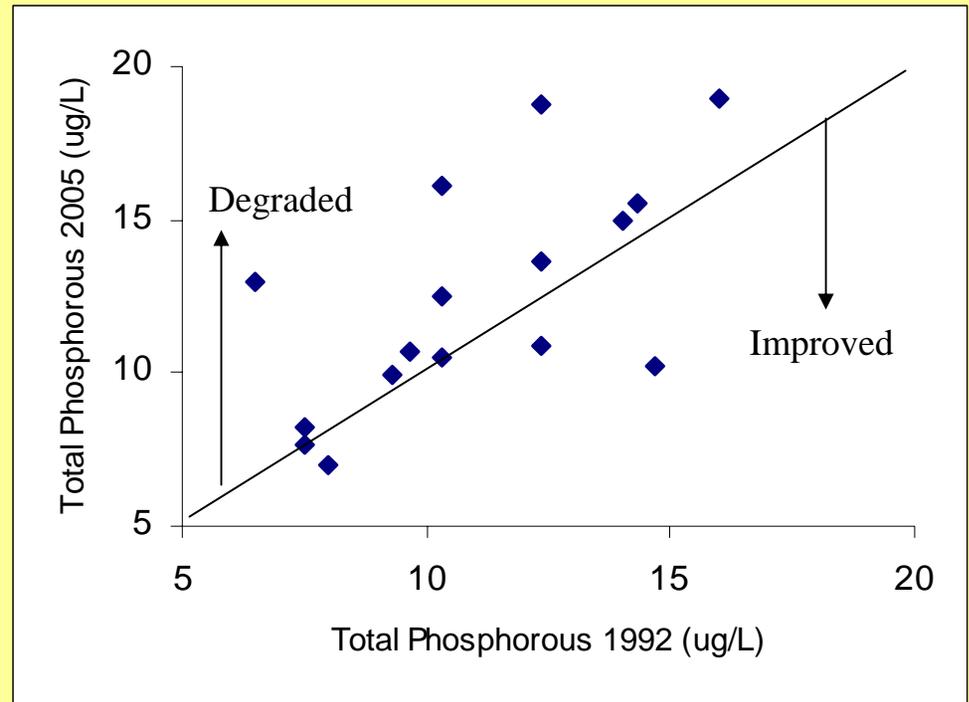
Population

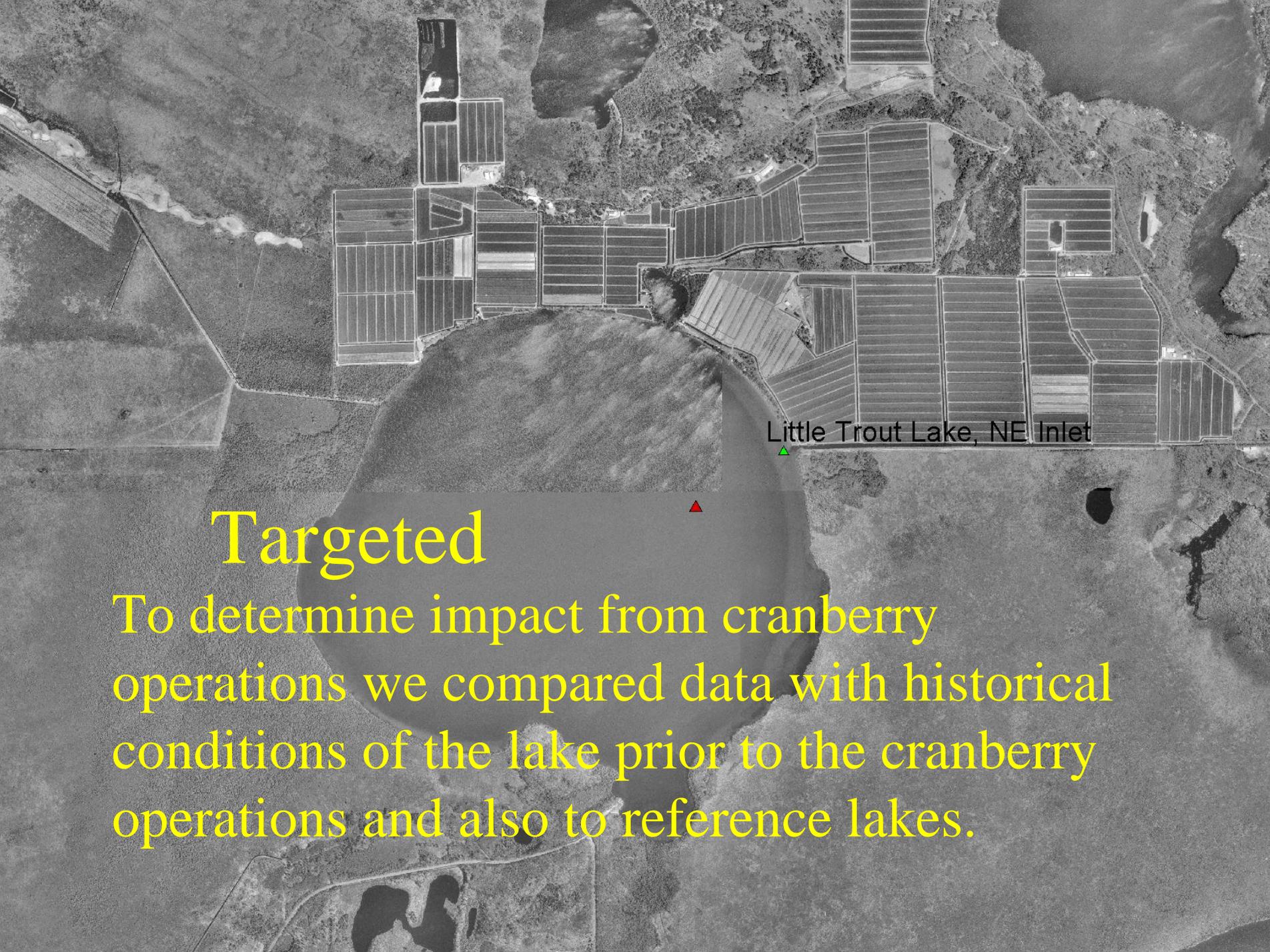
1990-

2434 persons

2000-

2995 persons





Little Trout Lake, NE Inlet

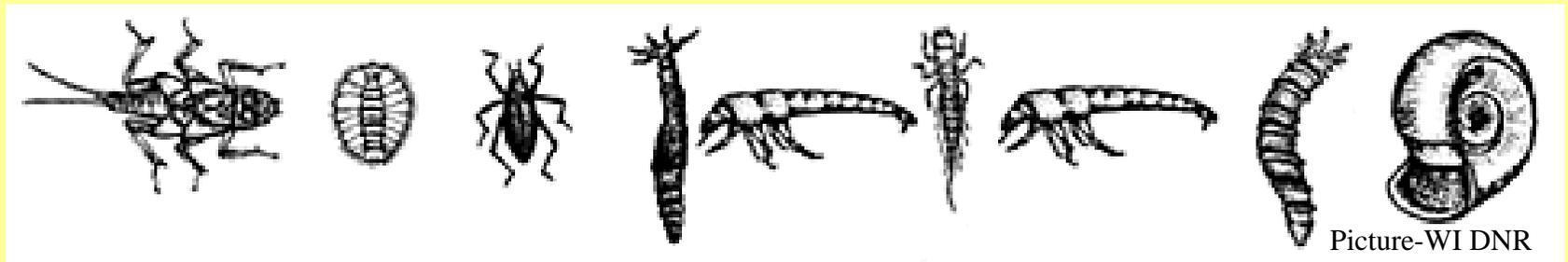
# Targeted

To determine impact from cranberry operations we compared data with historical conditions of the lake prior to the cranberry operations and also to reference lakes.

# Cranberry Operations

## Biological Assessment (Historical)

Macro-invertebrate, diatom, and sponge spicule inventories showed different assemblages before and during cranberry operations indicating the cranberry operations are stressing the lake ecosystem



Snort  
Lake

Lesser Corn  
Lake

Great Corn  
Lake



# Cranberry Operations

## Chemical Assessment (Reference Lake)

Initial sampling of basic parameters organized in an Excel spreadsheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Sample Code	Date	Temp. (C)	D.O. (mg/L)	Cond. (umhos /cm)	pH	Total Alkalinity (mg/L)	Choride (mg/L)	Color	Total Phos. (mg/L)	TSS (mg/L)	Turb. (NTU's)	NO3 +NO2 (mg/L)	TKN (mg/L)	Chloro- phyll a (ug/L)
2	SNTC	7/21/97	24	8.2	44	7.1	14	2.4	42	0.013	3	1.6	0.005	0.5	3
3	SNTC	8/6/97	24.5	8.2	48	7.1	14	2.8	41	0.011	3	1	0.005	0.3	2
4	SNTC	8/21/97	18	7.8	46	6.8	14	2.6	41	0.014	0.5	1.1	0.005	0.1	5
5	SNTC	9/4/97	18.5	7.8	97	7.68	11	2.4	65	0.021	2	1.8	0.005	0.5	2
6	SNTC	10/6/97	12.5	6.2	99	7.4	15	2.9	40	0.014	2	1.4	0.033	0.3	2
7	SNTC	10/20/97	4	3.8	45	6.68	15	2.7	60	0.017	1	1.5	0.001	0.1	2
8	SNTC	11/3/97	2	12.8	44	6.41	14	2.8	84	0.016	2	2.7	0.011	0.4	2
9	GTCC	7/28/97	23	8.2	50	7.65	12	2.1	16	0.008	2	0.8	0.005	0.3	1
10	GTCC	8/6/97	24	8.6	101	7.62	13	2.2	16	0.005	3	1	0.005	0.3	2
11	GTCC	8/21/97	17.5	8.2	48	6.97	13	2.1	16	0.012	1	0.8	0.005	0.1	4
12	GTCC	9/4/97	18.5	7.6	98	7.98	13	3.3	60	0.012	13	2.5	0.005	0.5	10
13	GTCC	10/6/97	11.5	6.4	98	7.4	15	2.8	64	0.013	4	1.9	0.006	0.3	6
14	GTCC	10/20/97	5.6	3.9	4	6.69	17	2.8	85	0.013	2	2.6	0.001	0.1	4
15	GTCC	11/3/97	2.4	12.8	54	6.56	16	2.8	112	0.013	0.5	2	0.008	0.5	7
16	LECC	7/23/97	22.5	8	49	7.71	14	2.7	66	0.014	1	1.2	0.005	0.4	3
17	LECC	8/6/97	22.5	8	49	7.6	12	3	60	0.009	3	1.1	0.005	0.4	2
18	LECC	8/21/97	18	7.4	48	6.88	13	3.1	55	0.013	1	1.2	0.005	0.1	5
19	LECC	9/4/97	18.4	7.2	94	7.66	14	3.1	55	0.011	3	1.4	0.005	0.4	4

# Statistics

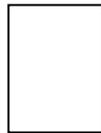
## Average, Standard Deviation, Median, Min/Max, Quartiles

	A	C	D	E	F	H	I	S	
3	Water Body	Date	Time	Temp. (C)	D.O. (mg/L)	pH	Alkalinity	Chloro-phyll a (ug/L)	phy
4	SNORT L.	7/21/97	12:00 PM	24	8.2	7.1	14		3
5	SNORT L.	8/6/97	1:25 PM	24.5	8.2	7.1	14		2
6	SNORT L.	8/21/97	10:00 AM	18	7.8	6.8	14		5
7	SNORT L.	9/4/97	9:30 AM	18.5	7.8	7.68	11		2
8	SNORT L.	10/6/97	9:20 AM	12.5	6.2	7.4	15		2
9	SNORT L.	10/20/97	9:30 AM	4	3.8	6.68	15		2
0	SNORT L.	11/3/97	9:30 AM	2	12.8	6.41	14		2
1	<b>SUM(E24:E30)/7</b>		<b>Ave</b>	<b>14.79</b>	<b>7.83</b>	<b>7.02</b>	<b>13.86</b>	<b>2.57</b>	
2	<b>STDEV(E24:E30)</b>		<b>sd</b>	<b>9.02</b>	<b>2.70</b>	<b>0.43</b>	<b>1.35</b>	<b>1.13</b>	
3	<b>MEDIAN(E24:E30)</b>		<b>median</b>	<b>18</b>	<b>7.8</b>	<b>7.1</b>	<b>14</b>	<b>2</b>	
4	<b>PERCENTILE(E24:E30,0.25)</b>		<b>25</b>	<b>8.25</b>	<b>7</b>	<b>6.74</b>	<b>14</b>	<b>2</b>	
5	<b>MIN(E24:E30)</b>		<b>min</b>	<b>2</b>	<b>3.8</b>	<b>6.41</b>	<b>11</b>	<b>2</b>	
6	<b>MAX(E24:E30)</b>		<b>max</b>	<b>24.5</b>	<b>12.8</b>	<b>7.68</b>	<b>15</b>	<b>5</b>	
7	<b>PERCENTILE(E24:E30,0.75)</b>		<b>75</b>	<b>21.25</b>	<b>8.2</b>	<b>7.25</b>	<b>14.5</b>	<b>2.5</b>	
8	GREAT CORN L.	7/28/97	10:15 AM	23	8.2	7.65	12		1
9	GREAT CORN L.	8/6/97	2:15 PM	24	8.6	7.62	13		2
0	GREAT CORN L.	8/21/97	10:45 AM	17.5	8.2	6.97	13		4
1	GREAT CORN L.	9/4/97	10:10 AM	18.5	7.6	7.98	13		10

MS Excel can do them all for you in the function/statistical section. Just cut copy and paste for each parameter.

# Compare Statistics for Each Parameter

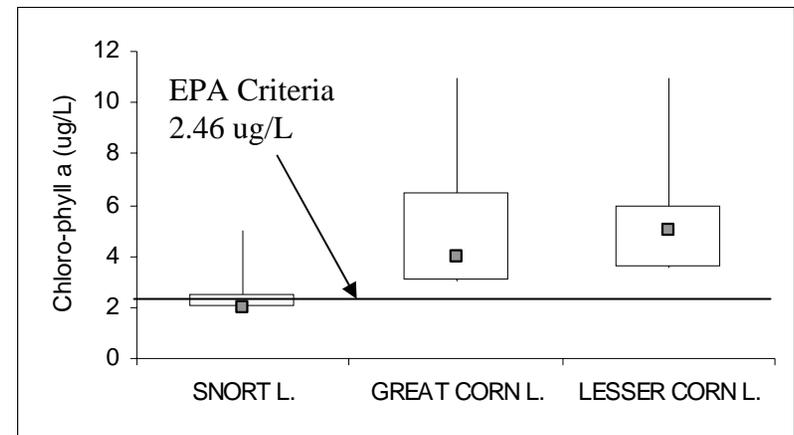
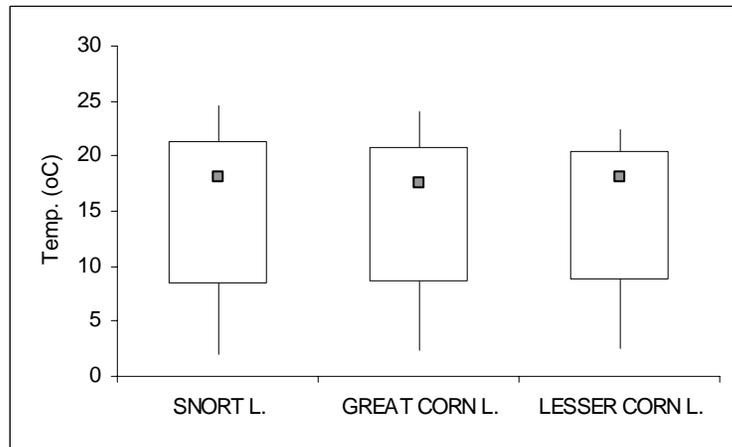
Quartiles



Median



Min/Max



Play with your data!

Next

Previous

Zoom

Print...

Setup...

Margins

Normal View

Close

Help

Table 1 Use Assessment for Reservation Water bodies

<b>WATERBODIES</b>	<b>Outstanding Tribal Resource Water</b>	<b>Stream (miles) or Lake (acreage)</b>	<b>Watershed</b>	<b>Pollutant</b>	<b>Severity</b>	<b>Source</b>
Bear River (1 <sup>st</sup> Bridge to Reservation Boundary)	X	13.23	B		Not Assessed	
Birch Lake		65.19	B		Not Assessed	
Black Lake	X	43.84	B		Not Assessed	
Bobidosh Lake		46.51	B		Fully Supporting	
Bolton Lake		140.58	B	P	Slight	Household runoff
Chewalah Lake		35.20	B		Not Assessed	
Crawling Stone Lake, Big		1506.41	B	Hg	Fully Supporting (P) High (Hg)	Atmospheric
Crawling Stone Lake, Little		114.46	B	P	Slight	Household runoff
Crooked Lake, Big		398.25	B	Hg	Fully Supporting (P) High (Hg)	Atmospheric
Doud Lake	X	20.59	B		Not Assessed	
Eagle Lake	X	18.08	B		Not Assessed	
Fat Lake		100.40	B	P	Slight	Resort runoff
Fence Lake		3487.29	B	Hg	Fully Supporting (P) High (Hg)	Atmospheric
Flambeau Lake		1173.84	B		Fully Supporting	

# Overview

- Determine designated uses (goals)
- Baseline inventory
- Identify stressor – Targeted
- Organize data
- Compare data to standards
- Compare data to historical and reference conditions
- Tell the story