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

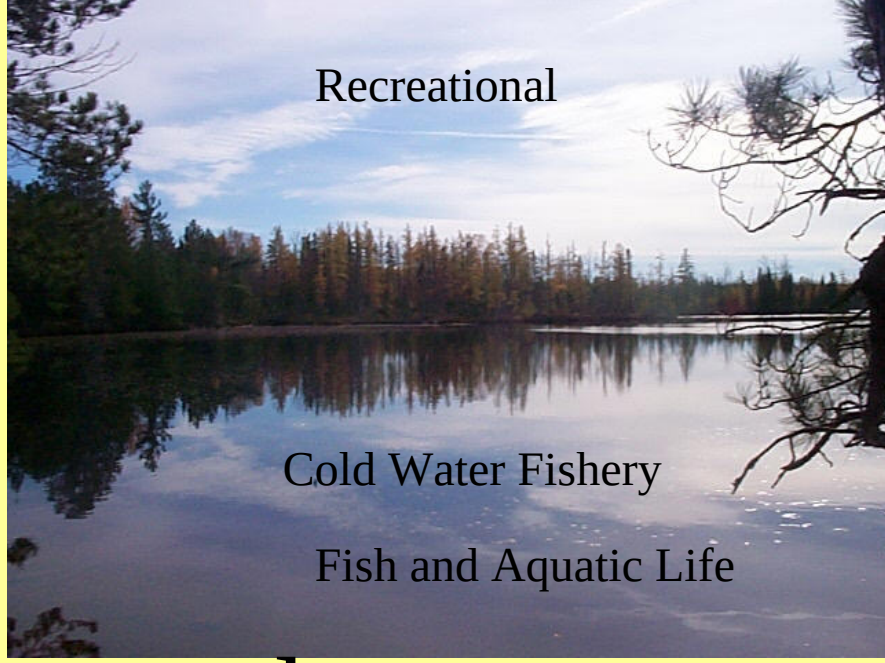
Lac du Flambeau-
Lake of the Flaming Torches

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

Designated Uses



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

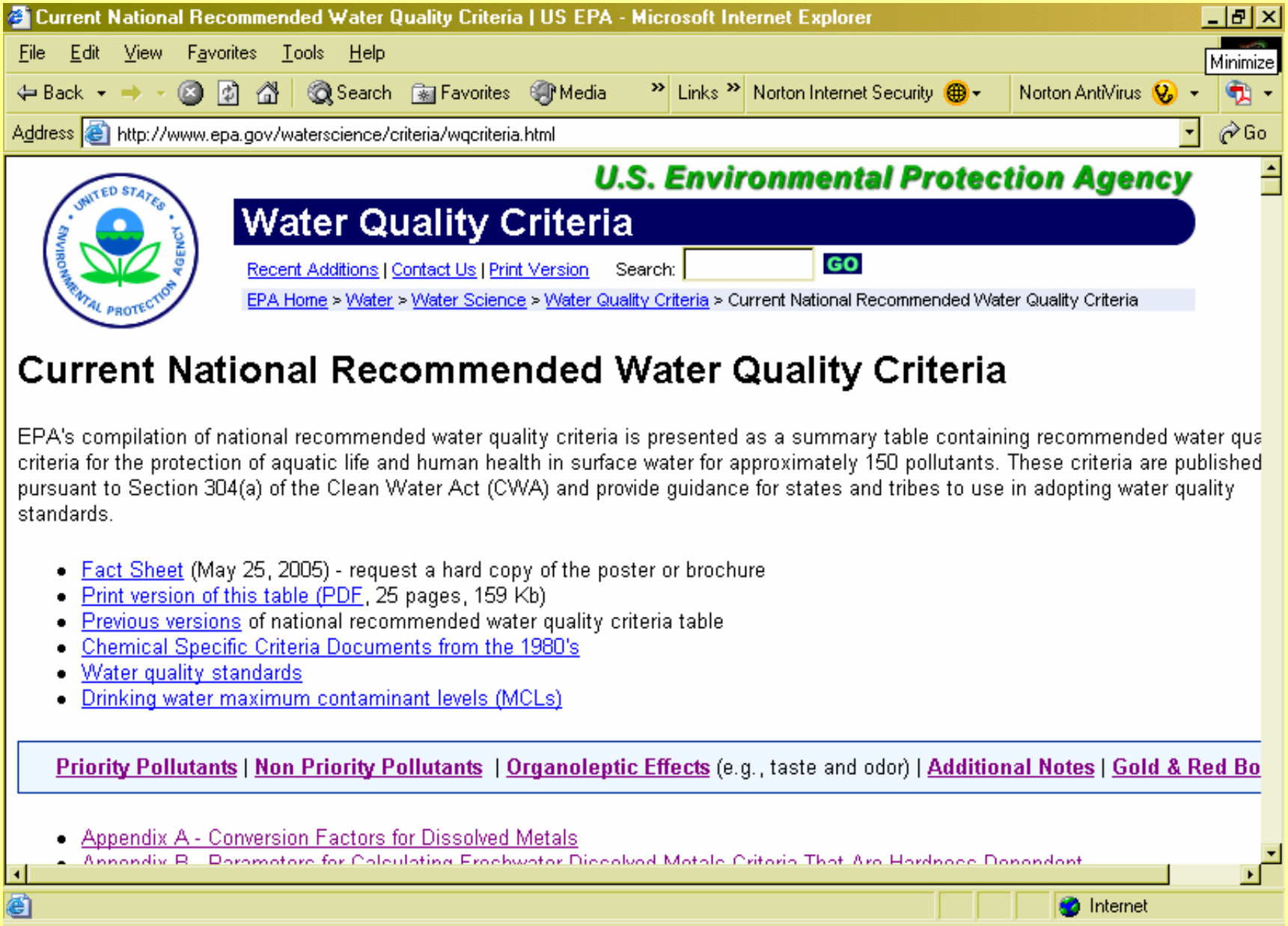
Tribal Water Quality Standards

Federal Recommended Criteria

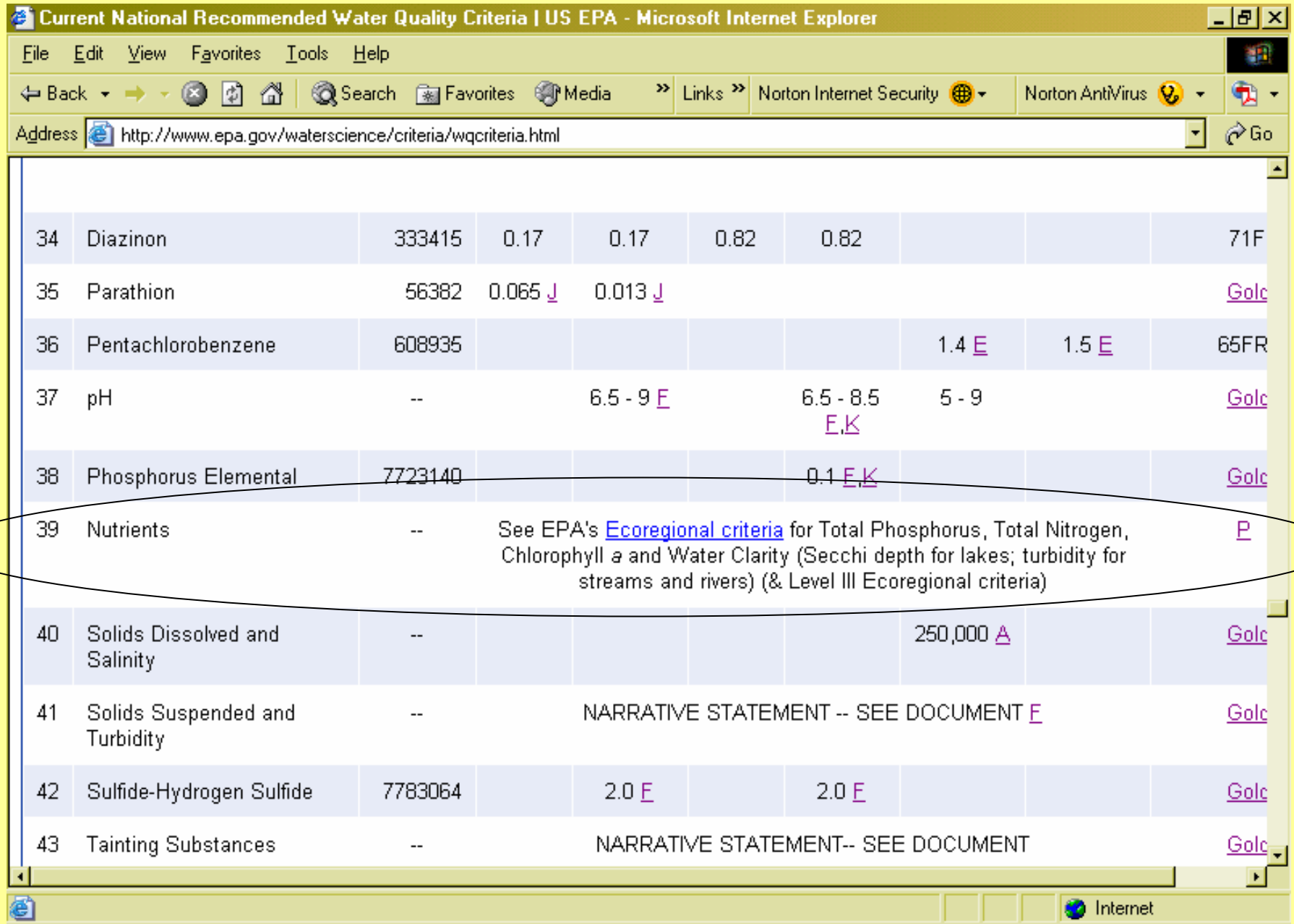
State Water Quality Standards

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

Comparing to Federal Criteria



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



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

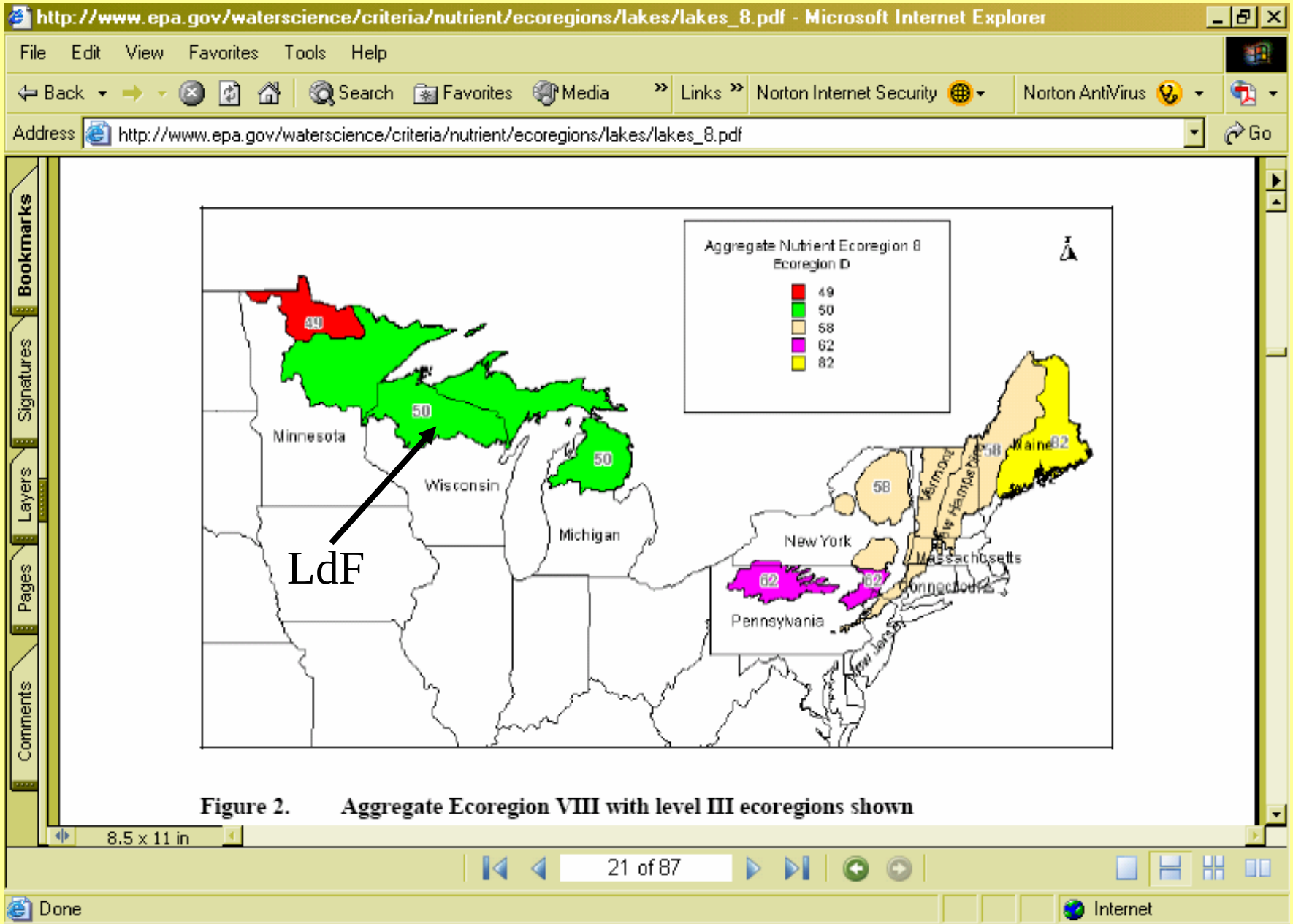
We published 17 ecoregional nutrient criteria documents for lakes and reservoirs, rivers and streams, and wetlands. See below for documents.

- 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.

Chose your Ecoregion and Subecoregion

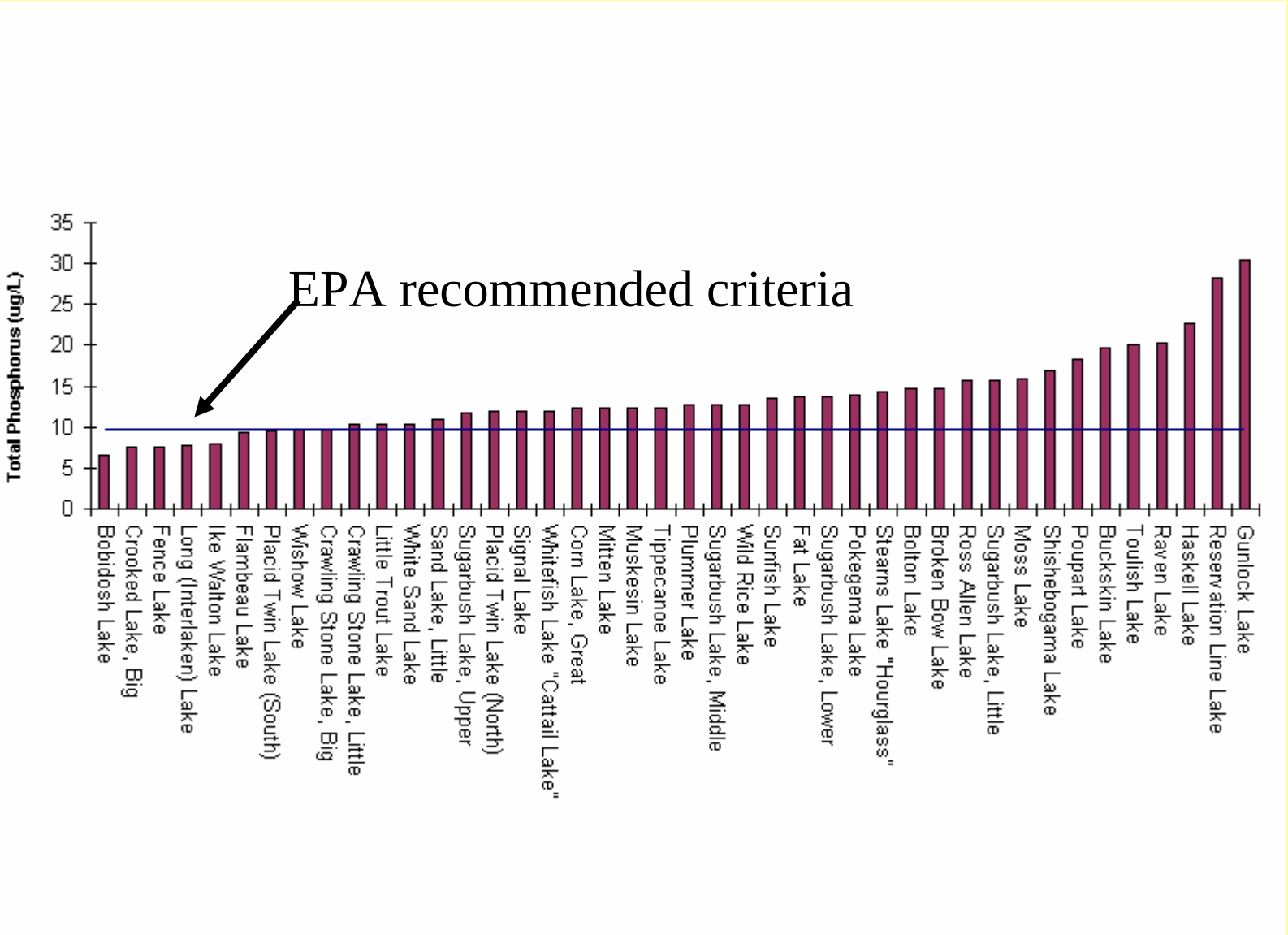


Chlorophyll *a* (ug/L) - S	21	1.13	8.85	2.70	
Chlorophyll *a* (ug/L) - T					

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

Parameter	No. of Lakes N ++	Reported values Min	Reported values Max	25th Percentiles based on all seasons data for the Decade P25+ all seasons +	Reference Lakes ** P75 all seasons
TKN (mg/L)	262	0.025	2.6	0.32	
NO2 + NO3 (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	1.16	0.49 zz	
TP (ug/L)	406	0.5	440	9.69	
Secchi (meters)	581	0.4	7.6	4.2	
Chlorophyll *a* (ug/L) - F	2	1.38	4.0	1.38	
Chlorophyll *a* (ug/L) - S	128	0.76	39.03	2.46	
Chlorophyll *a* (ug/L) - T					

Total Phosphorus in Reservation Lakes Compared to Federal Criteria



Comparison of Old Data to New

<u>Census Data</u>

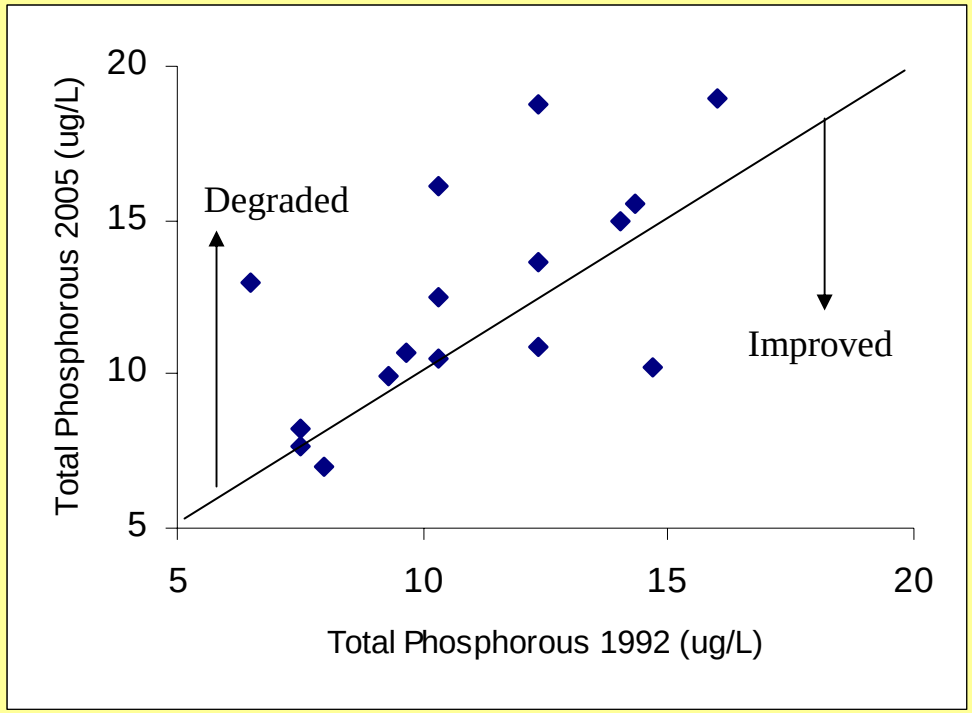
Population

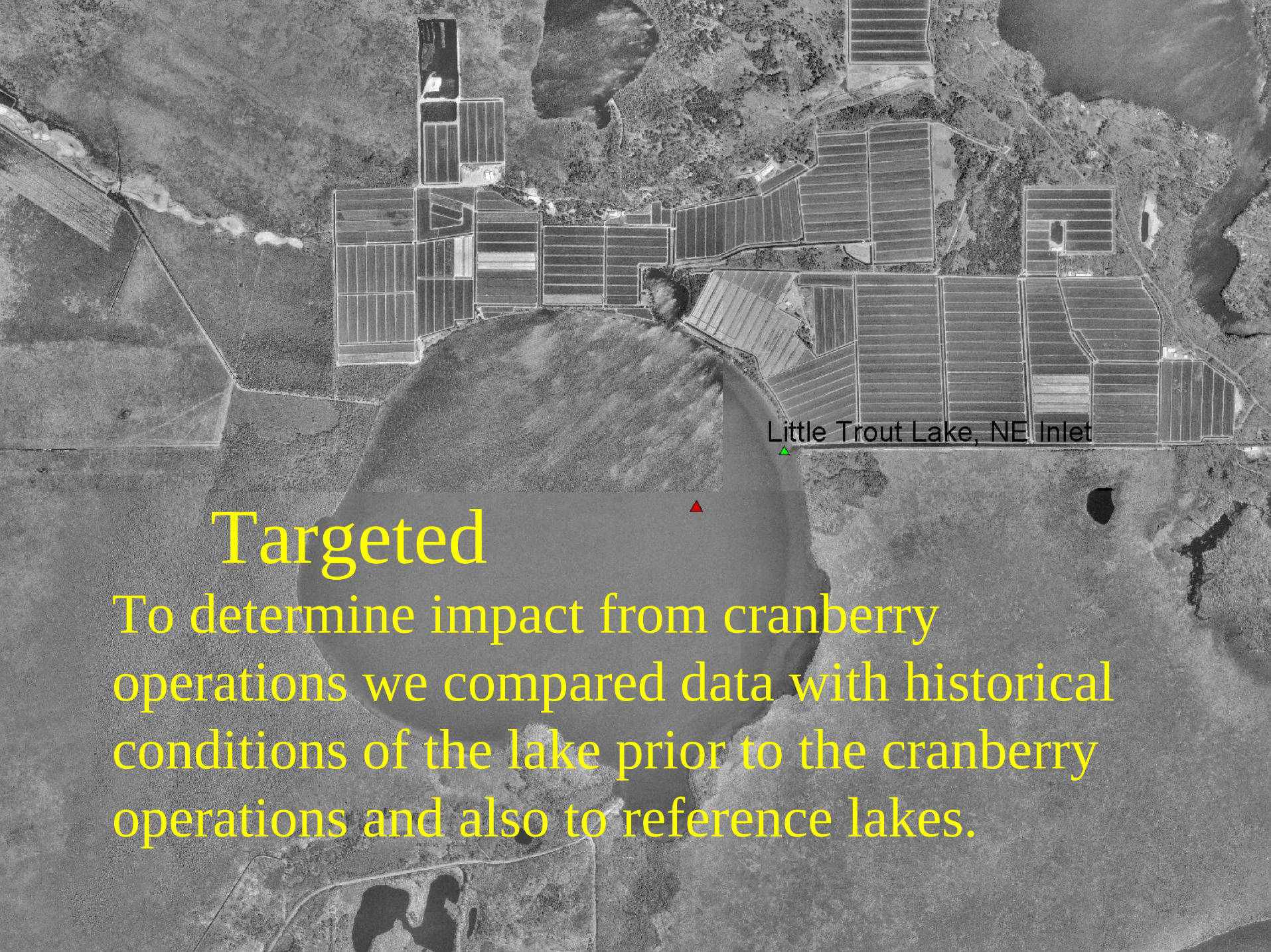
1990-

2434 persons

2000-

2995 persons





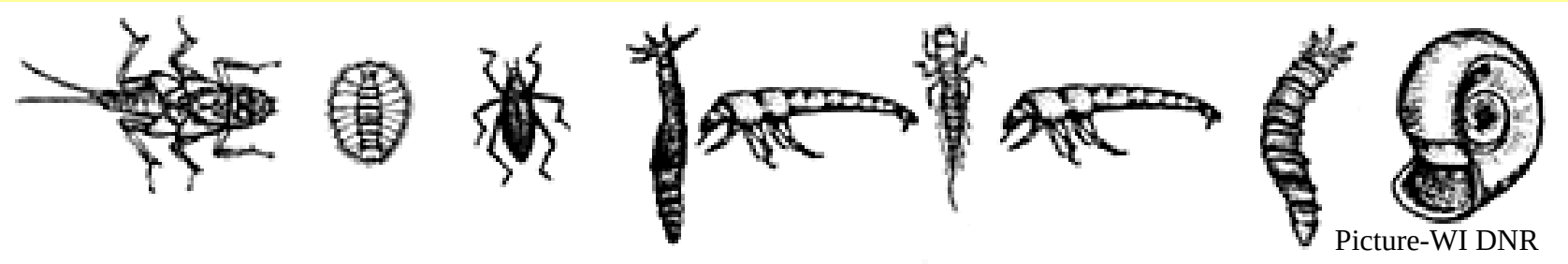
Targeted

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



Picture-WI DNR


Lesser Corn Lake
Snort 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

Sheet1 Sheet4 Sheet2 Sheet3

Statistics

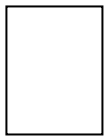
Average, Standard Deviation, Median, Min/Max, Quartiles

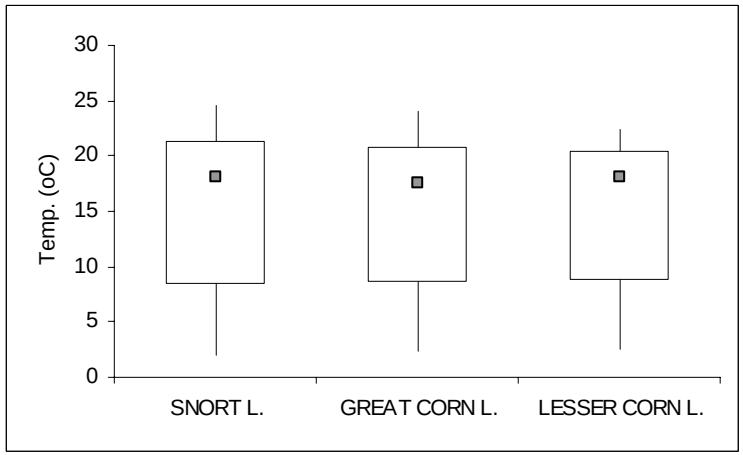
	A	C	D	E	F	H	I	S	
3	Water Body	Date	Time	Temp. (C)	D.O. (mg/L)	pH	Alkalinity	Chloro-phyll a (ug/L)	phy
4	SNORT L.	7/21/97	12:00 PM	24	8.2	7.1	14	3	
5	SNORT L.	8/6/97	1:25 PM	24.5	8.2	7.1	14	2	
6	SNORT L.	8/21/97	10:00 AM	18	7.8	6.8	14	5	
7	SNORT L.	9/4/97	9:30 AM	18.5	7.8	7.68	11	2	
8	SNORT L.	10/6/97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

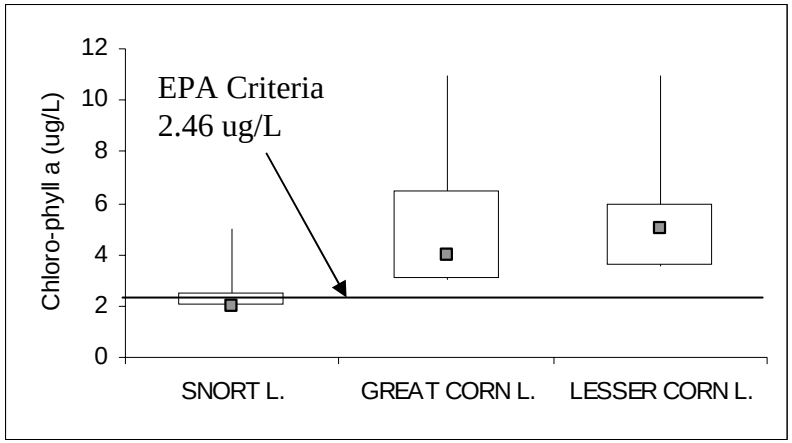
Sheet1 | **Sheet4** | Sheet2 | Sheet3

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!

Table 1 Use Assessment for Reservation Water bodies

WATERBODIES	Outstanding Tribal Resource Water	Strem (miles) or Lake (acrage)	Watershed	Pollutant	Severity	Source
Bear River (1st 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			

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