

February 2012

Water Fact Sheet 2012-3

# IOWA'S WATER

## Ambient Monitoring Program

### Lake Water Quality Summary 2000-2011

Water Quality Parameter	Units	Number of Samples	Min Value	Percentiles					Max Value
				10th	25th	50th	75th	90th	
Ammonia <sup>(1)</sup>	mg/L	4,245	<0.15	<0.15	<0.15	<0.15	<0.15	0.23	1.7
Alkalinity (as CaCO <sub>3</sub> )	mg/L	5,790	15	87	108	137	175	203	316
Chlorophyll a	µg/L	5,653	<5.0	<5.0	9.8	25	49.9	93.5	743
Dissolved Organic Carbon <sup>(2)</sup>	mg/L	2,929	<7.6	<7.6	<7.6	<7.6	8.3	11.1	56.6
Dissolved Oxygen	mg/L	5,656	0.1	5.8	7.2	8.7	10.4	12.6	30.2
Inorganic Suspended Solids	mg/L	5,558	<5.0	<5.0	<5.0	<5.0	9	17.8	378
Lake Depth	m	5,794	0.7	2.4	3.9	5.6	7.7	11.5	42.8
Nitrate + Nitrite (as N)	mg/L	5,761	<0.58	<0.58	<0.58	<0.58	0.95	4.6	19.2
Orthophosphate (as P) <sup>(2)</sup>	mg/L	5,025	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.72
pH		5,735	6.6	7.9	8.2	8.5	8.7	9.1	10.8
Phytoplankton Wet Mass	mg/L	5,114	<1	3	9	24	63	187	21,502
Secchi Depth	m	5,797	0.1	0.3	0.5	0.8	1.4	2.7	9.6
Silica <sup>(3)</sup>	mg/L	3,297	<1.0	1.1	2.1	4.3	8.2	14	280
Specific Conductance	µmhos/cm	5,755	56	224	276	361	470	573	1,361
Temperature	°C	5,775	7	17.1	20.9	24.3	26.5	28	33.8
Thermocline Depth	m	5,531	NIL	NIL	NIL	2	3.5	5	17
Total Dissolved Solids <sup>(4)</sup>	mg/L	1,766	6	143	180	217	300	348	529
Total Kjeldahl Nitrogen <sup>(5)</sup>	mg/L	2,546	<0.5	<0.5	0.8	1.2	1.8	2.5	14
Total Nitrogen	mg/L	3,250	<1.38	<1.38	<1.38	1.5	2.5	6.1	20.6
Total Organic Carbon <sup>(4)</sup>	mg/L	1,706	<0.5	5.2	6.8	8.7	11	15	135
Total Phosphorus (as P)	mg/L	5,807	<0.02	0.03	0.05	0.08	0.14	0.23	2.8
Total Suspended Solids	mg/L	5,763	<6.0	<6.0	6.2	11.4	20	35	452
Turbidity	NTU	5,707	<0.3	3.8	8	17	34.3	65.9	2,333

µg/L – micrograms per liter (parts per billion)

mg/L – milligrams per liter (parts per million)

µmhos/cm – micromhos per centimeter

NTU – Nephelometric Turbidity Units; m – meters

< – less than detection limit shown

(1) Sampling began in 2004; (2) Sampling began in 2002

(3) Sampling discontinued in 2009

(4) Sampling occurred from 2005-2008

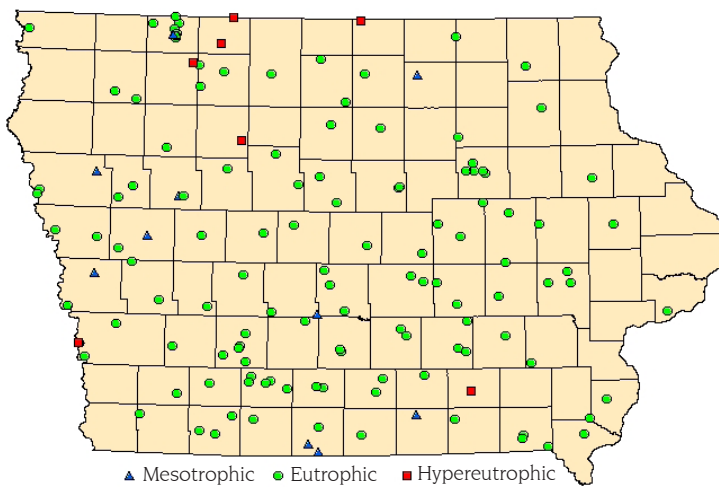
(5) Sampling began in 2005

Note: This summary only includes the lakes monitored as part of the ambient lake monitoring program. 132 lakes were sampled in 2008; 131 lakes in 2000, 2003, 2005; 130 lakes in 2001, 2002, 2006, 2009, 2011; 129 lakes in 2007 and 2010; 127 lakes in 2004. Additional lake sites throughout Iowa are also monitored, but are not included in this summary since their sampling frequency, sites, and parameters vary from the fixed network.

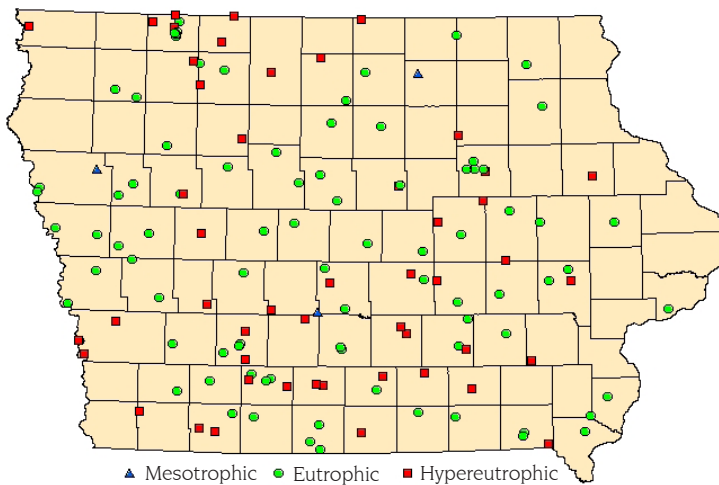
Raw data available through STORET: <https://programs.iowadnr.gov/iastoret/>

## Carlson's Trophic State Index Values for 2000-2011

The large amount of water quality data collected by the ambient lake monitoring program can be difficult to evaluate. A trophic state index (TSI) is a useful way to analyze the data collected. A TSI condenses water quality data into a single, numerical index. The most widely used and accepted TSI, called the Carlson TSI, was developed by Bob Carlson (1977). Carlson TSI values range from 0 to 100. The Carlson TSI values can be used to divide lakes into four main lake productivity categories (amount of biological activity or relative nutrient richness): oligotrophic (least productive), mesotrophic (moderately productive), eutrophic (very productive), and hypereutrophic (extremely productive). Mesotrophic lakes, for example, generally have a good balance between water quality and algae/fish production. Eutrophic lakes have less desirable water quality and can have an overabundance of algae. Hypereutrophic lakes have poor water quality and experience frequent algae blooms. For 2000-2011, based on the average chlorophyll a TSI value for each lake, 10 lakes were mesotrophic, 121 lakes were eutrophic, and 7 lakes were hypereutrophic. For 2000-2011, based on the average total phosphorus TSI value for each lake, 3 lakes were mesotrophic, 86 lakes were eutrophic, and 49 lakes were hypereutrophic.



**Figure 1.** Average Carlson Trophic State Index (TSI) scores for chlorophyll a based on data from 2000 through 2011.



**Figure 2.** Average Carlson Trophic State Index (TSI) scores for total phosphorus based on data from 2000 through 2011.

### References

Carlson, Robert E., 1977, A Trophic State Index for Lakes, *Limnology and Oceanography*, Vol. 22, No. 2 (Mar., 1977), p. 361-369.



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