~ 20 year Water Quality Trends

For detecting trends, a minimum of 8-10 years of data with 4 or more readings per season are recommended. Minimum probabilty accepted by the MPCA is 90%. This means that there is a 90% chance that the data are showing a true trend and a 10% chance that the trend is a random result of the data. Only short-term trends can be determined with just a few years of data, because there can be different wet years and dry years, water levels, weather, etc., that affect the water quality naturally.

There is a good amount of data available for Hubbard COLA lakes. Most lakes had enough data for trend analysis for total phosphorus (TP), chlorophyll a (CHLA) and Transparency (Tables 4-7). The data was analyzed using the Mann Kendall Trend Analysis.

Table 4. Hubbard COLA Lakes with improving water quality trends (TP=Total phosphorus, CHLA= Chlorophyll a, Secchi=Transparency).

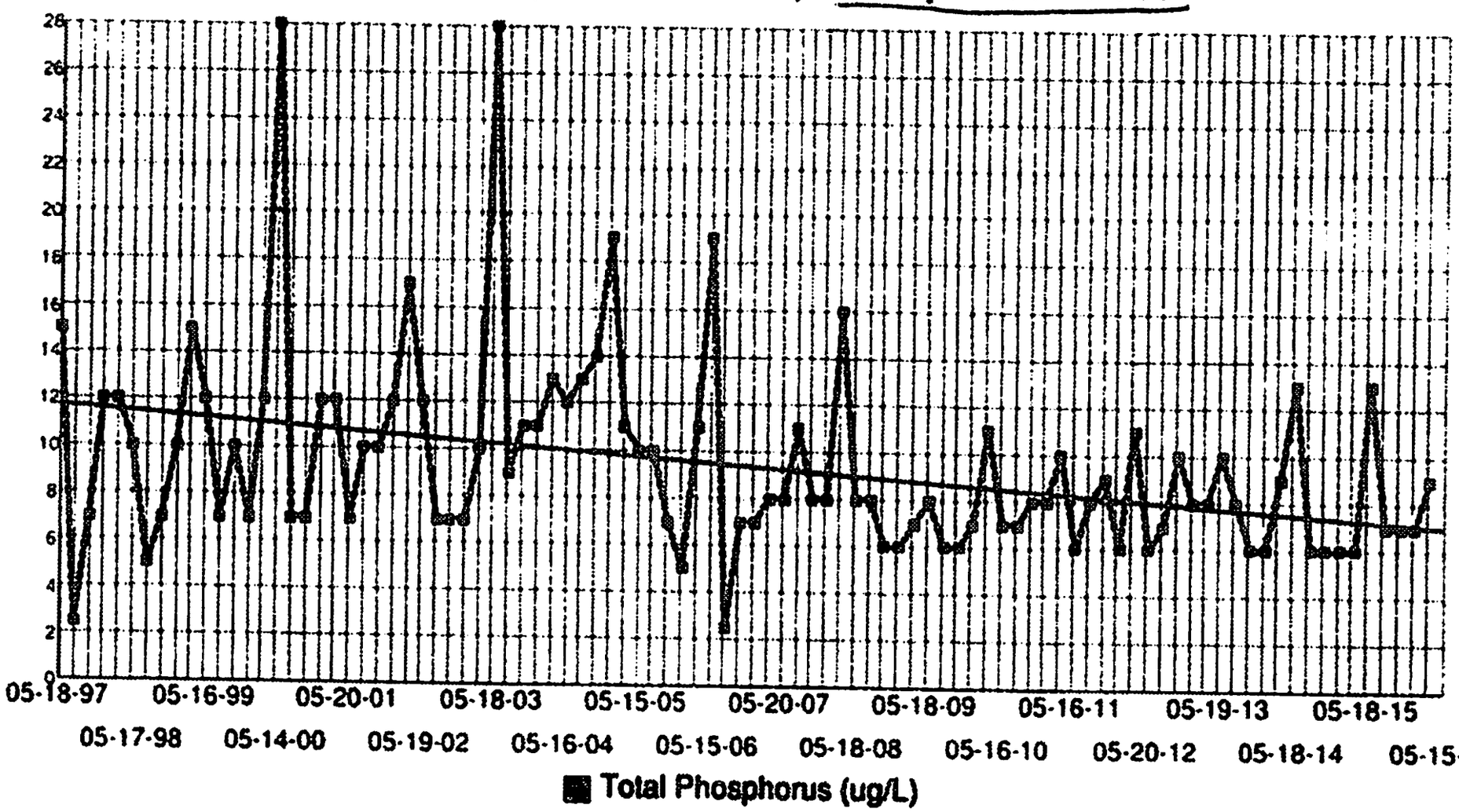
Lake	Parameter	Date Range	Trend	Probability
Little Sand	Secchi	1987-2011	Improving	99.9%
	TP	1997-2011	Improving	99%
	CHLA	1997-2011	No trend	-
Big Sand	Secchi	1994-2011	Improving	99%
	TP	1998-2011	Improving	95%
	CHLA	1998-2011	No trend	
Emma	TP	1999-2011	Improving	90%
	CHLA	1999-2011	No trend	-
	Secchi	Insufficient data	-	-
Eagle	Secchi	1997-2011	Improving	95%
	TP, CHLA	1997-2011	No trend	
Hinds	Secchi	1994-2003, 2006-2011	Improving	95%
	TP, CHLA	1997-2000, 2002-2004, 2006-2011	No trend	
Kabekona	Secchi	2000-2011	Improving	95%
	Secchi	1995-2011	No trend	-
	TP, CHLA	1994,1997-2010	No trend	-
Potato	Secchi	1990-2011	Improving	95%
	TP, CHLA	1997-2011	No trend	-
Stocking	Secchi	1995-2011	Improving	99%
	TP, CHLA	1997-2011	No trend	-

Trend Analysis Report

County	MN Lake ID	Lake	Site	Data Evaluated	Date Range	Data Source
Hubbard	29-0150-00	Little Sand	204	Phosophorus	05-18-1997 - 05-15-2016	RMB

Total Phosphorus concentration is decreasing,
which indicates improving water quality (99% confidence)

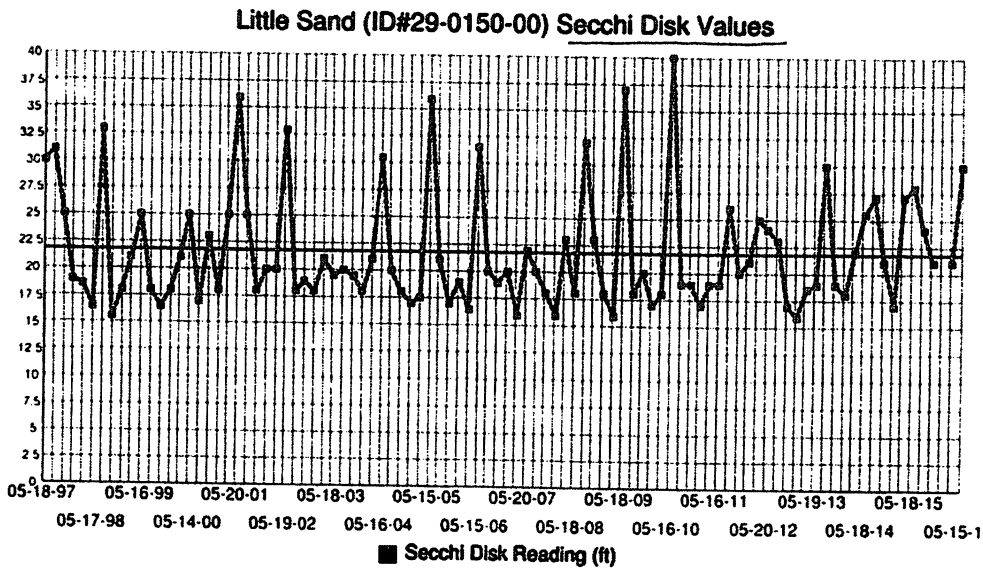
Little Sand (ID#29-0150-00) Phosophorus Values



Trend Analysis Report

County	MN Lake ID	Lake	Site	Data Evaluated	Date Range	Data Source
Hubbard	29-0150-00	Little Sand	204	Secchi Disk	05-18-1997 - 05-15-2016	RMB

No significant trend exists.



Trend Analysis Report

County	MN Lake ID	Lake	Site	Data Evaluated	Date Range	Data Source
Hubbard	29-0150-00	Little Sand	204	Chlorophyll_a	05-18-1997 - 05-15-2016	RMB

No significant trend exists.