Elm Creek Watershed Management Commission
Lake Water Quality Summaries
2014

Introduction

In 2014 Elm Creek Watershed Commission contracted with Three Rivers Park District to monitor the water quality in Fish Lake, Weaver Lake, the main basin of Rice Lake, Diamond Lake, and the Champlin Mill Pond.

These lakes were sampled biweekly from late April through late October. The seasonal and annual changes in water quality parameters were monitored for total phosphorus, soluble reactive phosphorus, total nitrogen, chlorophyll-a, and secchi depth transparency. To assess changes in water quality trophic conditions, annual growing season averages were calculated for total phosphorus, chlorophyll-a, and secchi depth transparency using data collected from May through September. The annual average for each trophic assessment parameter was compared to the MPCA state nutrient standards used for determination of recreational use impairment (see table below). The MPCA's assessment for water body impairments are based on a conservative average that is estimated from data collected from June through September. Lake "report cards" provide an assessment of overall trophic condition during the time period of primary recreational use (growing season from May through September), compared to MPCA state standards as a reference point.

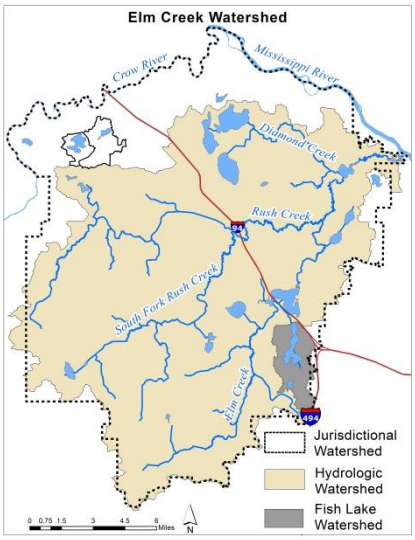
Minnesota Pollution Control Agency lake eutrophication standards for aquatic recreational use assessments.

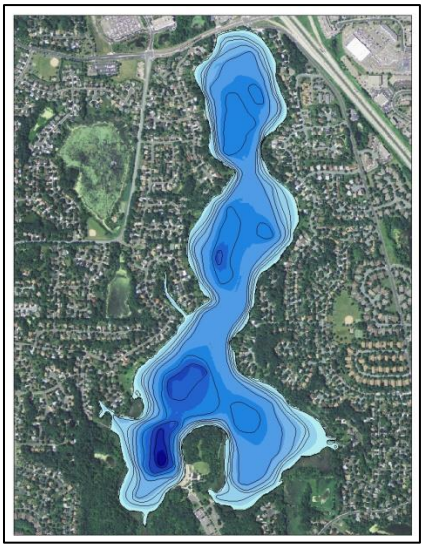
North Central Hardwood Forest Ecoregion			
Classification	**TP µg/L**	**Chl-a µg/L**	**Secchi m**
Aquatic Recreation Use (Class 2b) Deep Lakes	< 40	< 14	> 1.4
Aquatic Recreation Use (Class 2b) Shallow Lakes	< 60	< 20	> 1.0

Note: ***Deep Lakes*** *are enclosed basins filled or partially filled with fresh water that have a maximum depth > 15 feet.* ***Shallow Lakes*** *are enclosed basins filled or partially filled with fresh water that have a maximum depth < 15 feet or a littoral zone (area shallow enough to support emergent and submerged vegetation) that is ≥ 80% of the lake surface area.*

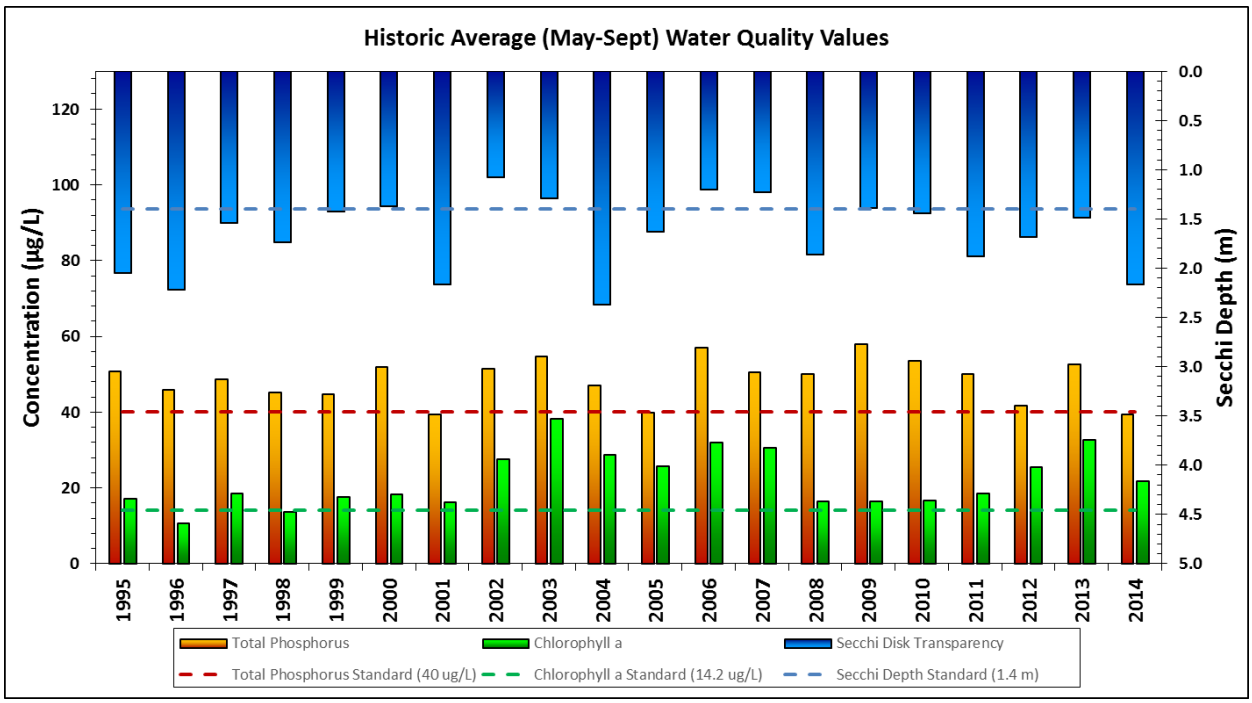
The report cards for these lakes are contained within this appendix and will be uploaded to the Commission's website, www.elmcreekwatershed.org, under the Water Quality tab. Report cards for the other lakes in the watershed are also being developed and will appear on the same site.

Fish Lake

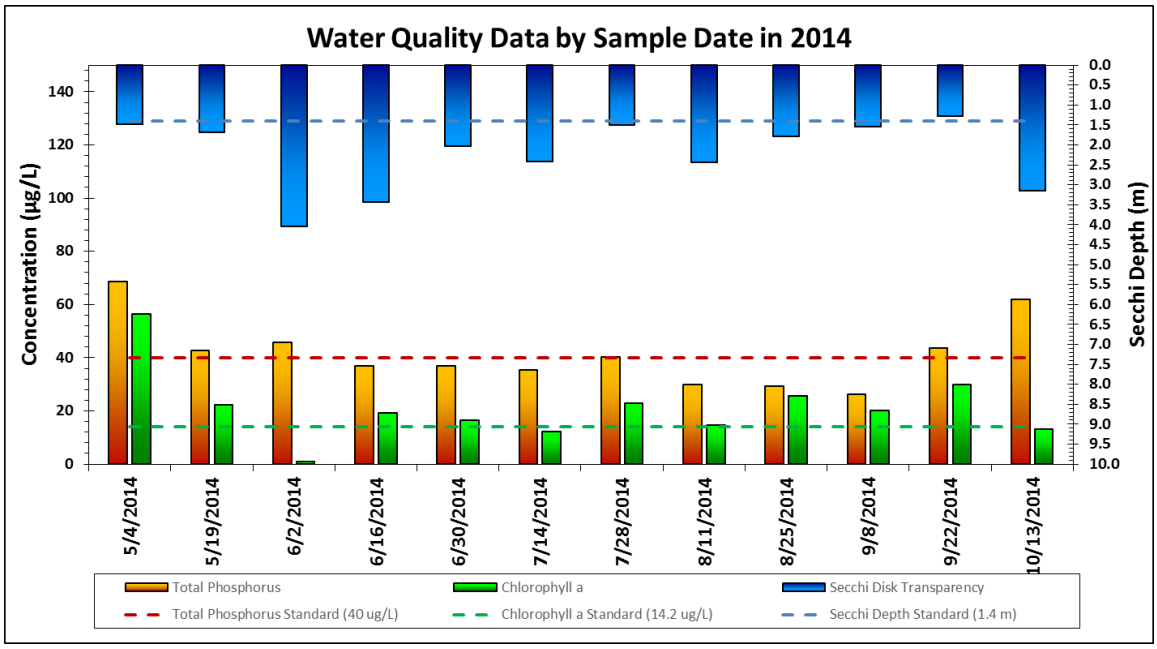


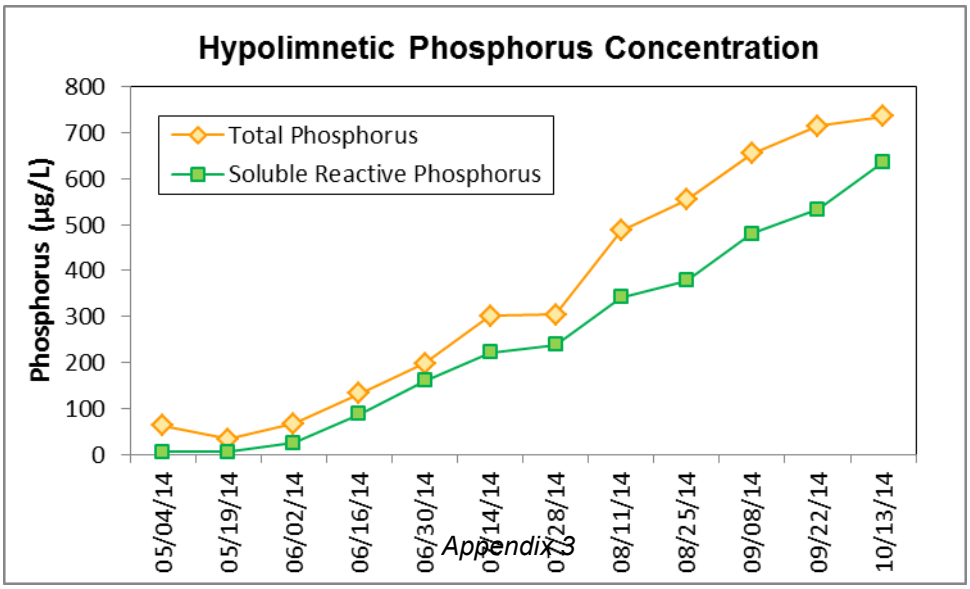


Lake and Watershed Characteristics	
DNR #	27011800
Watershed Area	1611 Acres
Lake Area	232.1 Acres
% Littoral Area	32%
Average Depth	20.5 ft
Maximum Depth	62.0 ft
Watershed/Lake Area Ratio	6.9 to 1
Hydraulic Residence Time	4.6 Years
Impairment	Excessive Nutrients 2008
Classification	Deep Lake

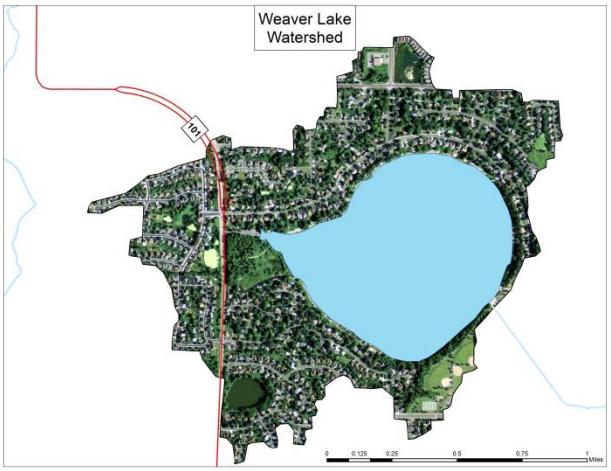


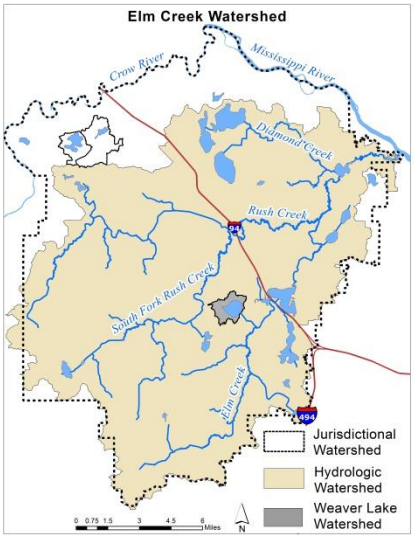
Fish Lake Water Quality Report Card				
Year	TP	Chl-a	Secchi	Avg Grade
1995	C	B	B	B
1996	C	B	B	B
1997	C	B	C	C+
1998	C	B	C	C+
1999	C	B	C	C+
2000	C	B	C	C+
2001	C	B	C	C+
2002	C	C	D	B
2003	C	C	C	C
2004	C	C	B	C+
2005	C	C	C	C
2006	C	C	D	C
2007	C	C	C	C
2008	C	B	C	C+
2009	C	B	C	C+
2010	C	B	C	C+
2011	C	B	C	C+
2012	C	C	C	C
2013	C	C	C	C
2014	C	C	C	C

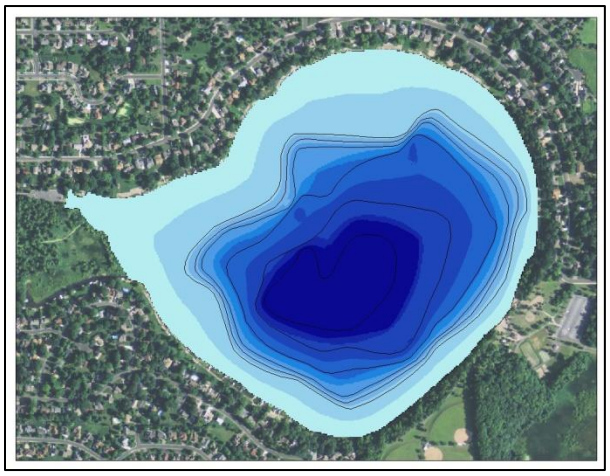




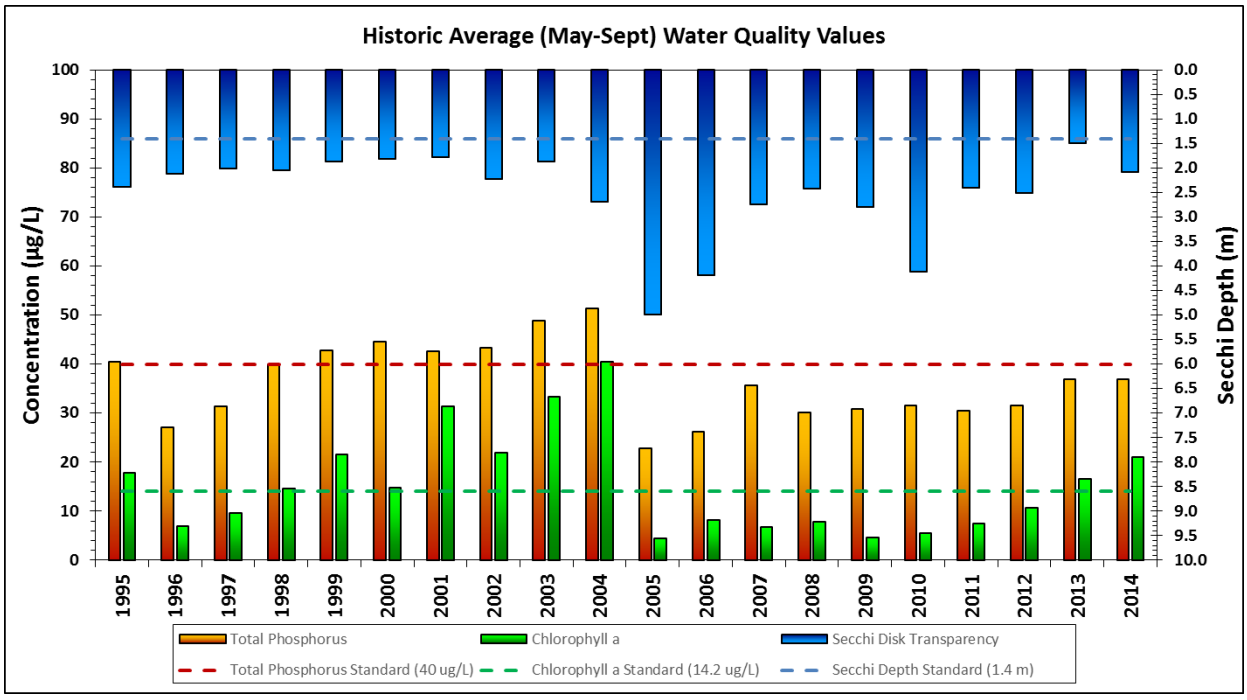
Weaver Lake





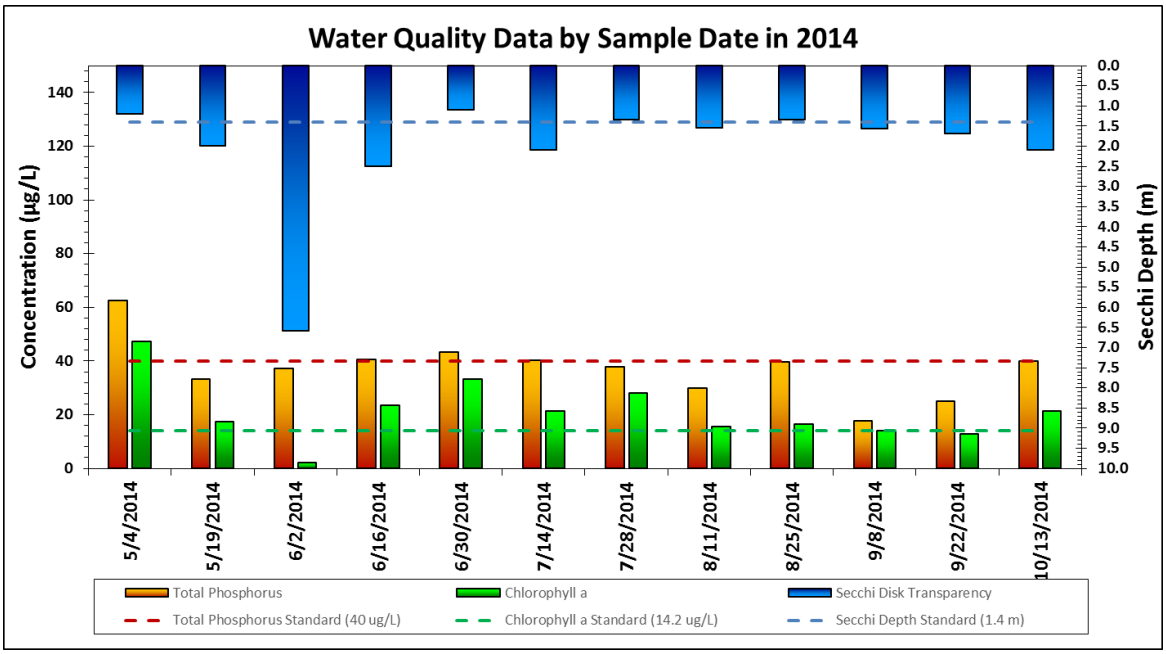


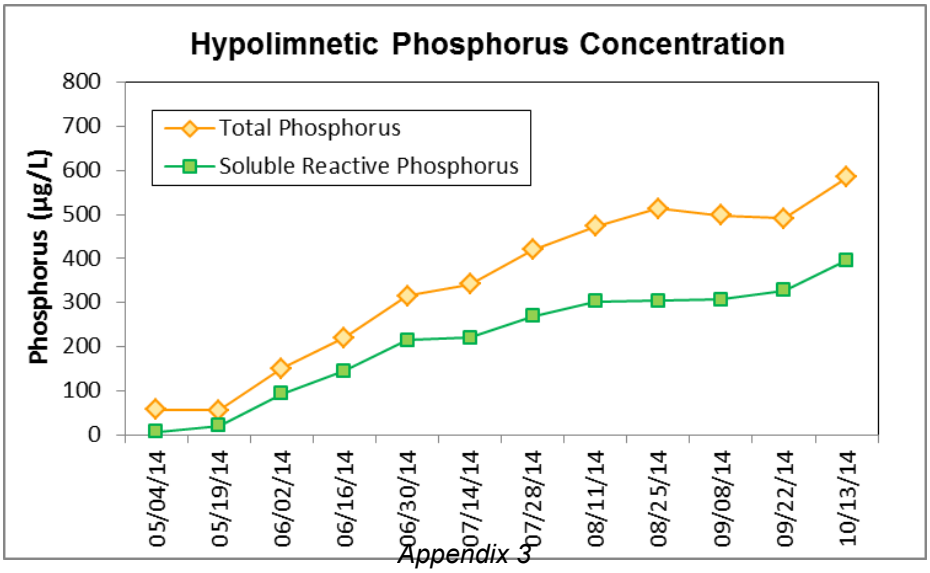
Lake and Watershed Characteristics	
DNR #	27011700
Watershed Area	187 Acres
Lake Area	149.5 Acres
% Littoral Area	47%
Average Depth	21.1 ft
Maximum Depth	52.0 ft
Watershed/Lake Area Ratio	1.3 to 1
Hydraulic Residence Time	13 Years
Impairment	None
Classification	Deep Lake



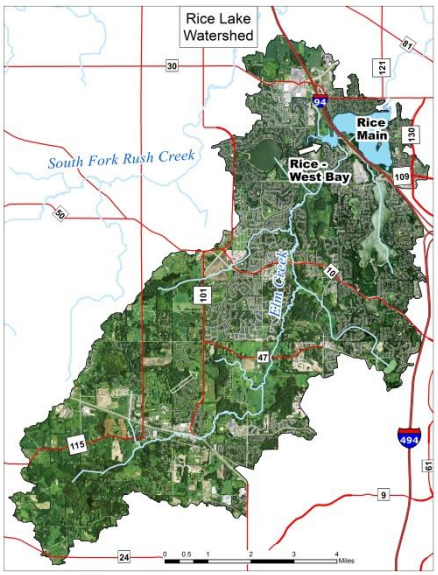
Weaver Lake Water Quality Report Card				
Year	TP	Chl-a	Secchi	Avg Grade
1995	C	B	B	B
1996	B	A	C	B
1997	B	A	C	B
1998	C	B	C	C+
1999	C	C	C	C
2000	C	B	C	C+
2001	C	C	C	C
2002	C	C	B	C+
2003	C	C	C	C
2004	C	C	B	C+
2005	A	A	A	A
2006	B	A	A	A
2007	C	A	B	B
2008	B	A	B	B+
2009	B	A	B	B+
2010	B	A	A	A
2011	B	A	B	B+
2012	B	A	B	B+
2013	C	B	C	C+
2014	C	C	C	C
MPCA Standard	C	B	C	C+

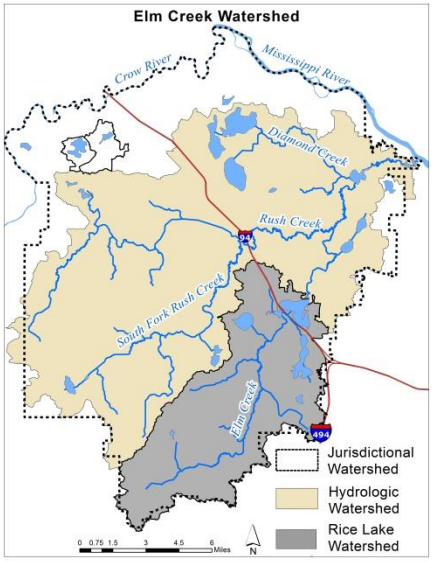
Metropolitan Council Grading System (Osgood 1989)

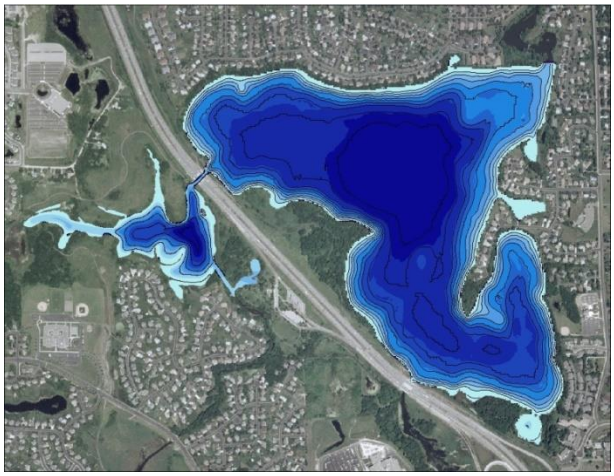




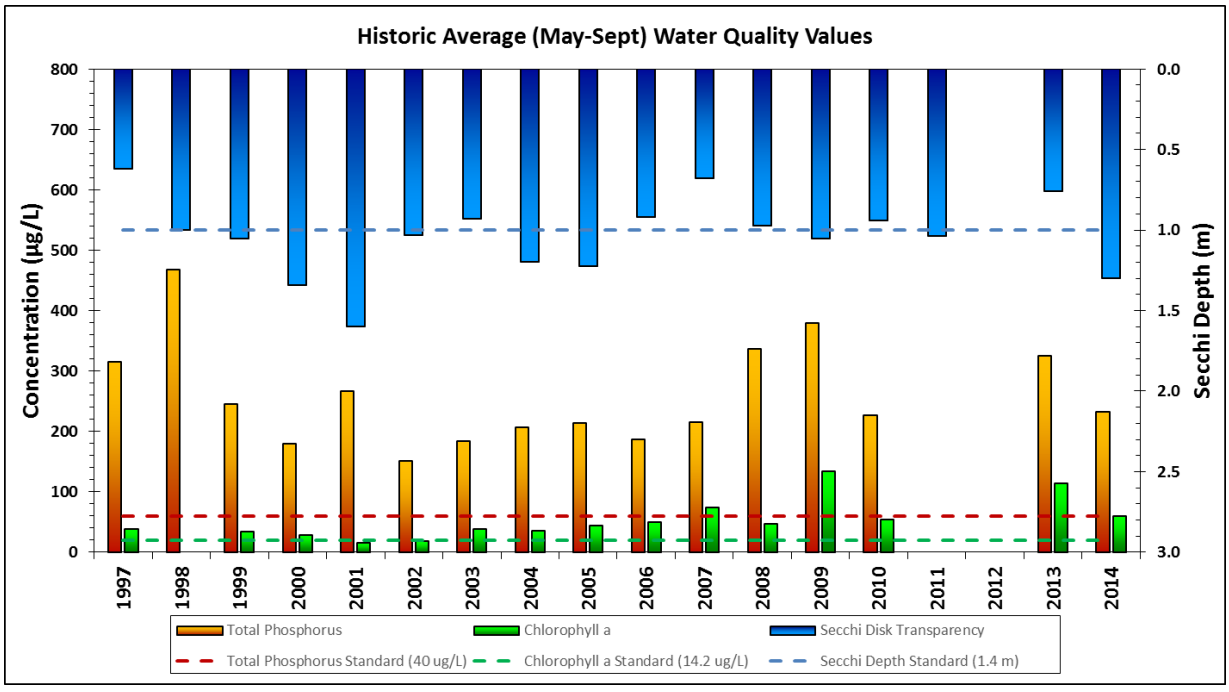
Rice Lake-Main Basin





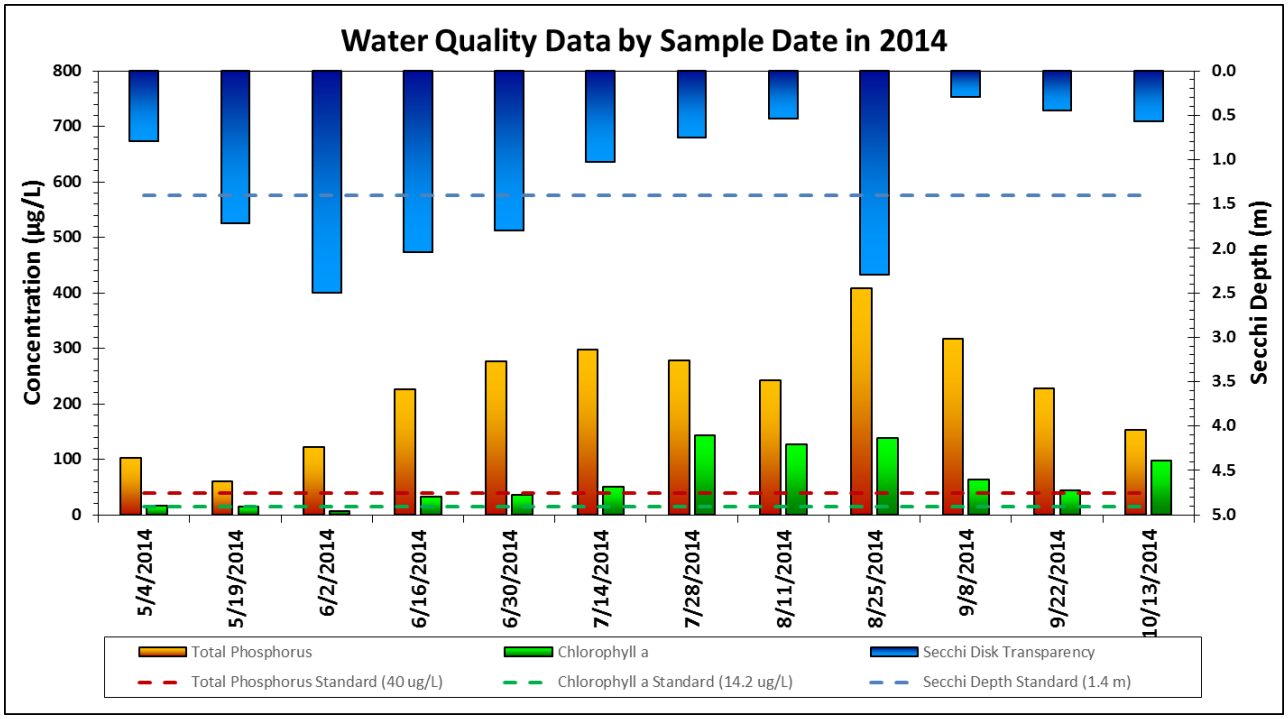


Lake and Watershed Characteristics	
DNR #	27011601
Watershed Area	16092 Acres
Lake Area	307.2 Acres
% Littoral Area	100%
Average Depth	7.02 ft
Maximum Depth	10.14 ft
Watershed/Lake Area Ratio	52.4 to 1
Hydraulic Residence Time	0.16 Years
Impairment	Excessive Nutrients 2010
Classification	Shallow Lake

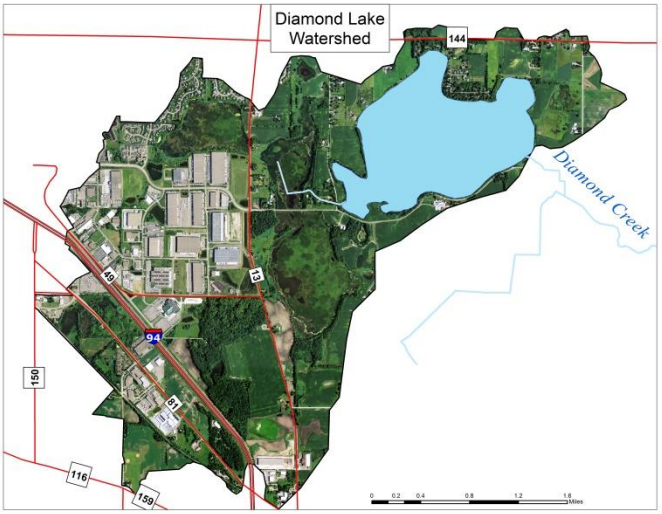


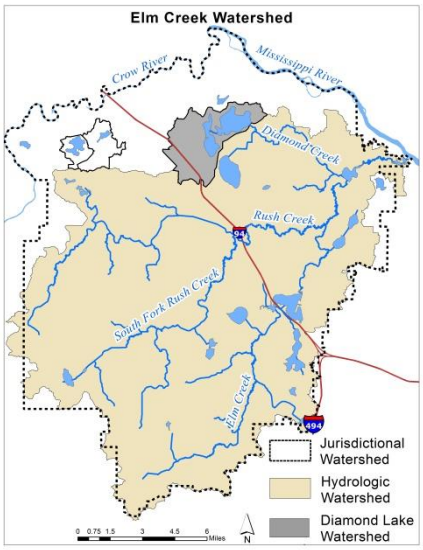
Rice Lake - Main Basin Lake Water Quality Report Card				
Year	**TP**	**Chl-a**	**Secchi**	**Avg Grade**
1997	F	C	F	D
1998	F		D	D-
1999	F	C	D	D
2000	F	C	C	D+
2001	F	B	C	C
2002	F	B	D	D+
2003	F	C	D	D
2004	F	C	D	D
2005	F	C	C	D+
2006	F	D	D	D
2007	F	D	F	F
2008	F	C	D	D
2009	F	F	D	F
2010	F	D	D	D
2011			D	D
2012				
2013	F	F	D	F
2014	F	D	C	D
MPCA Standard	C	C	D	C

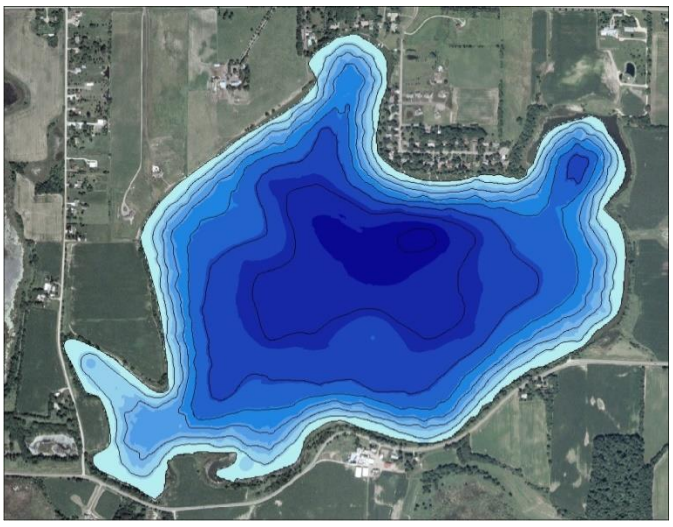
Metropolitan Council Grading System (Osgood 1989)



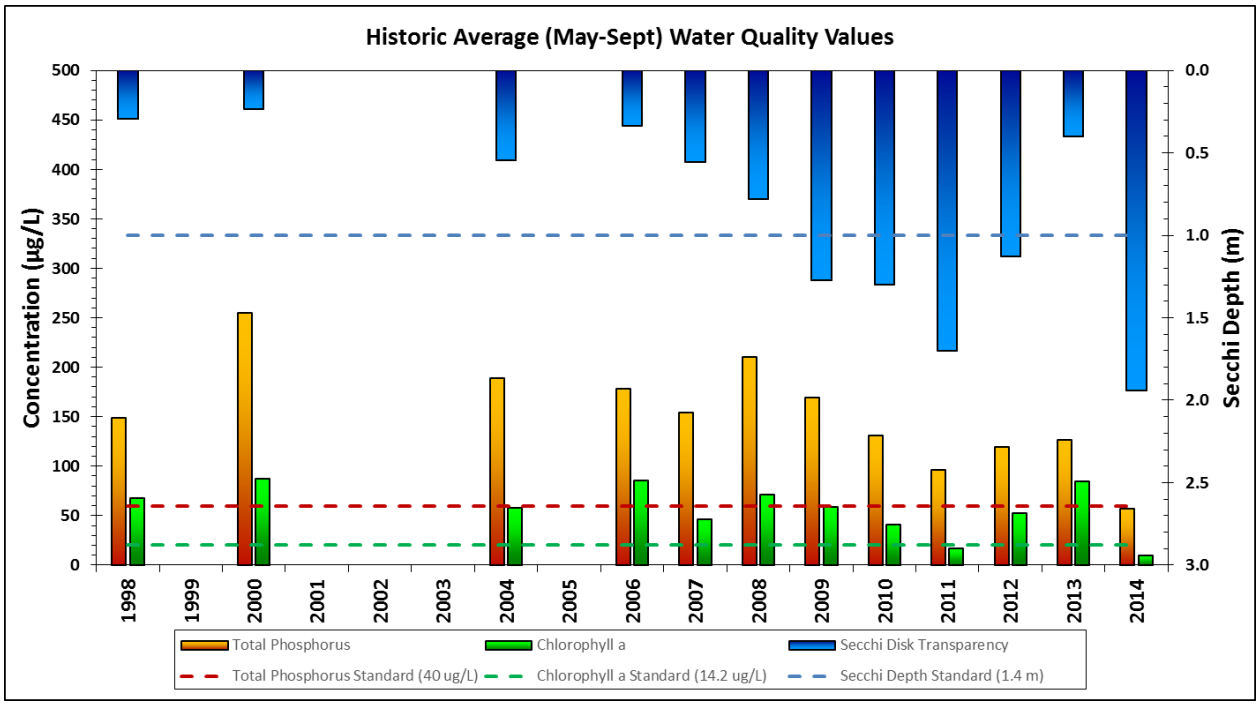
Diamond Lake





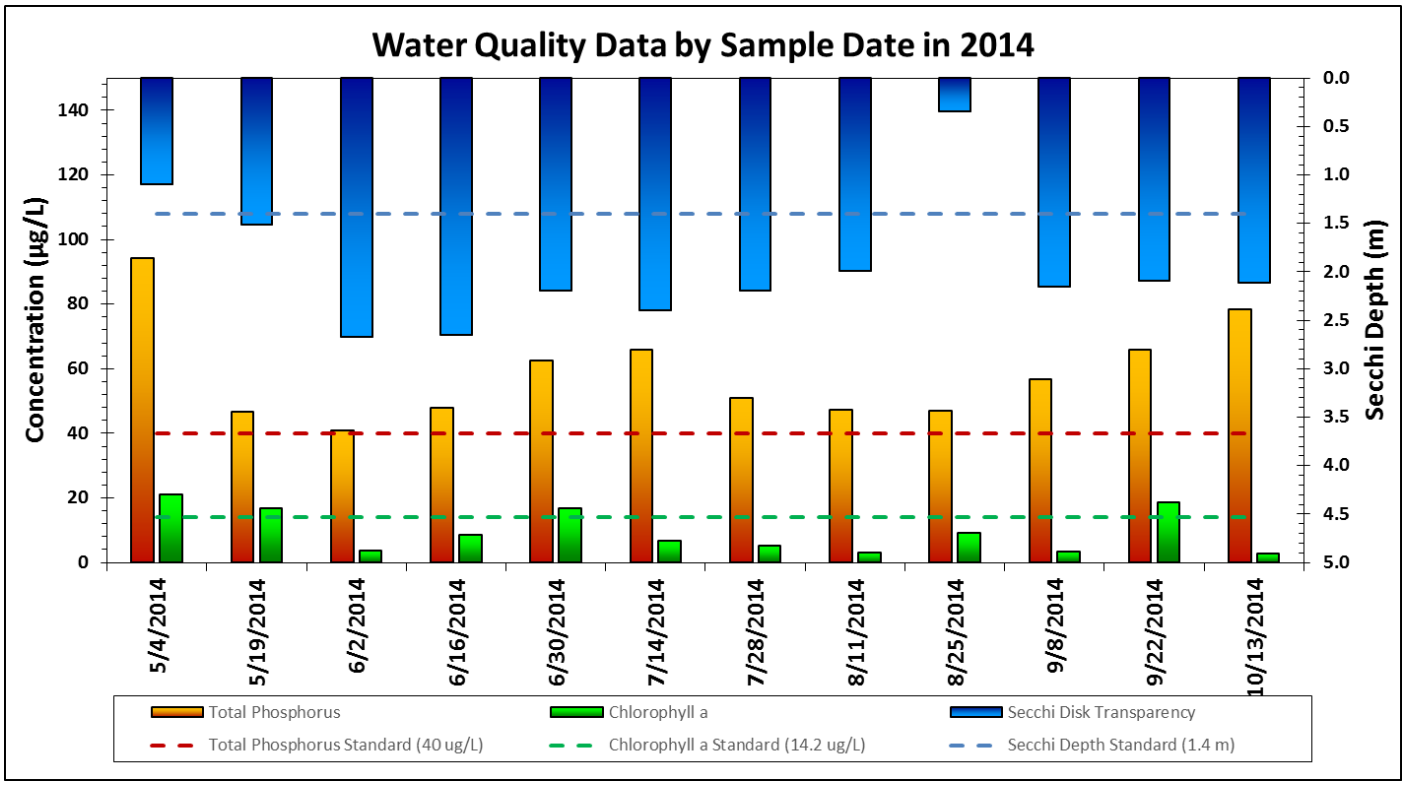


Lake and Watershed Characteristics	
DNR #	27012500
Watershed Area	2366.6 Acres
Lake Area	381.8 Acres
% Littoral Area	100%
Average Depth	3.97 ft
Maximum Depth	7.37 ft
Watershed/Lake Area Ratio	6.2 to 1
Hydraulic Residence Time	0.72 Years
Impairment	Excessive Nutrients 2006
Classification	Shallow Lake

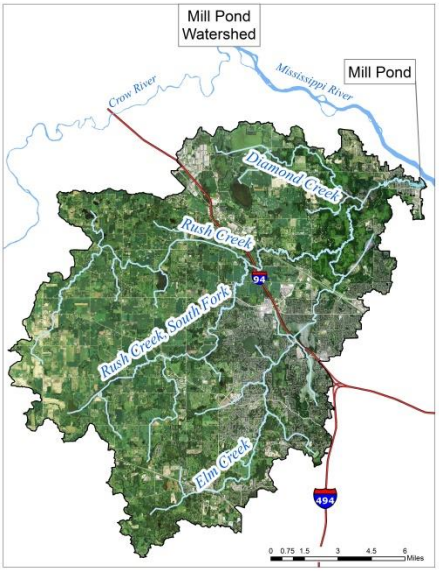


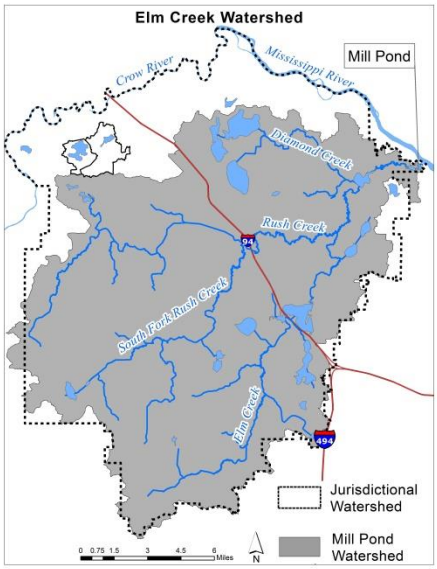
Diamond Lake Water Quality Report Card				
Year	**TP**	**Chl-a**	**Secchi**	**Avg Grade**
1998	D	D	F	D
1999				
2000	F	F	F	F
2001				
2002				
2003				
2004	F	D	F	F
2005				
2006	F	F	F	F
2007	F	C	F	D
2008	F	D	D	D
2009	F	D	C	D
2010	F	C	C	D+
2011	D	B	C	C
2012	D	D	D	D
2013	D	F	F	F
2014	C	B	C	C+
MPCA Standard	C	C	D	C

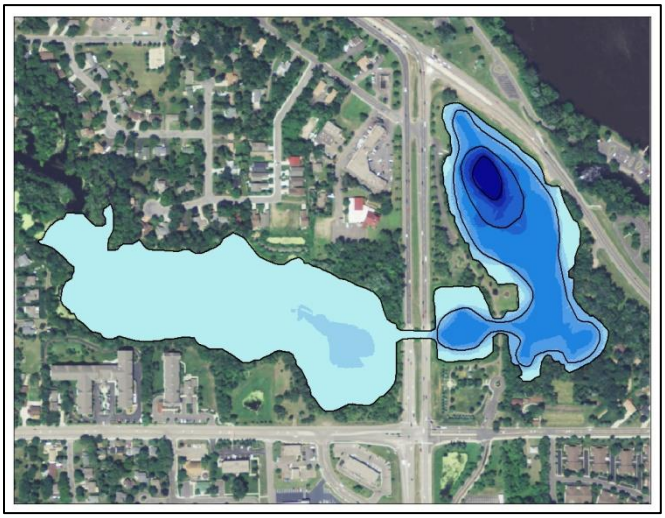
Metropolitan Council Grading System (Osgood 1989)



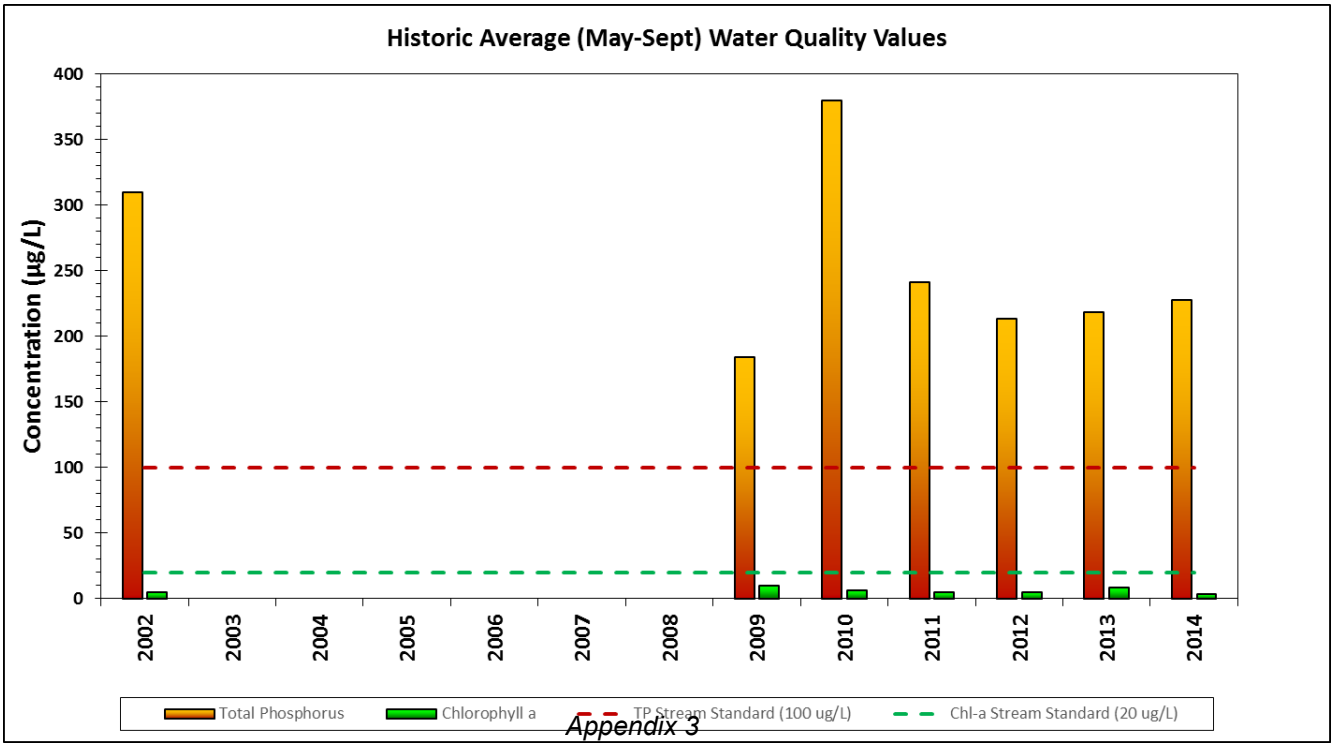
Mill Pond





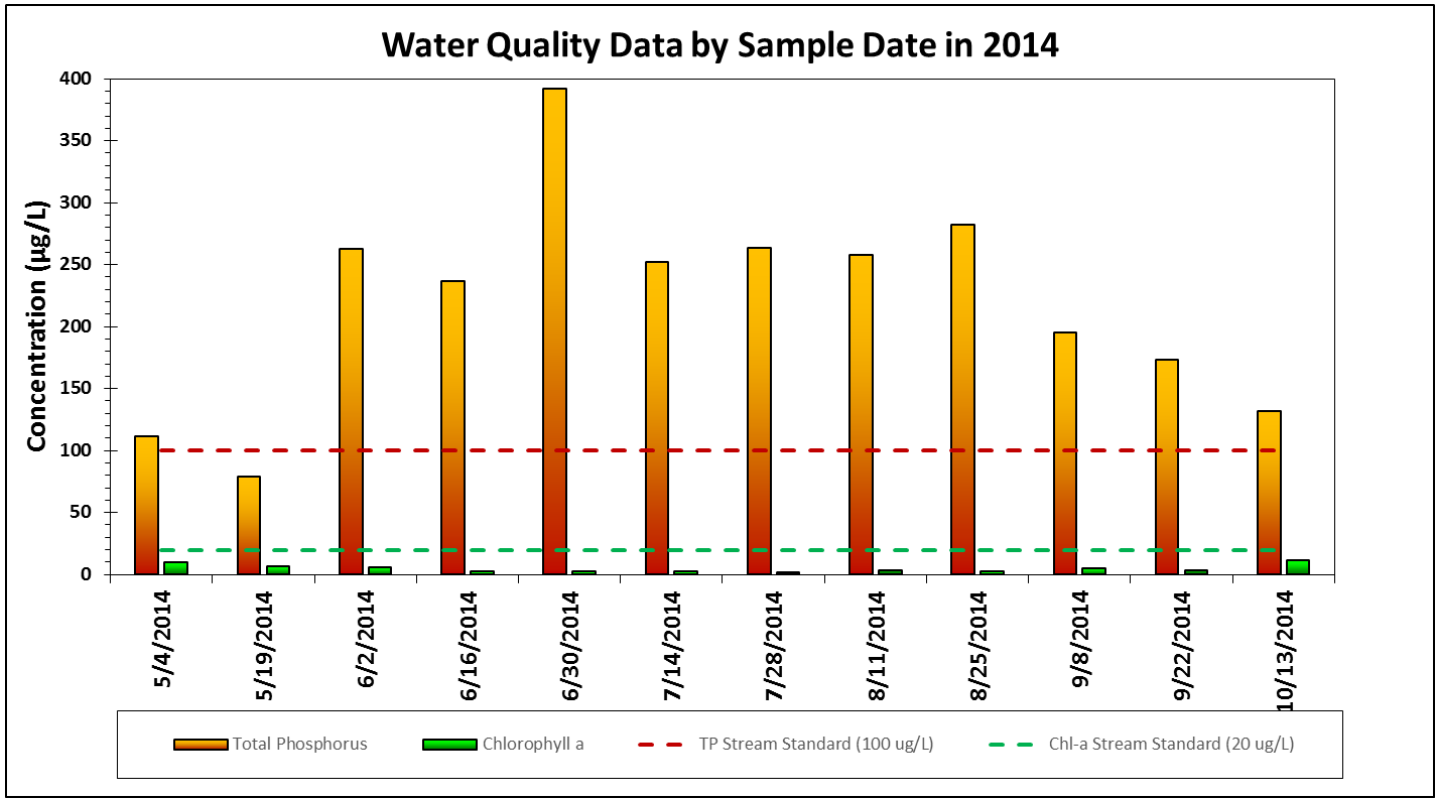


Stream and Watershed Characteristics	
DNR #	27006100
Watershed Area	66,381.86 Acres
Open Channel Area	35.6 Acres
% Littoral Area	100%
Average Depth	1.90 ft
Maximum Depth	9.95 ft
Watershed/Channel Area Ratio	1978.59 to 1
Impairment	Stream Eutrophication 2014
Classification	Elm Creek



Mill Pond Water Quality Report Card				
Year	**TP**	**Chl-a**	**Secchi**	**Avg Grade**
2002	F	A		C
2003				
2004				
2005				
2006				
2007				
2008				
2009	F	A		C
2010	F	A		C
2011	F	A		C
2012	F	A		C
2013	F	A		C
2014	F	A		C
MPCA Standard	C	C	D	C

Metropolitan Council Lake Grading System (Osgood 1989) for comparison purpose only!



2014 Lake Monitoring - CAMP

Lakes Dubay, Laura and Sylvan were monitored through the 2014 Citizens Assisted Monitoring Program (CAMP). The 2014 annual CAMP report will be available in summer 2015.

CAMP was initiated by the Metropolitan Council to supplement the water quality monitoring performed by Met Council staff and to increase the knowledge of water quality of area lakes. Volunteers monitor the lakes semi-monthly from mid-April to mid-October. They note natural and cultural observations and general perceptions of the lakes' condition and suitability for recreation. They take a water transparency reading using a Secchi disk, measure surface water temperature, and collect surface water samples that are analyzed for total phosphorous, total Kjeldahl nitrogen, and chlorophyll-a.

Data from each lake's sampling forms and lab analyses are entered into a data management and statistical analysis program called Statistical Analysis System (SAS). Various quality control methods are used throughout the program to ensure that proper sampling and data analysis techniques were used. Suspect data are excluded from the databases or conclusions.

Dubay, Laura and Sylvan Lakes were also monitored in 2013 as part of the CAMP program. Results from the 2013 monitoring are included in Met Council's **2013 Annual Lake Report,** located on Met Council's EIMS document repository: http://es.metc.state.mn.us/eims/lakes/index.asp. For more information on CAMP, please contact Brian Johnson via email, brian.johnson@metc.state.mn.us, or at 651.602.8743.

Lake Monitoring History

	Cook	*Cowley*	*Diamond*	*Dubay*	*Fish*	*French*	*Henry*	*Jubert*	*Laura*	*Medina*	*Mill Pond*	*Mud*	*Rice*	*Sylvan*	*Weaver*
2014			**T**	**C**	**T**				**C**		**T**		**T**	**C**	**T**
2013			**T**	**C**		**T**			**C**		**T**		**T**	**C**	**T**
2012			**T**	**C**	**T**	**T**				**C**	**T**			**C**	**T**
2011			**T**	**C**	**T**	**T**	**C**				**T**		**C**		**T**
2010		**C**	**T**		**T**	**T**	**C**				**T**	**T**	**C/T**		**T**
2009		**C**	**T**		**T**	**T**	**C**				**T**		**C**		**T**
2008			**T**		**T**		**C**						**C**	**C**	**T**
2007		**C**	**T**		**T**		**C**						**C**		**T**
2006		**C**			**T**	**T**	**C**								**T**
2005					**T**	**T**	**C**								**T**
2004			**T**		**T**	**T**									**T**
2003															
2002					**T**	**C**					**T**				**T**
2001	**T**				**T**	**C**									**T**
2000					**T**			**C**							**T**
1999					**T**						**T**				**T**
1998			**T**		**T**										**T**
1997					**T**									**T**	**T**
1996					**T**										**T**
1995					**T**		**C**								**T**
1994			**C**		**T**										**T**
1993					**T**										**T**
1992	**T**		**T**		**T**										**T**
1991					**T**			**T**			**T**				**T**
1990	**T**				**T**	**T**									**T**
1989			**T**	**T**	**T**			**T**							**T**
1988	**T**				**T**						**T**				**T**
1987					**T**			**T**							**T**
1986	**T**		**T**	**T**	**T**							**T**			**T**

T = monitored by Three Rivers Park District **C** = monitored through CAMP program