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**Mud Lake (82-0168) Rice Creek Watershed District**

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Mud Lake is a 187-acre lake located within the City of Forest Lake (Washington County). The maximum depth is 1.1 m (4.5 ft). The entire lake is considered littoral area (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient created by changing water temperatures in the lakes water column).

In 2002, an aquatic plant survey was conducted on Mud Lake. It was found that the lake has a healthy plant community (RCWD 2002 Mud Lake Macrophyte report). The strength of the aquatic plant community helps to reduce the algae abundance. Aquatic plants and algae compete for the same nutrients during the growing season. Strong aquatic plant communities will tie up nutrients and store them during the growing season preventing or reducing nuisance algal blooms.

As part of the RCWD monitoring program Mud Lake was sampled 9 times in 2002. Surface samples were collected for Chlorophyll-a (CLA), Total Phosphorus (TP), and Total Kjeldahl Nitrogen (TKN). Surface Dissolved Oxygen, Temperature, Specific Conductivity, pH, and secchi transparency were also recorded.

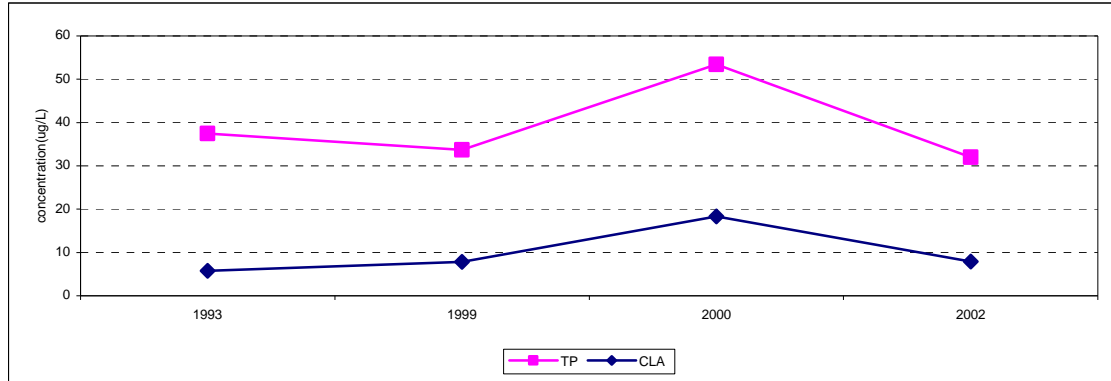
Historical monitoring of Mud Lake occurred in 1993, 1999 and 2000. Figures 1 and 2 show the historical average TP versus CLA and the historical CLA versus Secchi transparency. Review of the data show that as Secchi transparency is reduced there is a corresponding increase in algae abundance (CLA). The data from the 2000 shows the impact that rough fish can have on these shallow lakes. In 2000, it was documented by field staff that the relative abundance of carp and bullheads was high and the aquatic plant community was less than in 2002.

The 2002 water quality data shows that the TP average was 32 ug/L, CLA concentration was 7.9 ug/L, and the secchi transparency was 1.16 m. Lake water quality ranking is based on the lake water quality report card developed by the Metropolitan Council (Osgood 1989b). With this method a lake is ranked against other lakes in the metropolitan area following the same methodology. Lakes receiving an A can be deemed exceptional with no recreational impairments. A B-grade lake is considered to have good water quality and some recreational impairment, while lakes receiving a C-grade are considered to have average water quality are recreationally impaired. A D-grade lake has a very poor ranking (severely impaired), and an F-grade would mean extremely poor water quality with little to no recreational use. The lakes are ranked based on Secchi Depth, TP and CLA concentrations. For lakes greater than 10 feet deep the three parameters work fairly well to assess a lakes water quality, however in lakes less than 10 feet deep the secchi transparency may give an underestimated water clarity grade. For example, in 2002 the Mud lake secchi transparency was to the bottom during every sampling event, however the grade for secchi depth is a D. When in reality the water transparency was exceptional and the grade should have been an A. The lake grades for TP was a borderline B/C and for CLA was an A. This better represents the true chemical characteristics of Mud Lake. I have chosen to leave the secchi depth grade off of the Districts shallow lakes because of the possibility of misleading people to believe that the water quality is worst than it really is.

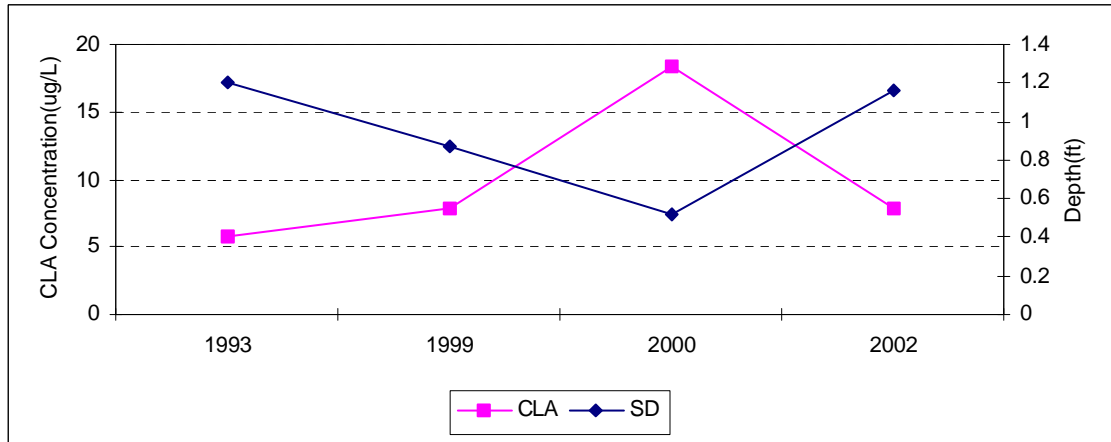
**Conclusion**

**Mud Lakes water chemistry and biological communities are in good condition and deserve protection. Mud Lake has a special consideration in that it is part of the Lamprey Pass Wildlife Management Area. This area historically supported large numbers of migratory birds and was used by a large heron colony for nesting and feeding. This area also serves as the headwater to Rice Creek. The current lakes riparian corridor is in good condition and deserves protection from development. A buffer strip of 50 feet around the high water perimeter would ensure that the lakes indirect drainage would be treated for settleable pollutants. This should not be difficult being that the largest property owner on Mud Lake is the MNDNR. The water quality of Clear Lake is also important to maintaining the quality of Mud Lake. Erosion control BMP's and potential 15 foot buffers along the incoming creek corridors would help maintain this source of water. Last the remaining rough fish population must be eradicated to help eliminate the potential for bottom sediment resuspension and loss of submerged aquatic plants**

**Figure 1 Annual Mean Values for TP and CLA for Mud Lake**



**Figure 2 Annual Mean Values for CLA and SD for Mud Lake**



**Table 1  
2002 Data for Mud Lake**

Date	TP µg/L	CLA µg/L	Secchi m	Temp C	D.O. Mg/L	pH S.U.	Cond. µmhos/cm	TKN Mg/L
5/10/02	24	7.2	1.1	8				1.58
5/23/02	45	9.8	1.1	16.7	8.4	8.85	482	
6/12/02	53	7.7	1.4	23.8	9.3	8.77	459	1.53
6/27/02	15	3	1.1	25.7	8.51	8.51	429	
7/17/02	40	9.3	1.1	29	7.8	8.27	438	
7/30/02	26	10.9	1.2	27	7.57	8.28	435	1.49
8/22/02	22	7.3	1.1	21.5	5.23	8.15	421	
average	32	7.9	1.16					

**Lake Water Quality Grades Based on Averages**

Year	1993	1999	2000	2002	2003
Total Phosphorus	C	C	C	B	
Chlorophyll a	A	A	B	A	
Secchi Depth	NA	NA	F	NA	
Overall	<b>B</b>	B	B-	A-	

NA= Not Applicable