LPL-781-02

Lake McKenzie Comprehensive Planning Report 2004

Amy Dechamps
Polk County Land and Water Resources Department
Suite 120
100 Polk County Plaza
Balsam Lake, WI 54810
715-485-8637

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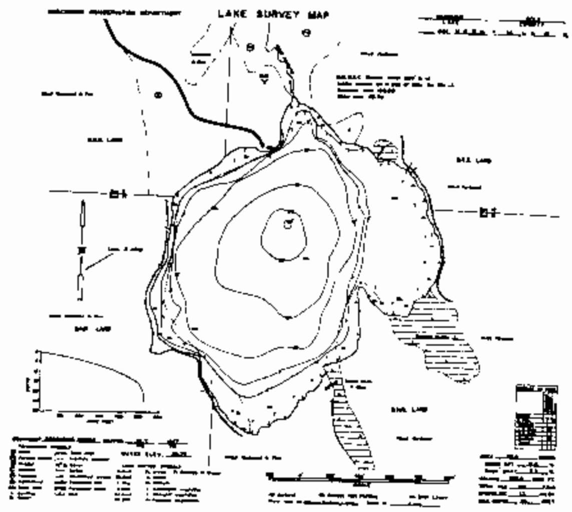
Introduction

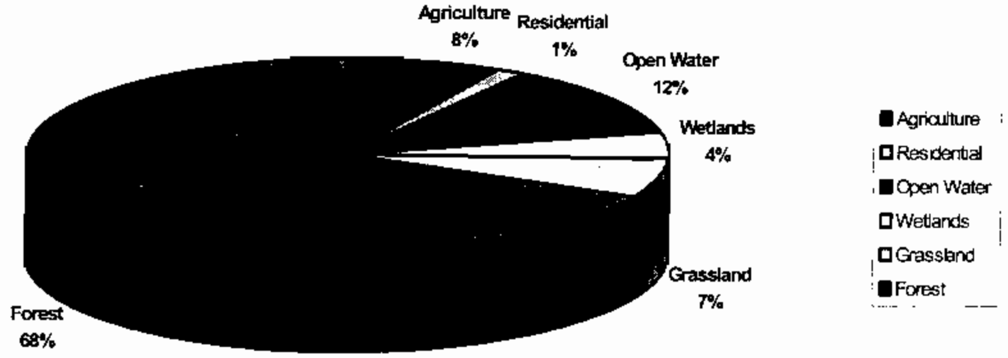
McKenzie Creek, which flows from McKenzie Lake, is an exceptional waterway, as stated by the Wisconsin Department of Natural Resources ruling 151, and needs protection. The St. Croix River Basin Water Quality Management Plan (WiDNR Water Resources Management Division, February 1994) recommends basic water quality monitoring and a habitat assessment of the area. This report is a summary of the water quality and habitat data collected in McKenzie Lake. Data was collected in 2001, 2002, and 2003 by Polk County Land and Water Resources Department staff and lake volunteers.

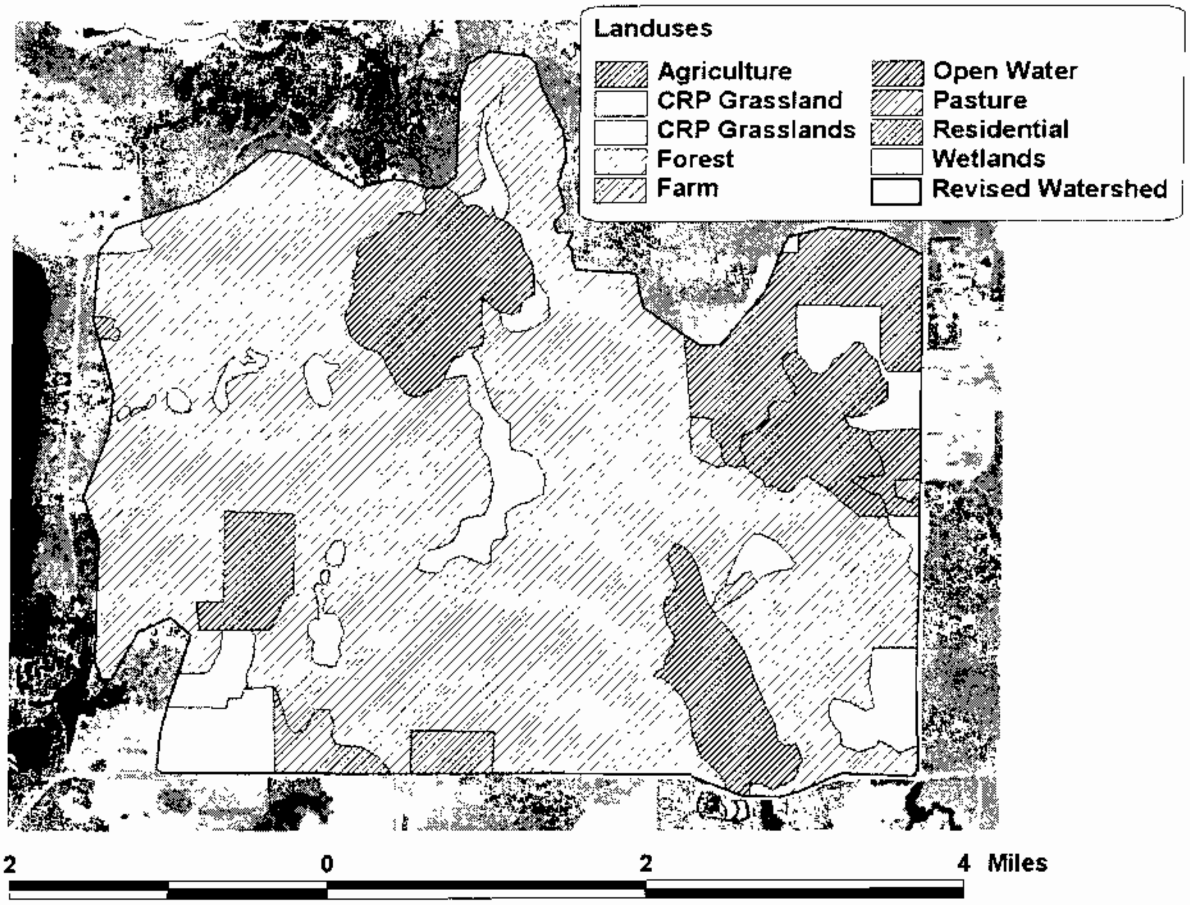
Physical Setting

McKenzie Lake is located in the Clam River sub-watershed in the larger St. Croix River Basin. The WDNR describes McKenzie Lake as a drainage lake (WiDNR, *Wisconsin Lakes Book Rev 1995*). There are a number of springs as well as a year-round inlet that feed the lake. McKenzie Creek leaves the lake from the northern outlet. Precipitation and groundwater also feed the lake. The lake surface area is 60 acres with a maximum depth of 25 feet. McKenzie Lake is immediately surrounded by WiDNR public land (McKenzie Creek State Wildlife Area) and considered undeveloped.



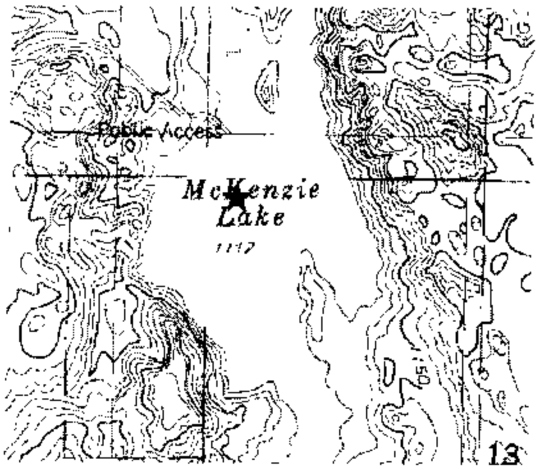
The surface water watershed surrounding McKenzie Lake is approximately 1069 acres. The movement of water from the land to the lake contributes to the water quality in lakes. Nutrients, organic material, and contaminants are transported with the water where they influence the chemical characteristics of the lake. For this reason, understanding the land use within the watershed is important to the study. Land uses within the watershed include forest land (67.6%), open water (12.2%), agriculture (7.9%), grassland (6.6%), wetland (4.4%), and residential (1.4%).





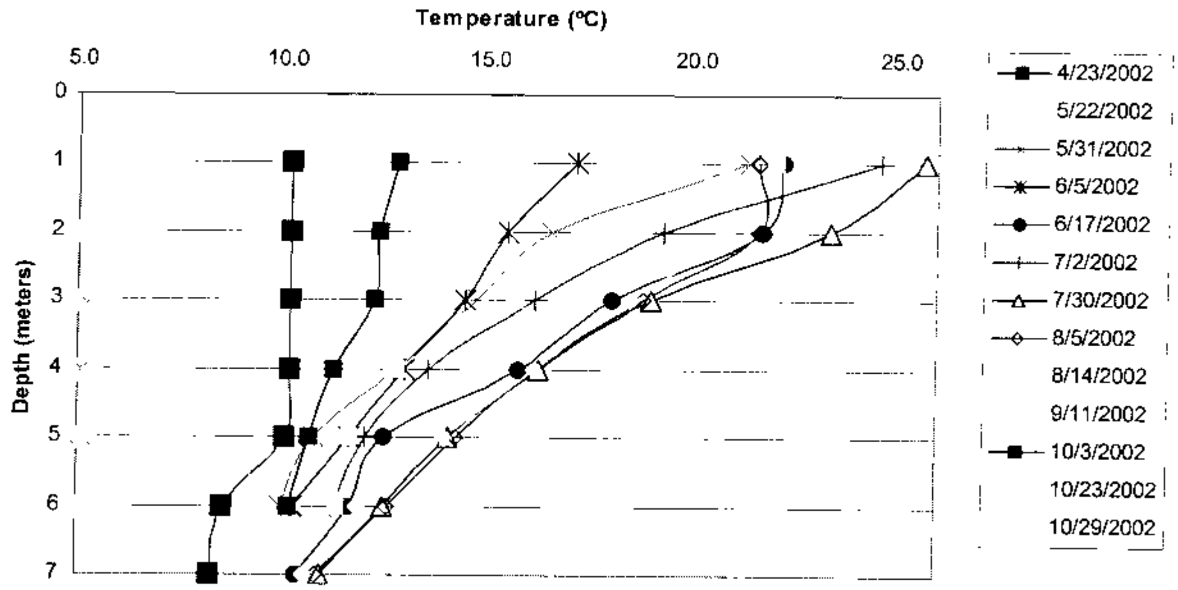
Water Chemistry

A water quality survey as well as profile monitoring was conducted on McKenzie Lake. Surface water samples were collected at spring and fall turnover in 2002 at the deepest part of the lake. Profile monitoring was conducted two times per month May through October of 2002. The star in the following figure points out the location of the deep hole on McKenzie Lake.



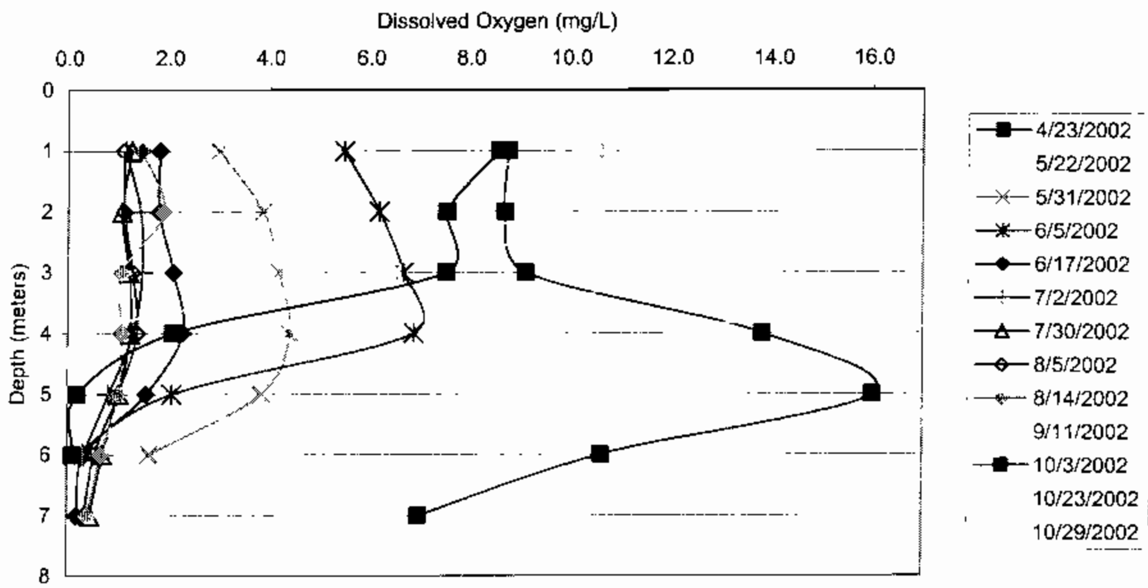
Temperature, Dissolved Oxygen, and Specific Conductance

The temperature profile of McKenzie Lake shows that it is a stratified, dimictic lake. In mid-spring and mid-fall, the temperature of McKenzie Lake is uniform throughout the water column during turnover. As the summer progresses, water at the surface of the lake warms to 25.7°C while the bottom portion of the lake remains between temperatures of 9.2°C and 11.0°C (in 2002). The epilimnion, metalimnion, and hypolimnion become established. The following figure shows the temperature profiles collected throughout this study.



The dissolved oxygen concentration in McKenzie Lake is due in part to the mixing of the water column during turnover, photosynthesis of plants and algae throughout the season, and respiration of organic matter in the water column. Dissolved oxygen concentrations indicate whether the water is hospitable to wildlife. Concentrations under 2 mg/L are considered anoxic and do not have the oxygen present to sustain life. Warmer water temperatures and the decomposition of organic matter either reduce the capacity for water to hold dissolved oxygen or consume oxygen, making the concentration lower. Colder water and photosynthesis increase dissolved oxygen concentrations. As plants and algae photosynthesize, they produce oxygen as a by-product, which increases the dissolved oxygen concentration in the water column.

McKenzie Lake showed evidence of plant or algae oxygen contribution during three sampling events. The April 23, May 22, and September 11 dissolved oxygen curves (given below) show a sharp increase in oxygen, which is termed a positive heterograde curve. Other sampling events in the middle of the summer show a clinograde oxygen curve, which is oxygen depletion in the hypolimnion as settled organic matter decomposes. Low oxygen concentrations are important not only because they restrict wildlife, but also in that this condition may allow phosphorus to be released from lake bottom sediments as the benthic chemistry is changed. This is termed internal loading and is discussed later in the Phosphorus Modeling section.



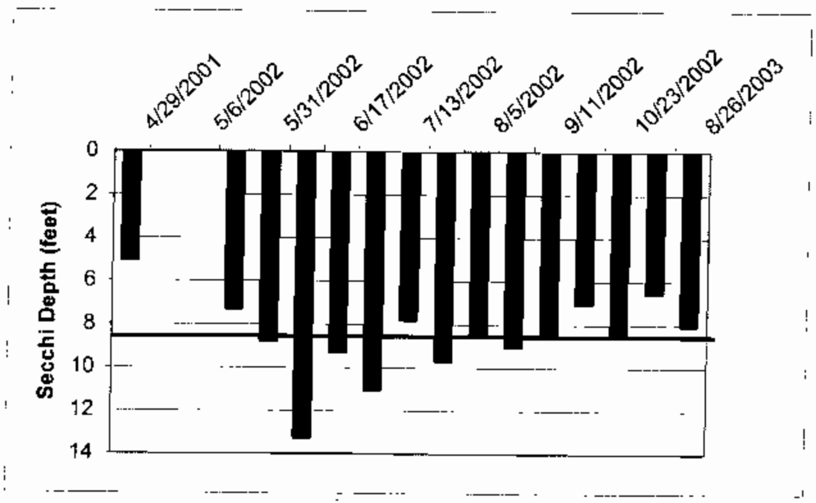
Specific conductance is a general water quality parameter collected in the field. Specific conductance measures the ability of a solution to conduct an electrical current at 25°C. Specific conductance increases with increasing ion content, so the more dissolved ions and material in the water, the greater its conductivity of electrical flow (Wetzel, 2001). Calcium, magnesium, sodium, potassium, bicarbonate, sulfate, and chloride are the most common ions present in water. High values of conductivity can be an indication of possible pollution, such as road salt and failing septic systems. The conductivity of Lake McKenzie ranged from 199.9 µS to 478.3 µS at the lake bottom. Most of these dissolved substances are naturally occurring, which dissolve as water passes through the watershed.

Secchi Depth

Secchi depth is a measure of water clarity or the amount of light penetration through the water column. The water clarity, and therefore Secchi depth, and can be affected by small particulates such as algae and *suspended* sediment in the water as well as water color (*dissolved* particles in the water.) The most common reason for low Secchi disc readings is the presence of algae and can often be directly related to chlorophyll *a*, an index of algae growth.

However, chlorophyll *a* concentrations were not collected throughout this study. Secchi disc readings on McKenzie Lake ranged from 5 feet in April to 13.25 feet in June. The average Secchi depth was 8.5 feet, which indicates fair to good water clarity, according to this chart from Shaw et al., 2002.

Water Clarity	Secchi Depth (ft)
Very Poor	3
Poor	5
Fair	[illegible]
Good	10
Very Good	20
Excellent	32



The above figure shows the Secchi depth on McKenzie Lake throughout the 2002 season. Variations in Secchi depth occur throughout the summer as algae concentrations and other particles in the lake fluctuate. These natural cycles affect Secchi depth, which is greatest during early summer and declines as the water temperatures warm and more algae is present.

Phosphorus

Phosphorus is considered the limiting nutrient in more than 80% of Wisconsin's lakes and affects the amount of plant and algae growth in the lake. The total phosphorus of McKenzie Lake was 54 µg/L and 34 µg/L during spring and fall turnover, respectively. This number is normal for natural lakes. During turnover events when lake water is mixed, sediments or organic material, which may contain phosphorus, are suspended in the water column and counted in the TP value. Shaw et al. recommends that lakes have a total phosphorus concentration below 20 µg/L to prevent nuisance algal blooms.

The soluble reactive phosphorus, or just the dissolved portion of phosphorus in the water, had a concentration of 13 µg/L at spring overturn and 6 µg/L in the fall overturn. Soluble reactive phosphorus (SRP) is the portion of phosphorus that is readily available to plants and algae. It varies widely in most lakes as plants take it up and release it. SRP should be 10 µg/L or less to prevent summer algae blooms.

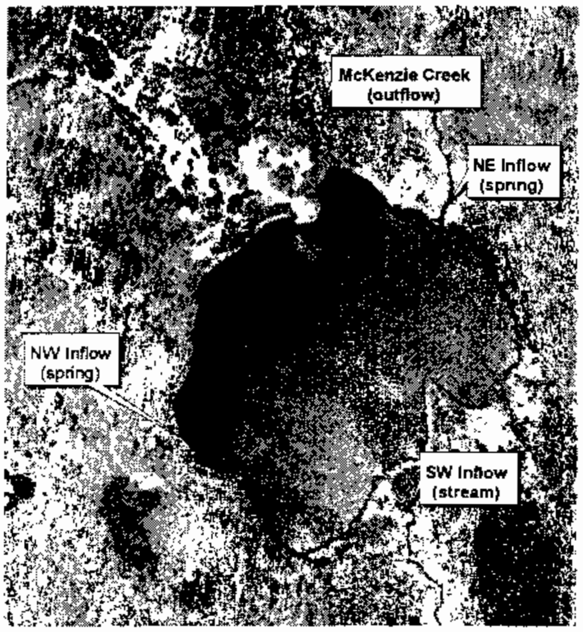
Alkalinity, Total Hardness, and Calcium Hardness

The alkalinity, total hardness, and calcium hardness of a lake is dependent on the type of bedrock and soils that are in the watershed. As water (rain, snowmelt, groundwater) comes in contact with the bedrock and soils, they may dissolve the minerals, carrying them with the water and into the lake. Lake McKenzie had an alkalinity concentration of 96 mg/L as $CaCO_3$ and 111 mg/L as $CaCO_3$ during spring and fall turnover, respectively. Alkalinity, also called acid neutralizing capacity, is the ability of a lake to resist changes in pH. The alkalinity of McKenzie Lake (averaging 104 mg/L as $CaCO_3$) is relatively high, meaning that it resists changes in pH relatively well and is not sensitive to acid rain.

Total hardness is a measure of calcium, magnesium, sodium, and sulfur. With an average total hardness concentration of 108 mg/L as $CaCO_3$, McKenzie Lake is classified as moderately hard water. The calcium hardness averaged 74 mg/L as $CaCO_3$, which makes up approximately 69 percent of the hardness.

Inflow Sampling

Areas of concentrated flow coming into the lake were sampled during the summer of 2003. These three areas, shown at right, were either springs around McKenzie Lake or seasonal streams. The samples were analyzed for phosphorus and nitrogen to reveal the concentrations coming into the lake from the watershed. The results are displayed in the following table.



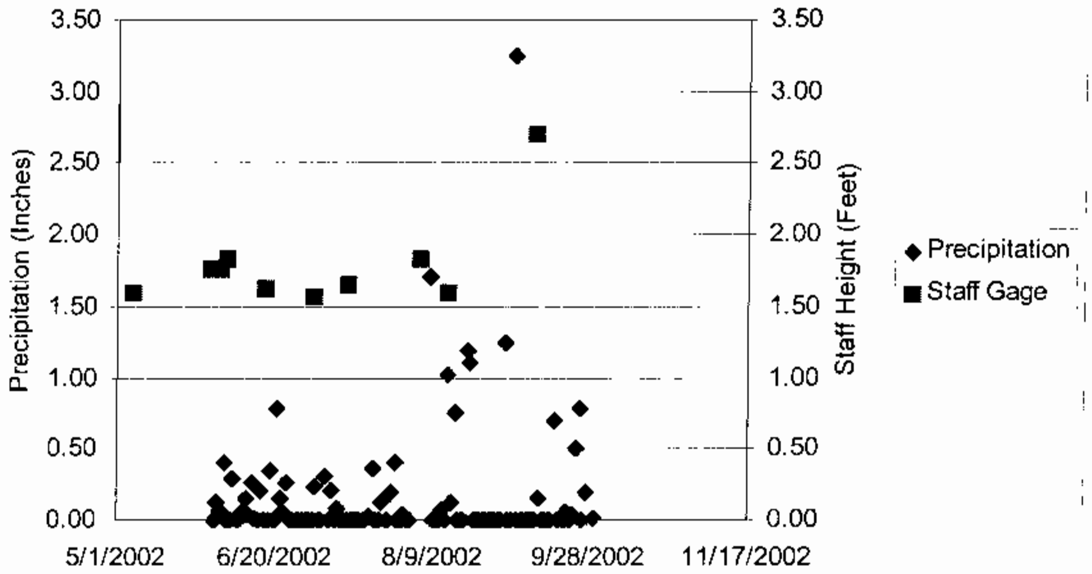
Site	NO2+NO3 (N) (mg/L)	TKN (mg/L)	SRP (μg/L)	TP (μg/L)
NW	0.2	0.32	38	41
SW	0.3	0.12	38	38
NE	0.5	0.24	44	36

The sites show that elevated levels of phosphorus and nitrogen are flowing to the lake. The average lake turnover SRP was 10 μg/L. Concentrations of 38 μg/L and 44 μg/L are certain to affect water quality of the lake if they continue. Nitrogen concentrations were not alarming, however, also indicate that they are elevated from natural background levels.

Because McKenzie Lake is surrounded by wetlands, it is difficult to determine the source of the nutrients. The land uses further back in the watershed should be investigated to determine if they are contributing nutrients, and best management practices put into place if needed. Soil cores taken along the stream bank may also help determine the nutrient loading.

Precipitation and Lake Level

A volunteer on Ward Lake, a neighboring lake just west of McKenzie, recorded precipitation data during the summer of 2002. A staff gage was also placed in McKenzie Lake and stage height was recorded approximately every two weeks.

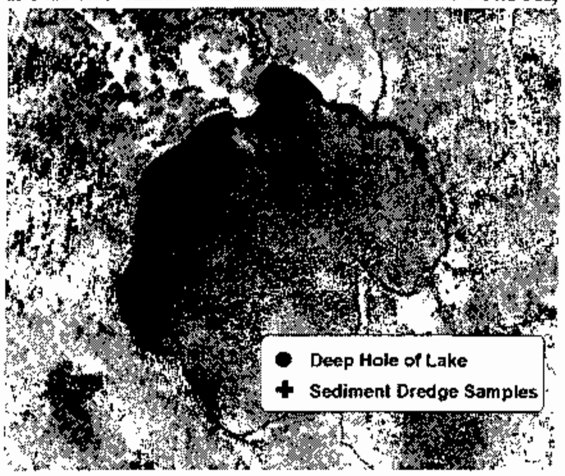


This figure shows that the lake level (staff gage height) closely reflects the amount of precipitation falling in the watershed. Since McKenzie Lake is a discharge lake influenced by surface water, this makes sense that the water coming into the lake is from precipitation.

Sediment Sampling

Sediment samples were collected from McKenzie Lake on August 26, 2003. These samples were collected using a Ponar Dredge at eight locations illustrated in the following figure. The samples were sent to the UW Soil and Forage Analysis Laboratory and analyzed for total nitrogen, total phosphorus, total potassium, sulfur, and percent moisture. The results are listed in the following table.

Nutrients in the sediment are important because they can contribute to algal and plant growth. Water that is in contact with the sediment transfers nutrients from the sediment to the water column. The decay of aquatic plants and animals can also transfer the nutrients to the water column. This transfer occurs during wind mixing and overturn mixing, providing the food for algae and other plants. This is termed internal loading. Rooted vascular plants are able to obtain their nutrients directly from the lake's sediments. For this reason,



it is important to understand the sediment composition.

Total nitrogen values were highest (3320 – 3720 mg/kg) at sites ML-3, ML-6, and ML-7. These sites were thick with aquatic vegetation, which most likely contributed to the organic nitrogen.

Total phosphorus was highest (650 – 1035 mg/kg) at locations within the middle of the lake (ML-3 – ML-6). As sediment particles and organic matter that binds with phosphorus settle, the particles drift to the deeper depths of the lake.

Potassium (K) is a very soluble element and leaches quickly from organic material. Sites ML-1 and ML-3 were highest in K (50 and 40 mg/kg, respectively). These values may be due to recently dropped organic vegetation or underwater seeps carrying K from the watershed.

Sources of sulfur include minerals found in the watershed, industrial sources (coal burning facilities), and decayed organic matter under anoxic conditions. Sites ML-3, ML-4, ML-6, and ML-7 had the highest values of sulfur, which occur where aquatic vegetation was thick. As the vegetation decomposes and uses the oxygen, sulfur becomes present in the lake sediments.

Sample Number	TN (mg/kg)	TP (mg/kg)	TK (mg/kg)	Sulfur (mg/kg)	% Moisture
ML-1	2400	275	50	670	90.0
ML-2	1530	245	10	435	95.5
ML-3	3320	650	40	1515	84.2
ML-4	2225	900	15	1430	86.9
ML-5	1135	670	10	840	91.9
ML-6	3320	1035	20	1825	84.9
ML-7	3720	495	15	1320	88.0
ML-8	2510	315	15	845	88.6

Total nitrogen to total phosphorus ratios of the sediment samples showed a more even trend across the lake. Relative to nitrogen, there was more phosphorus in the center of the lake than on the perimeter or shallow areas. These nutrient values are very typical of Wisconsin lakes and are able to sustain rooted vascular plants.

Site	TN:TP
ML-1	8.727273
ML-2	6.244898
ML-3	5.107692
ML-4	2.472222
ML-5	1.69403
ML-6	3.207729
ML-7	7.515152
ML-8	7.968254

Watershed Biodiversity Survey

Aquatic Macrophyte Survey

The aquatic macrophyte survey was carried out on McKenzie Lake on August 28, 2002. Ten sampling points were established around the lake, approximately every 1500 feet. Transects lines were set at the shore and extended seaward 100 feet.

Macrophyte collection sites on McKenzie Lake

The Jessen and Lounds rake method was used to sample the macrophytes. This method involved using a rake with a handle and making a figure eight in an area that is approximately 1 m^2. The rake was then inverted and brought to the surface to assess the sample.

Each species on the rake head was identified, and the approximate density of each species was determined (*e.g. Potamogeton zosteriformis,* density of 4). This method can be used to determine species composition or dominance of a species at a site or certain water depth. The results were then evaluated using three different indices or metrics. The Floristic Quality and Shannon-Wiener Diversity Index were calculated as well as the Frequency of Occurrence for each species.

The Frequency of Occurrence (FO) is defined as the number of sites along all of the transects that the species occurred divided by the total number of sites in the lake with vegetation. FO is expressed as a percent. The FO shows that *Ceratophyllum demersum* (coonstail) was the dominant species during this sampling event, occurring at 93% of the intervals. However, sites 4, 6, and 10 had an abundance of *Chara spp.* that rivaled *C. demersum. Chara spp.* is often present at groundwater inflow sites because of the increase in carbonate at these sites. Likely, the influence of groundwater springs at these sites was the reason for *Chara spp.* dominance. *Potamogeton zosterformis* (flat stem pondweed) was also relatively abundant in the lake with a FO of 58%.

C. demersum was by far the densest species in McKenzie Lake. The relative amount was two fold denser than any other species in the survey.

The Shannon-Wiener Diversity Index was calculated for the lake. The Shannon-Wiener Index determines how difficult it would be to correctly predict the species of the next individual collected. This, in turn, tells us how diverse the plant community is. A number close to 1 indicates that an individual could easily predict correctly the next plant collected, which means there is low diversity in the lake. A higher number indicates a more diverse lake. The Shannon-Wiener Index uses the equation:

$$H = \sum_{i=1}^{s} (pi)(\log 2pi)$$

where H = Shannon-Wiener Diversity, *SUM* = constant for each species calculated, s = the number of species, pi = the proportion of individuals of the total sample belonging to the *ith* species calculated as *ni/N* for each *ith* species with ni being the number in species i and N being the total number of individuals in the sample (Barbour, et al, 1987). Because the total number of individuals was not determined in this survey, the density of the species was substituted for the total number. It was thought that the density of the species would accurately represent the population of each individual species.

The Shannon-Wiener Diversity Index for McKenzie Lake was calculated to be 2.5. This indicates moderate diversity in Polk County. As the lake was heavily dominated with *C. demersum* and the density of other species was small, giving a moderate rating. The actual diversity rating is probably slightly higher than calculated because other species, such as *Ranunculus sp.*, were observed in passing but not collected. Additional monitoring would improve diversity indices and our understanding of the aquatic plant community.

The Floristic Quality Index was also determined to assess the quality of the macrophyte community in McKenzie Lake. The Floristic Quality Index is designed to evaluate the closeness of the flora in an area to that of an undisturbed condition. It can be used to identify natural areas, compare the quality of different sites or locations within a single lake, monitor long-term floristic trends, and monitor habitat restoration efforts. This is an important assessment in Wisconsin because of the demand by the Department of Natural Resources (DNR), local governments, and riparian landowners to consider the integrity of lake plant communities for planning, zoning, sensitive area designation, and aquatic plant management decisions (Nichols, 1999).

Using the equation $I = \overline{C}\sqrt{N}$ (where I is the floristic quality, $\overline{C}$ is the average coefficient of conservation (obtainable from http://www.botany.wisc.edu/wisflora/FloristicR.asp) and $\sqrt{N}$ is the square root of the number of species), the floristic quality of McKenzie Lake was determined to be 21.92. The average for this area of the state (North Central Hardwood Forest) is 17 to 24.4 with a median of 20.9. McKenzie Lake appears to be a relatively undisturbed lake. Again, the floristic quality of McKenzie Lake is probably higher than calculated as high quality species such as *Ranunculus sp.* were observed but not collected.

The rich aquatic plant community of McKenzie Lake is most likely an invaluable part of the lake's ecosystem, particularly to invertebrates and fish. In order to maintain a balanced lake ecosystem, the aquatic plant community needs to be protected. The aquatic plant community should continue to be monitored to ensure a healthy ecosystem and gauge the effectiveness of management techniques. A major disturbance to the macrophyte community of McKenzie Lake could be detrimental to its ecosystem.

Terrestrial Plant Survey

The riparian zone of McKenzie Lake is an incredibly diverse ecosystem that is both ecologically and hydrologically important

McKenzie Lake was taken in early summer of 2002. Twenty sites were identified, and a 100-foot tape measure was stretched from 1-foot depth of water seaward. The number of coarse woody debris pieces in the water (fallen logs, limbs, and shrubs) were then counted and labeled as small debris (less than or equal to 4 inches) or large debris (greater than 4 inches). The results of the inventory are summarized in the following table.

Plot Number	# of Small Debris	# of Large Debris
1	21	2
2	36	1
3	48	0
4	54	1
5	11	0
6	32	2
7	23	0
8	16	1
9	50	2
10	68	1
11	25	2
12	53	1
13	23	0
14	6	0
15	8	0
16	8	0
17	24	1
18	23	1
19	36	0
20	18	0

The amount of coarse woody debris (CWD) has increasingly been recognized as important habitat for both terrestrial and aquatic wildlife. The CWD links the shoreland community with the riparian community by providing places for terrestrial animals to find food, shelter, and protection from predators in the aquatic environment. This also supplies a place for floating plants to root, structure for water creatures, sunny niches for small animals, and habitat for insects which provide food.

In addition to wildlife corridors, CWD impacts hydrological processes. CWD alters water movements, buffers against shoreline erosion, and affects the flow of organic mater into surface waters.

Indirectly, the alteration of riparian vegetation on land may lead to the reduction of CWD in the water. Developed lakes also have the problem of direct removal of CWD from the water. The ecological impact of removing coarse woody debris and woody shrubs from the shoreline and the water can affect the dynamics of the fish population present in the lake. This in turn will have an impact on the entire lake ecosystem. The restoration of CWD are likely to take decades to hundreds of years and exhibits a long-term problem for lakes and their ecosystems (Christensen, et al., 1996.)

Fisheries Survey

The fishery of McKenzie Lake was surveyed in the spring of 2003 by the Department of Natural Resources to obtain baseline data on the status and health of the fishery. Largemouth bass were collected on McKenzie Lake, with a fairly low density, however, no other gamefish were collected. The shallow lake and complex aquatic vegetation does not offer proper habitat for large gamefish. However, common panfish collected were bluegill, pumpkinseed, yellow perch and black crappie. The DNR stated, "The panfishery on McKenzie Lake is currently above average in density and quality." The fishery in 2003 is also higher compared to a 1987 survey. The complete survey can be found in Appendix B.

Phosphorus Modeling

The Wisconsin Lake Modeling Suite (WiLMS) was used to model current and pre-development phosphorus conditions for McKenzie Lake. Phosphorus was the key parameter in the modeling scenarios because it is the limiting nutrient for algal growth in most lakes.

The following tables estimate annual phosphorus loading to the lake. The models that appeared to be the best "fit" for McKenzie Lake were the Reckhow Natural Lake Model (1979) and the Vollenweider Shallow Lake Model (1982). The Reckhow model predicts growing season phosphorus concentrations (during the summer months), and the Vollenweider model predicts spring turnover and growing season average phosphorus concentrations.

The current conditions prediction uses current land use in the watershed to determine the phosphorus loading and lake phosphorus concentrations. It is estimated that 92 kg of phosphorus reach the lake each year. Given this loading, the water column phosphorus concentration is predicted to be between 26 and 36 µg/L.

McKenzie Lake Current Conditions Prediction

Annual Total P Loading	Reckhow, 1979 Natural Lake Model Predicted P[ ]	Vollenweider, 1982 Lake Model Predicted P[ ]
92 kg	26 µg/L	36 µg/L

Prior to European settlement of the McKenzie Lake watershed, it is estimated that McKenzie Lake had an annual phosphorus concentration of 22 µg/L versus the modeled concentration today of 36 µg/L. The annual loading to McKenzie Lake was nearly cut in half, with 51 kg of phosphorus reaching the lake (versus 92 kg). An overall in-lake phosphorus concentration of 22 µg/L is a potential management goal. At this phosphorus concentration, algae blooms would be limited throughout the season. Such a level would likely maintain water clarity and ensure a quality lake for generations.

McKenzie Lake Undeveloped Conditions Prediction

Annual Total P Loading	Reckhow, 1979 Natural Lake Model Predicted P [ ]	Vollenweider, 1982 Lake Model Predicted P [ ]
51 kg	15 µg/L	22 µg/L

The implementation of best management practices (BMPs) throughout the watershed (such as conservation buffers and rain gardens) may reduce phosphorus loading to the lake. Limiting future nutrient inputs to the lake will likely result in maintaining the current water quality of McKenzie Lake. Continuing to restrict boat traffic on the lake could also further reduce internal phosphorus loading. The empirical models in WiLMS estimate internal loading to account for approximately 8.4% of the total phosphorus in the water column.

Therefore, a majority of efforts should be focused on maintaining the undeveloped conditions of the shoreline and the natural state of the watershed. This will limit phosphorus inputs and continue to provide important wildlife habitat. The nutrient content of the lake will remain lower and the ecosystem can remain in tack.

I & E Activities

A Lakes and Rivers Discovery Day was held on McKenzie Lake July 13, 2002. Polk County residents came to explore the wonders in McKenzie from dissolved oxygen concentrations to water snakes to aquatic macrophytes. Several people attended the learning day. Pictures and press releases from the event can be found in Appendix C.

Another opportunity to explore McKenzie Lake with lake managers was held June 28, 2003. A macrophyte workshop was conducted at McKenzie Lake to introduce Polk County residents to the aquatic and terrestrial vegetation.

Management Implications

McKenzie Lake is a very unique lake in Polk County. The lake is protected by the native area surrounding it. Nutrient loading from the watershed is low because of its relatively undeveloped status. The lake is currently classified as a eutrophic lake. The lake has a fair amount of total phosphorus, but the reactive portion is under 10 µg/L, which limits nuisance algae and plant growth. The moderately hard water of the lake may be able to buffer the current amount of nutrients, leaving the lake in a delicate balance.

It is in the best interest for the water quality of the lake and its interconnected ecosystem for the lake to remain in its natural state as a designated wildlife area. The lake currently has a vegetative buffer of 150 feet minimum surrounding the lake, which inhibits sediments from reaching the lake, reduces shoreland erosion, and provides critical habitat. Maintaining the vegetative buffer would also prevent the infestation of invasive wetland and terrestrial species, such as purple loosestrife.

An eradication program to eliminate common buckthorn from the watershed should be implemented on McKenzie Lake. Friends of McKenzie, the Ice Age Trail, or other citizen volunteers may be willing to take up the initiative.

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Appendix A - Water Quality Data

Turnover Data

	Sample Date	NH4	NO2+ NO3 (N)	TKN	SRP	TP	K	Na	SO4	Alk	Condo	Cl	pH	Color	T Hardns	Turbidity	Calcium Hardness
Spring Turnover	4/23/2002	<.01	<.02	0.42	0.013	0.054	1	3.3	2	96	210	1	8.19	<5	104	1.9	71
Fall Turnover	10/29/2002	0.03	0.16	0.44	0.006	0.034	1	3.3	2.4	111	226	1	7.84	15	112	1.3	76

Inflow Sampling

Site	Sample Date	NO2+NO3 (N)	TKN	SRP	TP
NW	6/19/2003	0.2	0.32	0.038	0.041
SW	6/19/2003	0.3	0.12	0.038	0.038
NE	6/19/2003	0.5	0.24	0.044	0.036

Sediment Samples

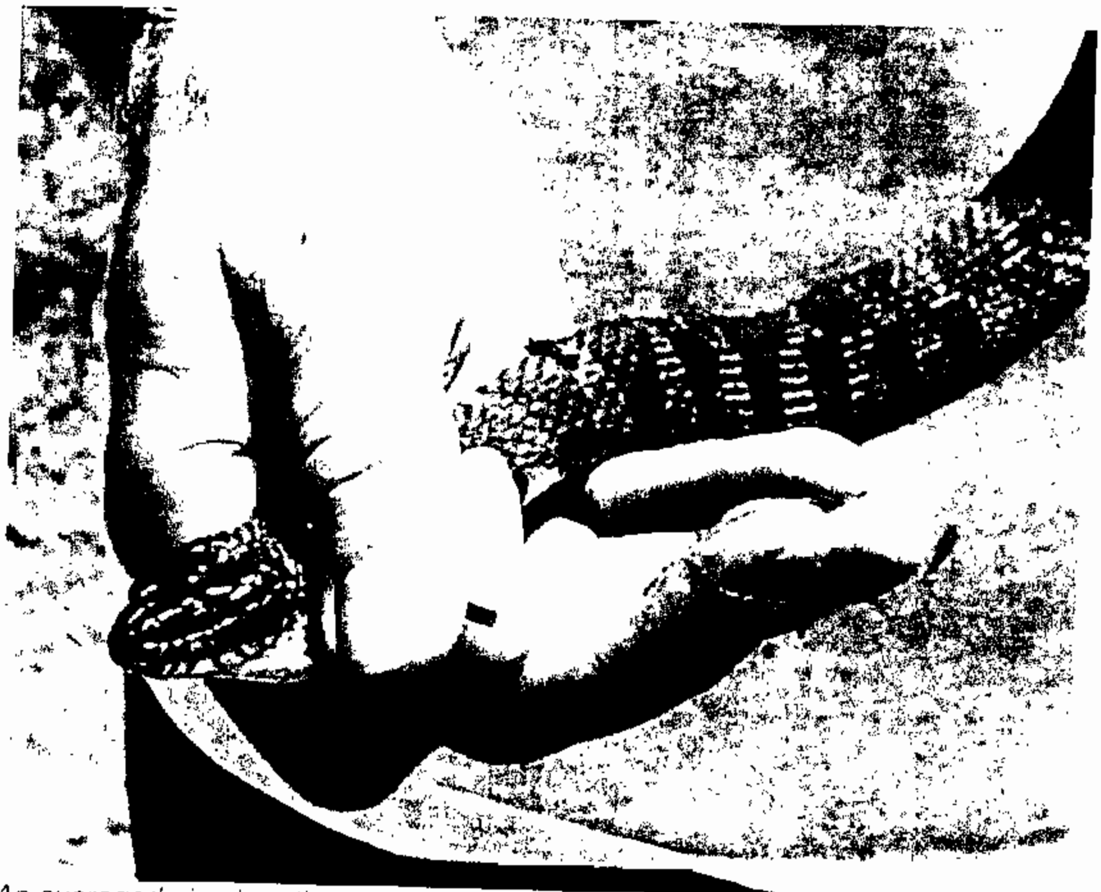
Sample Number	TN (mg/kg)	TP (mg/kg)	TK (mg/kg)	Sulfur (mg/kg)	% Moisture
ML-1	2400	275	50	670	90.0
ML-2	1530	245	10	435	95.5
ML-3	3320	650	40	1515	84.2
ML-4	2225	900	15	1430	86.9
ML-5	1135	670	10	840	91.9
ML-6	3320	1035	20	1825	84.9
ML-7	3720	495	15	1320	88.0
ML-8	2510	315	15	845	88.6

Secchi Depth Measurements

Date	Secchi Reading
4/29/2001	5
5/22/2002	7.25
5/31/2002	8.75
6/5/2002	13.25
6/17/2002	9.25
7/2/2002	11
7/13/2002	7.75
7/30/2002	9.67
8/5/2002	8.5
8/14/2002	9
9/11/2002	8.5
10/3/2002	7
10/23/2002	8.5
10/29/2002	6.5
8/26/2003	8

Appendix B –2003 Fish Survey

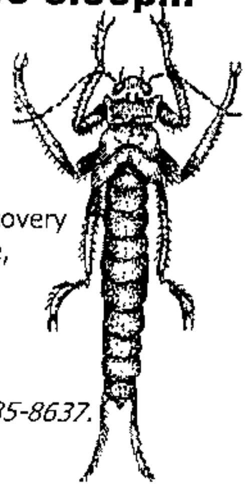
Attendees watch a northern water snake being released back into the wild.



An averaged-sized northern water snake. These snakes are nonvenomous and feed primarily on fish, frogs, insects, and crayfish.

LAKES & RIVERS DISCOVERY DAY

JULY 13 --1:00-3:00pm



Increase your lake and river smarts by attending the family-friendly Lakes and Rivers Discovery Day at McKenzie Lake, 11 miles east of Luck. Follow the signs from Hwy 48.

For more info: 715/485-8637.

FOR IMMEDIATE RELEASE

Contact: Brook Waalen, 715-485-8637 or brookw@co.polk.wi.us

Date: June 24, 2002

Headline: Increase your lake and river smarts

Increase your lake and river smarts by attending the family-friendly Lakes and Rivers Discovery Day at McKenzie Lake in northeastern Polk County on July 13. Resident natural resource experts will answer your lake- or river-related questions and offer short presentations from 1:00 – 3:00pm (but may go until 4:00pm if there is a substantial turn out) Topics include.

- ***ID clinic***: Bring samples of weird things from the water. Try to stump our experts and learn what's in your lake or river.
- ***Lake and river monitoring***: Unravel the mysteries of the Secchi disk.
- ***Algae***. What's the difference between algae and duckweed? When is algae not algae?
- ***Aquatic critter hunt*** for kids and adults: There's more in the water than fish – lots more.
- ***Alien invaders***: Plants and animals that threaten aquatic ecosystems.
- ***Water quality***: What makes good water quality?

McKenzie Lake is off-limits to motors and is surrounded entirely by public land. The Ice Age Trail winds around the lake offering hiking opportunities for individuals or families. McKenzie Lake is a stunning setting to make your own discoveries.