Round Lake Chain Management Plan

January, 2007

<u>Plan Partners</u>

Sawyer County
Lac Courte Oreilles Tribe
Wisconsin Department of Natural Resources
Great Lakes Indian Fish and Wildlife Commission
Round Lake Property Owners Association
Tiger Cat Lake Association
Osprey Lake Association

PLAN CONTENTS

PLAN CONTENTS

FIGURES

EXECUTIVE SUMMARY

ROUND LAKE CHAIN
MANAGEMENT PLAN

Chapter 1
INTRODUCTION and OVERVIEW

The primary lakes discussed in this plan include: the Tiger Cat Flowage, a 1,911 acre impoundment created by a county-owned dam; Big Round Lake, a 3,054 acre lake known for high water quality and recreation; Little Round Lake, a 230 acre lake that is directly connected to Big Round Lake with a county-owned dam to regulate water levels on Big and Little Round lakes; and Osprey Lake, a 208 acre lake that is mostly located on the Lac Courte Oreilles Reservation. Osprey Lake is relatively undeveloped with a large portion surrounded by wetlands and a natural outlet to Lac Courte Oreilles Lake.

WATER HISTORY

Historically Big Round Lake was connected to Little Round Lake by a wetland area and channel. There was also an outlet from Little Round into Osprey Lake (formerly known as Squaw Lake) and from there to Lac Courte Oreilles Lake by a natural watercourse east of the constructed channel under Carlson Road. As the area became more populated the wetland area between Big and Little Round was filled for construction of Highway B, leaving a small channel between the lakes. The natural outlet from Little Round was also filled for the construction of a private road.

In the 1930's there was a prolonged drought that depleted lake water levels in the region. In 1937 Sawyer County requested permission to divert surplus water from the North Fork of the Chippewa River to Round Lake to restore water levels that had dropped as much as 10 feet below previous levels. Round Lake was considered a premiere lake, vital to tourism and the tax base, and the restoration of normal water levels was a high priority. As a solution, the Tiger Cat dam was designed to create a flowage and raise water levels enabling water to reach Round Lake by diversion canals linking small lakes. Canal No. 1 joined the Tiger Cat Flowage to Burns Lake, Canal No. 2 joined Burns to Placid Lake; Canal No. 3 conducted the water from Placid to a natural depression or slough; and Canal No. 4 connected the slough with Round Lake and included a control dam to regulate the amount of water into Round Lake (Lake Placid Dam – DNR File Number 57.31). The project was completed in 1940 and water levels did return to normal on Big Round. The gates on the Placid Control Dam were closed on October 28, 1940.

Although the control dam remained closed, water levels in Big Round continued to rise. In order to maintain normal water elevations an outlet for Big and Little Round lakes was necessary. In 1942 two 36" culverts were installed at Hwy. B between the lakes and by 1943 an outlet channel from Little Round to Osprey Lake was constructed under Carlson Road with a dam (DNR File Number 57.34) at the outlet of Little Round. A normal water elevation of 77.0 feet was established by the Public Service Commission in 1941. During this period the outlet stream from

Osprey Lake was spanned by a bridge on World's End Resort Road. In a 1950 correspondence from J.C. Cavill, General Superintendent of the Department of the Interior to the Public Service Commission of Wisconsin, a reference is made to two 24" culverts under World's End Resort Road. In 1970 this portion of the road was abandoned and reconstructed slightly downstream as part of the new County Highway NN. There are currently two 36" culverts at the stream crossing.

Initial normal elevation of the pond created by the Tiger Cat Dam (DNR File Number 57.30) was 90.0 feet. In 1949 application was made to raise the level to 90.5 to provide better navigation between the various lakes in the Tiger Cat system. During the subsequent Public Service Commission hearing, concerns were raised by individuals on Round and Lac Courte Oreilles lakes and a further study of how water levels between the three systems were related was requested. The hearing was held open to allow an experimental level of 90.5 to determine effects on other lakes. In June 1950 the Public Service Commission concluded their findings and granted the 90.5 level provided: diversion from Tiger Cat to Round Lake requires permission from the Public Service Commission; the diversion control structure at Lake Placid must be locked; and the partially constructed channel from Little Round to Osprey Lake be kept blocked at the elevation of natural ground level to allow excess water to flow towards Osprey Lake by natural ground contours.

In 1983 Sawyer County requested permission to raise the authorized level of the Tiger Cat Flowage to 91.34 feet (approximately 10 inches) to again improve navigation. Following a public hearing, the request was approved in 1984 by the Wisconsin Department of Natural Resources.

There is a long history of complaints regarding water levels on Big Round, Little Round and Osprey lakes. Several agencies including the Public Service Commission, Army Corps of Engineers and the Department of Natural Resources have made surveys and reviewed the various orders and historic records pertaining to the water levels. Additional comments regarding water levels within the chain have been made by Tiger Cat Flowage property owners, the Lac Courte Oreilles Tribe and the Town of Bass Lake Board of Supervisors. The levels of the various lakes are affected by rainfall, groundwater seepage, and the increased impervious surfaces that are a result of development. There are also multiple control points which affect water levels within the chain. The primary water level control for a specific water body within the chain is dependent on the hydraulic situation.

MANAGEMENT PLAN WORK GROUP DEVELOPMENT

On July 1, 2004 Sawyer County filed a petition with the Wisconsin Department of Natural Resources requesting a clarification of orders relating to the water level on Round Lake. As a result, a work group was formed in May 2005 to begin the process of clarifying the issues, identifying the needs of the resource and developing management recommendations.

The work group included individuals from lake associations, county, tribal and town government, and the Department of Natural Resources (DNR). Members of the work group are:

Tom Aartila, Upper Chippewa River Basin Supervisor, DNR
Paul Cunningham, Fishery Biologist, DNR
Frank Dallam, Dam Safety, DNR
Carole and Wayne Dannehl, Osprey Lake Property Owner's Association
Peter David, Wildlife Biologist, Great Lakes Indian Fish and Wildlife Commission
Jan Eck, Sawyer County Land and Water Conservation
Gary Gedart, Sawyer County Highway Commissioner and Town of Hayward Supervisor
Kris Goodwill, Attorney, Lac Courte Oreilles Tribal Government
Jim Hausman, Property Owner, Round Lake
Mic Isham, Lac Courte Oreilles Tribal Governing Board
Tom Jerow, Regional Water Leader, DNR
Dave Kafura, Water Regulation, DNR
Kris Mayberry, County Clerk, Sawyer County
Dale Olson, Conservationist, Sawyer County
Shirley Riedmann, Sawyer County Board of Supervisors
Stan Strainis, Tiger Cat Lakes Property Owners Association and
Town of Round Lake Supervisor
Kris Tiles, Facilitator, DNR
Dan Tyrolt, Environmental Engineer, Lac Courte Oreilles Conservation Department
Bill Whitlock, Round Lake Property Owners Association
Representatives from Weld, Riley, Prenn & Ricci, S.C., Legal Counsel, Sawyer County

PLAN PROCESS and CITIZEN INVOLVEMENT

The work group reconvened in December 2005 and met on a monthly basis to clarify the initial issues and develop a format for the management plan. A technical team was established in June 2006 to facilitate the process. Members of the technical team included: *Aartila to add language describing technical team duties*

Tom Aartila, Upper Chippewa River Basin Supervisor, DNR
Paul Cunningham, Fishery Biologist, DNR
Frank Dallam, Dam Safety, DNR
Dave Kafura, Water Regulation, DNR
Dale Olson, Conservationist, Sawyer County
Dan Tyrolt, Environmental Engineer, Lac Courte Oreilles Conservation Department

In addition to the work group and technical team, interested members of the public often attended the meetings and were offered the opportunity to comment on the matters discussed.

Members of the group participated in tours by bus and boat to better understand the complexity of the water system.

An initial draft plan was submitted in *DATE* to the following for comment:

- Lac Courte Oreilles Tribal Governing Board
- Great Lakes Indian Fish and Wildlife Commission
- Sawyer County Land and Water Conservation Committee
- Sawyer County Board of Supervisors
- Department of Natural Resources

In *DATE* the public was invited to review the proposed plan and comment. *More specific information will be added describing the public meeting and subsequent actions.*

PLAN GOALS/VISION

The work group developed the following vision statement to guide the process and establish goals:

> *To protect and enhance the ecological and cultural characteristics of the Round Lake chain-of-lakes through sustainable management.*

Plan Goals/Vision will be included in Executive Summary.

PARTNER ROLES

Have each partner develop language to describe their role?

Sawyer County

Great Lakes Indian Fish and Wildlife Commission

Lac Courte Oreilles Tribe

Wisconsin Department of Natural Resources

Round Lake Property Owners Association

Tiger Cat Lake Association

Osprey Lake Association

CHAPTER 2
RESOURCE CONCEPTS and POLICIES

WATER RESOURCES

WATER QUALITY

In Wisconsin, much of the regulations pertaining to water quality stem from the Public Trust Doctrine which protects the navigable waters of the State and holds them in trust for everyone. Several federal agencies also maintain authority over navigable waters including the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Natural Resources Conservation Service and U.S. Fish and Wildlife Service. Tribal and local governments also have laws and regulations affecting water quality. The Lac Courte Oreilles tribal government has also adopted ordinances such as the Shoreland Protection Ordinance to protect water quality on the reservation.

Goals and standards for surface water quality are adopted at the federal, tribal and state levels. Standards are based on the intended use of the waterbody and then categorized. For instance, a waterbody may be intended to support recreation, irrigation, or meet drinking water standards. At a minimum, all surface waters should support aquatic life. The Lac Courte Oreilles Conservation Department closely monitors water quality on all water bodies located on the reservation.

The designated use and corresponding standard for a specific surface water also determines the water quality monitoring necessary to make the determination of whether the waterbody can support its intended use. Surface waters that are found to support their intended use(s) are scored as “GOOD” while those that can not meet one or more are scored as “IMPAIRED”. Waters can be further categorized by designating them an Exceptional or Outstanding Resource Water.

Over time, lakes naturally change when sediments and nutrients accumulate as a result of natural causes. This process is known as eutrophication. Cultural eutrophication is caused by human activities which accelerates the natural processes. Determining the extent to which human activities affect water quality is important in ensuring surface waters meet or exceed the designated standards.

Monitoring surface water quality provides valuable information and insight into eutrophication levels and the overall health of a lake. There are many ways to monitor surface water quality including physical measurements (flow and turbidity), chemical measurements (nutrients and pesticides) and biological measurements (aquatic plant and animal life). By collecting data over an extended period of time an accurate appraisal of surface water quality can be developed. While there are many reasons to monitor water quality, the five major purposes are to:

1. identify changes or trends in water quality over a period of time;
2. determine specific water quality problems that exist or may be developing;
3. obtain information to be used in development of prevention or remediation projects;
4. provide an assessment of the success of implemented prevention and/or remediation projects; and
5. provide baseline data when responding to emergency situations caused by hazardous spills or extreme natural events.

HYDROLOGY

A simple definition of hydrology is the study of how water moves and is distributed. This includes surface water, ground water, and precipitation as part of the hydrologic cycle. While it may be possible to make predictions with regard to future water movement and levels, the predictions are based on historic data which may or may not be an accurate representation of future hydrology. Both natural (precipitation or evaporation rates) and man-made (construction and impervious surfaces) elements may change hydrology.

AQUATIC PLANTS

Native aquatic plants play numerous vital functions in a lake. Depending on the type of plant these functions may include:

- habitat for fish, insects, and small invertebrates
- food for fish and wildlife
- oxygen producers
- spawning areas for certain species of fish in early spring
- stabilize marshy borders of the lake
- protect and stabilize shorelines from wave erosion
- nesting sites for waterfowl and other marsh birds
- providing opportunities for human consumption

FISHERY RESOURCES

In addition to the standard State of Wisconsin, Department of Natural Resources regulations that guide fishery resources, Sawyer County is within the territory ceded to the United States by the Lake Superior Chippewa Tribes. Treaties establish fishing rights for members of the signatory treaty tribes within this area and also guide the utilization of fishery resources. The Great Lakes Indian Fish and Wildlife Commission is an intertribal regulatory agency involved in the utilization and monitoring of off-reservation resources.

WATER LEVELS

There are a number of factors that affect water levels including:

- seasonal precipitation changes
- unusual weather patterns including drought and prolonged heavy rains
- groundwater changes
- impervious surfaces
- stream inflows and outflows
- man-made structures (i.e. dams)

The majority of these factors are naturally occurring while some have human influences. They also may have cumulative affects that can cause water level extremes. For instance, heavy snowfall during the winter followed by a rapid spring thaw and rain can cause significantly higher water levels in a short period of time.

Fluctuations in water level may have a wide variety of consequences for water quality, habitats, fisheries, and human activities. Stressful conditions may occur in low water situations that impact fisheries and change habitats. Many aquatic invasives species thrive in low water and may become more prevalent. High water levels have other potential impacts including increased nutrients from runoff and the potential failure of older septic systems located near shorelines. Navigation is often impacted in both low and high water scenarios.

SHORELINE RESOURCES

The near shore buffer area along lakes, rivers, and streams is a critical element that protects waterways from erosion and flooding. Natural buffers are also necessary to maintain healthy fisheries, wildlife habitat, and water quality. The amount and variety of natural vegetation, soil type, and amount of slope are the primary factors that influence the success of a buffer.

Generally, a smaller buffer width is adequate in areas with dense vegetation, undisturbed soils, low shoreland slope, and a relatively low intensity of human activities, such as park land or a low density of residences. Larger buffers are necessary for areas with steep shoreland slopes, and more intense land use, such as paved areas and roofs. Site specific conditions vary too greatly to make a definitive conclusion on the effectiveness of the 35' buffer requirement and the 75' structure setback, but these standards can be expected to provide at least moderate sediment trapping and nutrient and toxicant retention in situations in which slopes are not extreme, runoff volume is moderate, and the soil outside the buffer is not severely disturbed. A minimum buffer cannot provide adequate sediment control during construction if proper erosion and sediment control techniques are not practiced. Natural wetlands adjacent to shorelines provide an effective water quality buffering function.

Policy makers and planners need to identify the correct tools to address a particular water quality situation. Stormwater (runoff during a rainstorm or snowmelt) impacts have a great influence on water quality in developed areas with stormwater inputs. In these developed areas, current shoreland zoning standards alone are inadequate to protect water quality and must be supplemented with adequate standards for stormwater treatment. Shoreland standards that limit the amount of impervious surfaces per lot are an important first step in addressing stormwater issues. Watersheds which accumulate more than 8% impervious surfaces are usually considered imperiled due to runoff.

In larger watersheds, inputs from streams running through agricultural land greatly influence water quality. This is hardly the case in these lakes where the majority of the land is forested. Though forested watersheds present the fewest water quality impacts, buffer standards are critical in protecting water quality as the watersheds are logged.

In smaller lakes, shoreland zoning standards can play a large role in protecting water quality because the shoreland zone accounts for a larger proportion of the nutrient delivery to the lake. A useful measure for planning purposes is the ratio of drainage area to lake area, with a smaller ratio indicating that lakeshore buffer standards will be relatively more important to the lake's water quality.

Impacts to water quality from shoreland development operate on a cumulative level. Controlling the density of development is an essential aspect in meeting water quality goals. The issue of cumulative impacts also arises in connection with protecting aquatic habitat, wildlife habitat, and natural beauty. Additional information regarding shoreline regulations can be obtained by contacting the following:

- Wisconsin Department of Natural Resources – www.dnr.wi.gov
- Lac Courte Oreilles Tribal Administration – www.lco-nsn.gov
- Lac Courte Oreilles Conservation Department – www.lco-nsn.gov/entities
- Sawyer County Zoning Department – zoning.sec@sawyercountygov.org

FORESTS

In lakes where the majority of the land is forested there are generally fewer water quality impacts. Best management practices and buffer standards are critical in protecting water quality as the watersheds are logged. It has been determined that wider buffer standards may be necessary to prevent the creation of optimal beaver habitat along streams.

AQUATIC INVASIVES

Plants and animals that are found beyond their typical or native range are considered to be a non-native species. Other common terminology used to label invasive species includes non-indigenous, alien or exotic species. Some of these species will not survive outside their native range, while others readily adapt to new sites where they often are not restricted by their natural predators and competition and can develop into nuisance populations. The species may also become invasive, displacing native species that have not developed means to compete with a new plant or animal.

Aquatic invasive species have been introduced unintentionally by international shipping, garden and aquarium hobbyists or when unused bait is discarded. Other species have been introduced intentionally for various reasons and become invasive, displacing the native plants and animals where they were introduced. After being introduced, non-native species can be inadvertently transported to new sites via recreational users. This process multiplies the number of infested sites over a wide geographic area. The spread of invasive species also occurs by natural processes such as seed dispersal and migration into adjacent waters.

Regardless of how aquatic invasive species are introduced, they can cause significant negative impacts to our ecology, economy, and recreation. From an ecological standpoint, invasive species can significantly alter aquatic habitat harming and/or displacing the native animals and plants. Aquatic invasives can also cause significant recreational hardship as when plants impair access to waterways or reduce native sport fish populations. Economic impacts occur from the loss of recreational revenues, costs to repair or maintain affected infrastructure and the expenses related to controlling or eradicating invasive species.

On a local level, there is a combined effort by individuals, organizations and agencies to provide education on preventing the introduction of aquatic invasive species; monitoring, mapping and treating known sites where aquatic invasive species are present; and rapid response treatment of newly discovered infestations.

RECREATION

All the lakes in the Round Lake chain-of-lakes have significant recreational value to a variety of users. Any alteration to the management of the system has the potential of affecting recreational activities such as access to boat landings, swimming beaches and in particular navigation between lakes.

CULTURAL RESOURCES

The area within the boundaries of the management plan, have been occupied by Native American Tribes since Paleolithic times. Native people depended on the lakes, streams, wetland and upland natural resources for food, medicines, plant gathering, and shelter. The interconnecting waterways provided a convenient means of travel.

Tribal staff will provide additions

JURISDICTION

There are a number of levels of jurisdiction that define public and private rights within the area of the Round Lake water system. Because of the complexity of overlapping, and at times conflicting, jurisdictions the following information does not completely describe the topic and is only intended as a general guide. Appendix D provides further direction to determine how jurisdiction may affect particular individuals or situations. *Tribal staff will provide additional language.*

FEDERAL

The majority of federal jurisdiction and regulatory authority for waters can be traced to the commerce and general welfare clauses in the United States Constitution. A number of regulatory agencies have been established by Congress to administer programs related to waters. These include the:

- U.S. Environmental Protection Agency charged with protecting water quality;
- U.S. Army Corps of Engineers who have jurisdiction of structures and fill placed in navigable waters and wetlands;
- the Federal Emergency Management Agency oversees floodplain management;
- the Bureau of Land Management is responsible for waters on federal land; and
- U.S. Fish and Wildlife and the Natural Resources Conservation Service who work with the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers to maintain surface water quality.

STATE

The State of Wisconsin's regulatory authority over waters is based in the public trust doctrine and includes navigable surface water, groundwater and non-navigable surface waters. The Department of Natural Resources is the primary agency appointed by the Wisconsin Legislature with authority to manage our waters according to the public trust doctrine.

Several additional agencies have authority and jurisdiction in specific instances.

- Agricultural and surface water drainage in rural areas is under the jurisdiction of the Department of Agriculture, Trade & Consumer Protection.
- Construction sites and sewage disposal standards that relate to water quality are administered by the Department of Commerce.
- The Department of Health and Family Services is responsible for setting groundwater (drinking water) standards.

- Great Lakes Indian Fish and Wildlife Commission wardens enforce state conservation laws within the ceded territory.

TRIBAL

Lac Courte Oreilles Band of Lake Superior Chippewa tribal treaties are in effect for the ceded territories which includes the entire subject area. These treaties and subsequent legal decisions are very complex and include issues related to water quality, hunting, fishing, and gathering rights. Indian nations have been recognized by federal law as having sovereignty and therefore have considerable latitude in matters that affect tribal lands and members.

COUNTY

County zoning regulations are the primary source of jurisdiction within the shoreland areas. This area includes land within 1,000 feet of the ordinary high water mark on navigable lakes or flowages and within 300 feet from the ordinary high water mark of rivers and streams. These zoning regulations including building setbacks, lot sizes, impervious surfaces, clearing, and buffers.

LOCAL GOVERNMENT

There are no cities or villages within the subject area. Several towns are located within the immediate area including the Town of Round Lake, Town of Hunter and the Town of Hayward. The Town of Bass Lake is immediately downstream of Osprey Lake.

Towns have the authority via the Wisconsin Constitution and Legislature to regulate zoning, stormwater, and boating that have local impacts. Their authority is limited by the supremacy of state law in certain matters.

<u>CHAPTER 3</u>
RESOURCE INFORMATION, DATA and RECOMMENDATIONS

WATER RESOURCES

The following information is a somewhat technical overview of the water quality on the lakes within the Round Lake chain. In reviewing the information, it is important to understand that lakes change from day-to-day and year-to-year due to natural occurrences as well as human activities. The physical and chemical characteristics of any given lake are unique. For an in-depth explanation of water quality and data interpretation please refer to the University of Wisconsin-Extension publication *Understanding Lake Data (G3582)*.

<u>TIGER CAT CHAIN of LAKES</u>

<u>Water Quality Data</u>

The Tiger Cat Flowage is a soft water drainage impoundment on the headwaters of the North Fork of the Chief River. The Flowage itself is comprised of a chain of lakes. This chain of lakes includes the following water bodies: Upper and Lower Twin, McClain, Burns, Tiger Cat and Placid Lake. Water quality data for portions of this impoundment is available from the Wisconsin Department of Natural Resources (WDNR) Self-Help lake monitoring program. The data can be downloaded from the WDNR website. The chemistry and Secchi disk data indicate that the Tiger Cat Flowage is mesotrophic. The Secchi disk depth may be mostly impacted by tannins in the water. The lake also does not appear to stratify during the summer months.

Average annual Secchi disk values for the deep hole have ranged from a low of 5.5 feet in 1999 to a high of 10.8 feet in 2005. The Average annual Secchi disk values for the Upper Twin monitoring station have ranged from a low of 8.2 feet in 1998 to a high of 15.6 feet in 2004. Since the Tiger Cat Flowage is made of several individual lakes with each of them having water quality parameters that can vary significantly from each other.

<u>Water Quality Recommendations</u>

Implement baseline monitoring in each of the different water bodies of the Tiger Cat Flowage. It is recommended that collection of this water chemistry and Secchi disk data be an on-going effort. By collecting background water quality data on an annual basis, chemical and biological changes that take place in the future can be detected. If detrimental changes are detected, corrective action can often be taken before a lake's water quality becomes badly deteriorated and therefore avoiding expensive lake rehabilitation techniques.

ROUND LAKE

Water Quality Data

Round Lake is a soft-water drainage lake which flows into Osprey Lake. It has a surface area of approximately 3,283 acres and a volume of approximately 100,146 acre-feet with a maximum depth of 74 feet. Approximately 70% of the lake is over 20 feet deep and only about 10% is less than 3 feet deep. The total shoreline of the lake spans 26 miles and the watershed of Round Lake, including the lake surface, encompasses nearly 8,700 acres or 13.6 miles.

Volunteer monitoring has occurred at the deep hole in Round Lake since 1995 for total phosphorus, chlorophyll-a and Secchi Disk. In 1999 as part of a detailed water quality study of the lake, the LCO Conservation Department expanded monitoring to two additional sites on Round Lake and added a site in Little Round Lake. These additional monitoring stations were implemented to gain a better understanding of how the water quality may vary spatially within the lakes. The additional sites for Round Lake included the deep hole in Hinton Bay and the deep portion of Richardson's Bay. Since 1999, annual summer sampling has continued at all of these sites to help determine if any trends in water quality can be observed over time. A trend of improving Secchi disk readings has been observed at the Deep Hole sampling station. See Figures 1 – 17 on pages XX to XX for the annual TSI, total phosphorus, chlorophyll-a and Secchi disk values for all of the Round Lake and Little Round Lake sampling stations.

The available annual water quality data indicates that Round Lake has excellent water quality. Total phosphorus, chlorophyll-a and Secchi disk data are within the oligotrophic category (nutrient poor, minimal algal growth, no recreational use impairments). Water clarity appears to be slightly better than expected based upon total phosphorus and chlorophyll-a concentrations. The seasonal patterns of chlorophyll-a, total phosphorus and Secchi disk readings tend to mirror each other indicating that the lake's algal growth is directly related to the phosphorus levels in the lake.

The comprehensive study completed in 1999 computed phosphorus budget for Round Lake. This study revealed that the total annual phosphorus loading to Round Lake was 2,438 pounds, based on 1998-99 data. Atmospheric (aerial) deposition contributed the largest amount of phosphorus. By applying a wet and dry atmospheric deposition rate of 0.27 pounds/acre/yr to the surface of Round Lake, the atmospheric component of the phosphorus loading is computed to be 880 pounds or 36.1%. The next largest phosphorus source to the lake is from Agriculture (701 pounds or 28.8%). The computations reveal that septic systems and residential use contribute 230 pounds (9.4%) and 209 pounds (8.6%) of the annual load respectively. Wetlands are estimated to contribute only 13 pounds (0.5%) and the forested portion of the watershed contributes 302 pounds of phosphorus which is 12.4% of the loading. The inlet from Placid Lake is estimated to contribute only 24 pounds (1.0%) and the inlet from the wetland north of the Placid Lake inlet is estimated to contribute 43 pounds (1.8%). Internal loading is also assumed to be relatively minor in contributing 35 pounds (1.4%) of the total phosphorus load. See Figure 17.

In addition to the annual sampling of total phosphorus, chlorophyll-a and Secchi disk, Round Lake and Little Round Lake were sampled for zooplankton and phytoplankton during the summers of 2003 - 2005 at all of the sampling locations. Although there were spatial and temporal differences in the total zooplankton density, density (per feet3) was generally lower at the Deep station. At the Deep, Hinton and Little Round stations Bosmina density increased during the summer. Only at the "Rich" stations did Bosmina density decline from June to September. Other zooplankton taxa density was variable during the summer at these four stations. Overall, total zooplankton density in Round Lake was lower than other lakes surveyed. Diversity was fairly consistent between stations and sampling times and was slightly higher than the average for all lakes sampled. The Gannon Index indicated higher than average productivity during the entire summer at all locations. Small Cladoceran were common and abundant at all locations, indicating that SSP may be an important factor shaping the plankton assemblage in this lake. The ratio of Daphnia to Bosmina is variable during the season, indicating that the quality of food resources may be variable over the summer. Chydorus were detected regularly at the Hinton station and on one occasion each at the Deep station and the Little Round station. This zooplankton is adapted to feed in vegetated areas or on bottom detritus that may be more abundant at these locations. Holopedium, typically found in cold clear lakes, is detected in this lake. The invertebrate predator Chaoborus is detected at all sampling locations except the Hinton station. Compared to other lakes in this study, total zooplankton density in August was near or above average. The Hinton station had the greatest density, followed by the Rich station, and then the Deep and Little Round locations, which had near equal density. Diversity across the four locations spanned the intermediate range of values for all lakes sampled in August. The Hinton station had the greatest density, followed by the Little Round, Rich, and Deep stations. In August, the four stations had intermediate productivity and low to moderate SSP compared to other lakes in the study. The averages and ranges for density, diversity, Gannon index, and the size indices were similar from summer 2003 to summer 2004.

The most recent study conducted on Round Lake was a paleoecological study which was completed in June of 2005. The objectives of this study were to:

1. determine changes in nutrients during the last 130 years;
2. determine if the frequency of algal blooms has increased during the last century;
3. determine if the macrophyte growth has changed during the last century; and
4. estimate the major sources of increased nutrient input.

The sediment core from Round Lake collected for the paleoecological study indicated that prior to 1900 the lake was largely un-impacted by watershed activities associated with European settlers. These activities would have included logging and early tourism. As European settlement increased after 1900 subtle changes occurred in the diatom community indicating a slight increase in phosphorus levels and most likely a slight decline in water clarity. This change was not reflected in the geochemical record indicating any changes were minor. The diatom community continued to change during the first half of the twentieth century but the lake's environment was most affected after 1940. Around the middle of the twentieth century nutrient levels in the lake increased and the amount of aquatic vascular plants increased. These changes resulted in the slight decline in oxygen levels in the deepest waters of the lake.

The greatest change in the geochemical record for Round Lake has occurred during the last two decades. The soil erosion has not increased very much but there has been a significant increase in elements indicative of shoreline development. These elements, uranium, calcium, nitrogen, and phosphorus are mostly associated with soil amendments applied to lawns such as fertilizers and to neutralize acidity. During the last twenty years zinc deposition has also increased reflecting increased development in the watershed. Although the diatom community has not indicated a significant change in the lake's water quality during this time period, the large increase in manganese deposition indicates a significant decline in the oxygen levels of the bottom water of the lake. The decline in hypolimnion oxygen is a classic sign of increased eutrophication of a lake. Although the current water quality of Round Lake is good, the sediment core indicates that shoreline development is having a significant impact on the lake and if control measures are not instituted the lake's water quality could begin to significantly decline.

In summary the paleoecological study for Round Lake indicates that:

1. The mean sedimentation rate in the main lake basin is one of the lowest measured in 45 lakes in Wisconsin.
2. The historical trend in the sedimentation rate is fairly constant from 1885 until the 1980s. The rate has significantly increased during the last 2 decades.
3. Geochemical profiles indicate an increase in urbanization beginning around 1920 and accelerating during the last 2 decades.
4. The early urbanization most likely was a result of road and cottage construction. Associated with this were increased soil erosion and the input of the nutrient, phosphorus.
5. The increased urbanization during the last 2 decades probably reflects improvements in shoreline properties as well as increased construction in the watershed. Associated with this has been increased deposition of soil amendments used to develop and maintain lawns, e.g. fertilizer, nitrogen, and lime.

6. The dissolved oxygen levels in the deepest waters of the lake have declined since the 1970s. This likely is the result of increased productivity in the lake from both algae and attached plants.
7. The diatom community indicates that water quality began to slowly decline during the first two decades of the twentieth century. The degradation accelerated around 1950 with a slight increase in open water phosphorus levels and a more significant increase in attached plants (macrophytes).

Round Lake Water Quality Recommendations

It is recommended that collection of water chemistry and Secchi disk data be an on-going effort. By collecting background water quality data on an annual basis, chemical and biological changes that take place in the future can be detected. If detrimental changes are detected, corrective action can often be taken before a lake's water quality becomes badly deteriorated and therefore avoiding expensive lake rehabilitation techniques.

Figure 1

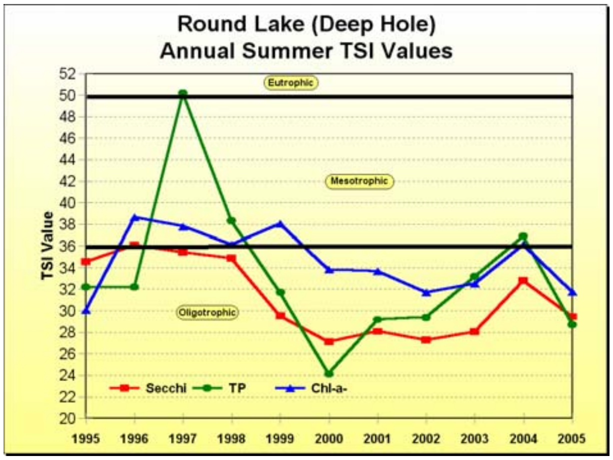


Figure 2

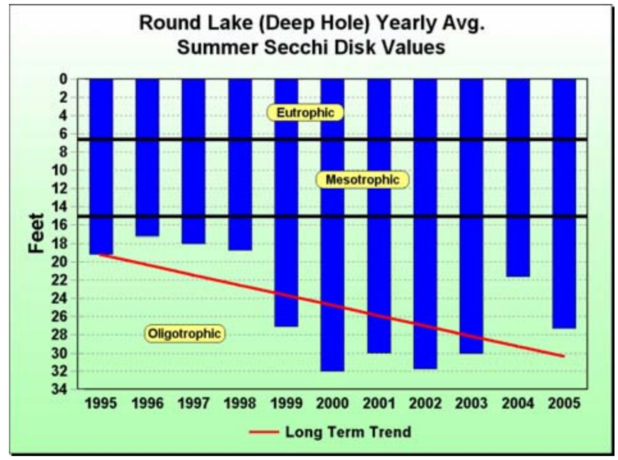


Figure 3

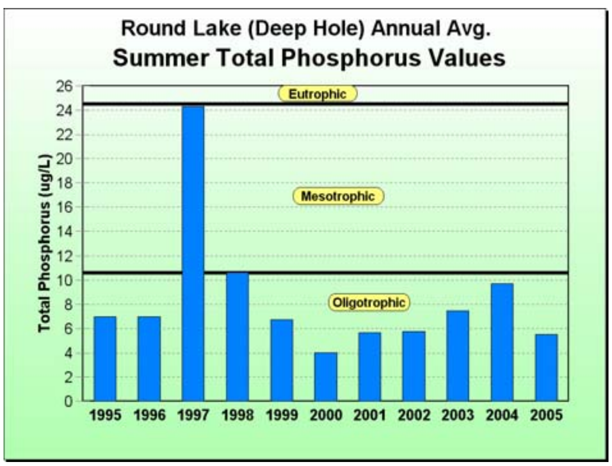
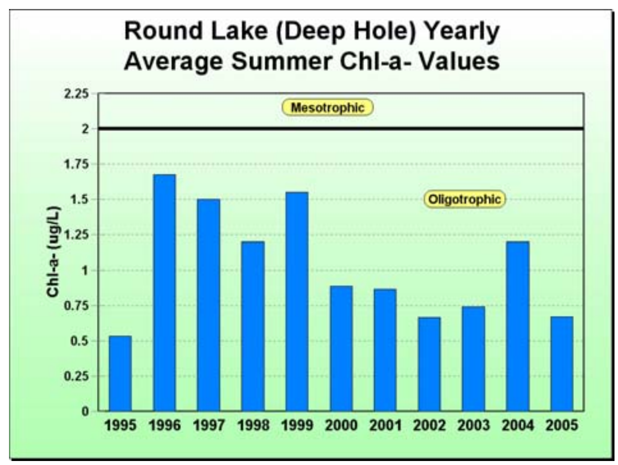


Figure 4



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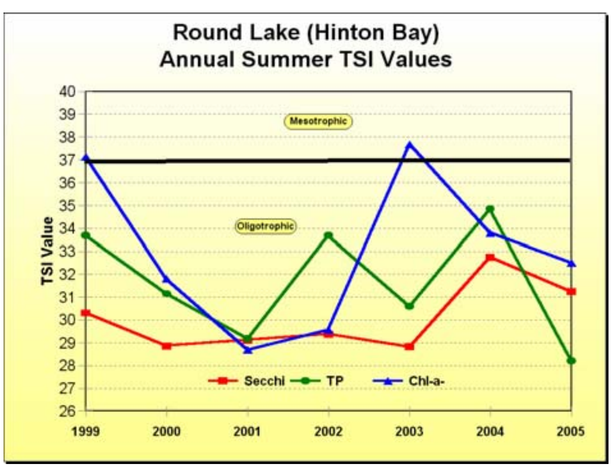

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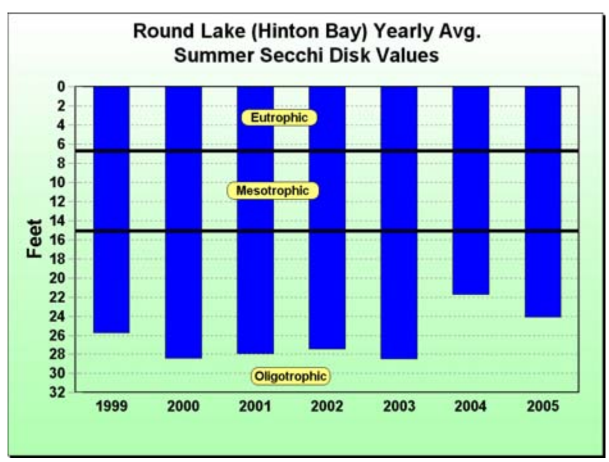

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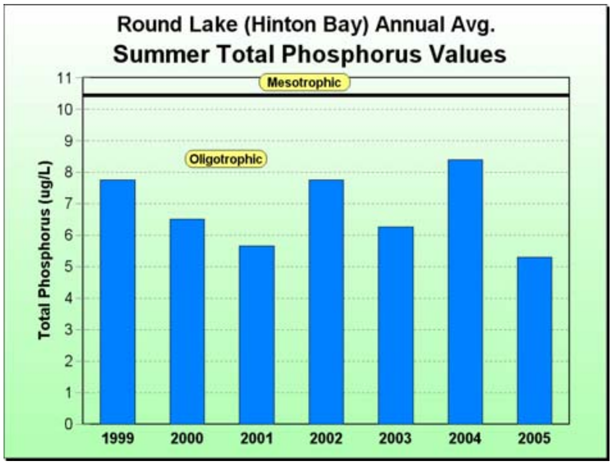

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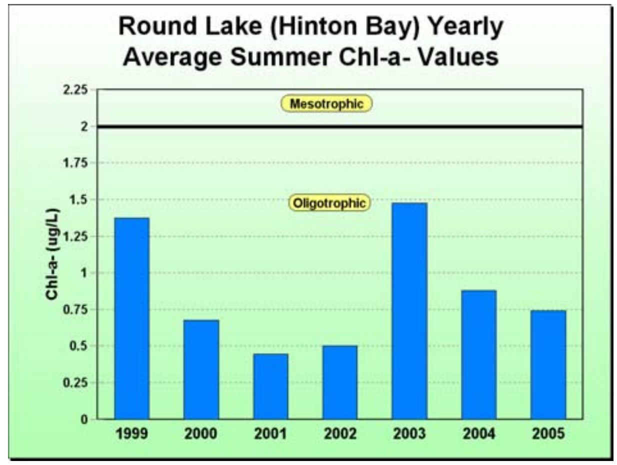

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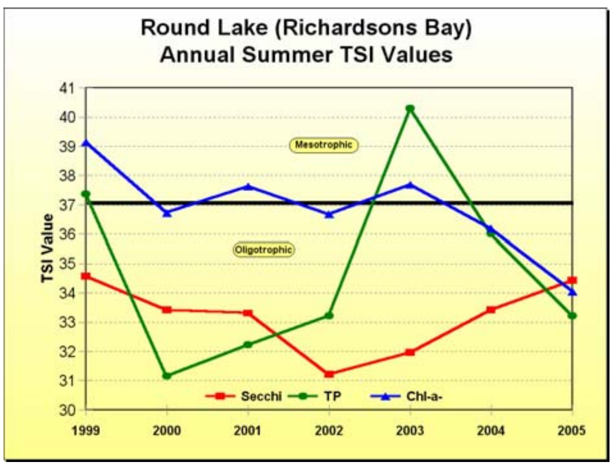

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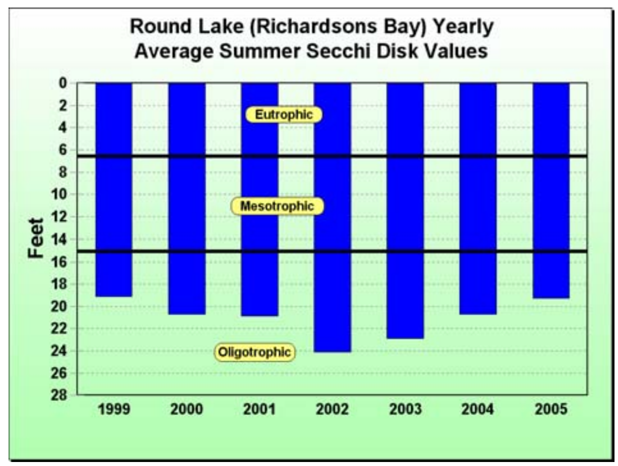

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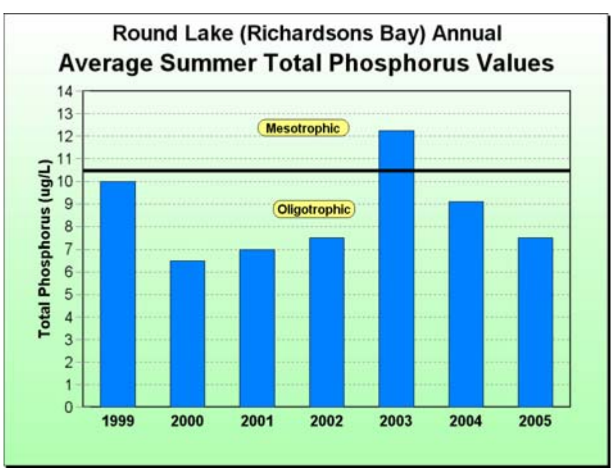

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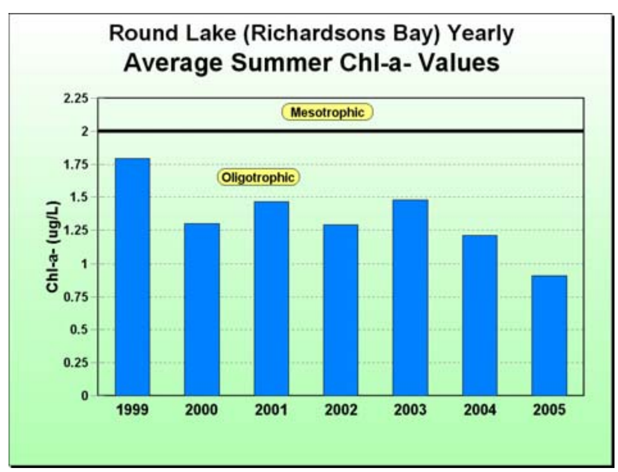

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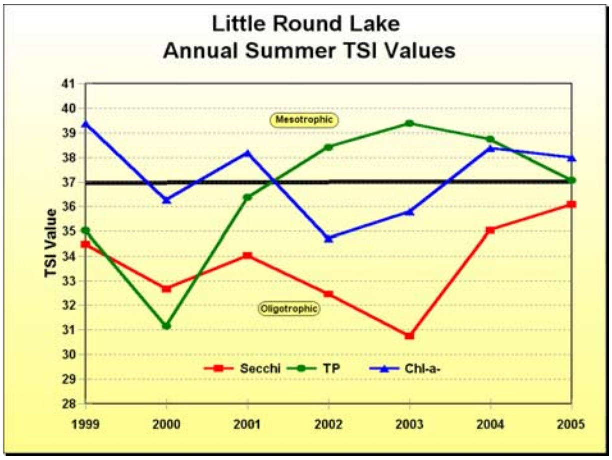

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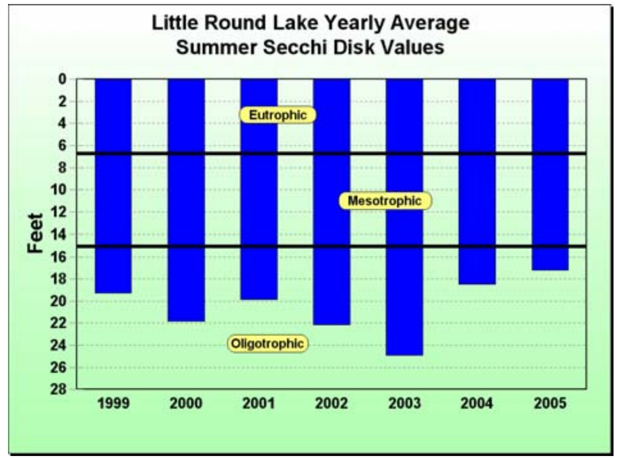

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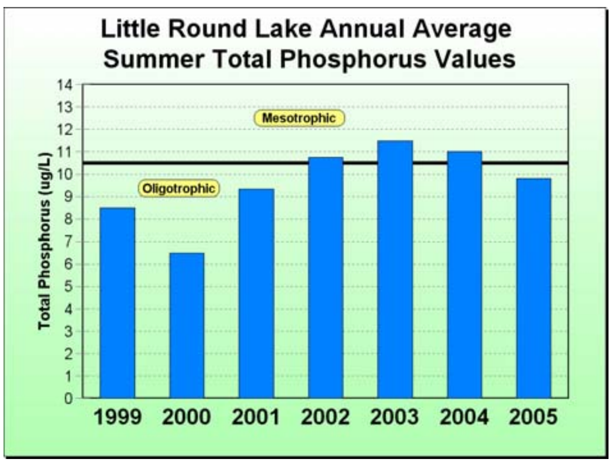

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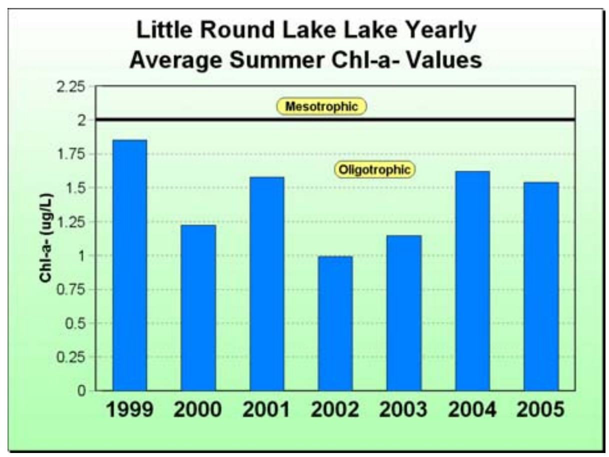

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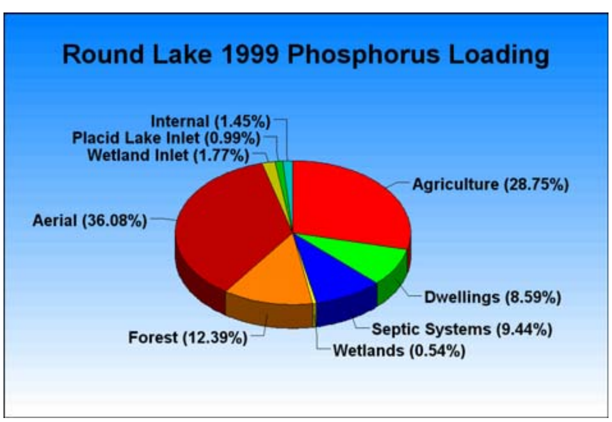


OSPREY LAKE

Water Quality Data

Osprey Lake is a soft-water drainage lake located in the Couderay River watershed. It has an inlet stream from Little Round Lake and an outlet flowing into Lac Courte Oreilles Lake. It has a surface area of approximately 208 acres and a volume of approximately 2,546 acre-feet. The maximum depth is 32 feet. Approximately 31% of the lake is over 20 feet deep and 18% is less than 3 feet deep. The total shoreline of the lake spans 5.86 miles.

The Lac Courte Oreilles Conservation Department collected water quality data on Osprey Lake since 1998 and in 2004 a comprehensive water quality study was completed. The study was conducted to assess the existing water quality of Osprey Lake and to look at historical water quality data to determine if any trends in the water quality could be noted. The following water quality data and reports are available for Osprey Lake:

- Osprey Lake Water Quality Study 2004 Water Year. This report summarizes the results of a water quality investigation of Osprey Lake. Basic in-lake and tributary water quality data were collected from April through September of 2004 to determine the existing conditions of the lake. This data was then used to estimate annual hydrologic and phosphorus budgets for the lake in order to examine the relationship between watershed land use activities and lake water quality. The report also discusses the trophic state indices of the lake, the zooplankton and phytoplankton assemblages of the lake and provides isopleth diagrams for pH, dissolved oxygen, temperature, total dissolved solids and specific conductance.
- Surface Waters Resources of Sawyer County, WDNR 1969. Provides a limited discussion of Osprey Lake with a historical Secchi disk reading of 20 feet in 1969.
- Secchi disk values from 1998 - present
- Total phosphorus values from 2000 - present
- Chlorophyll-a values from 2000 - present
- 2003 macro-invertebrate sampling data
- 2003 and 2004 zooplankton and phytoplankton data

The water quality data indicates that Osprey Lake has water quality consistent with a north temperate oligotrophic lake. Total phosphorus, chlorophyll-a, and Secchi disk averages are generally within the oligotrophic category (low productivity and no recreational use impairments). The annual summer averages tend to fluctuate near the borderline between oligotrophic and mesotrophic indicating that a slight change in water quality conditions could change the trophic status of the lake. The seasonal patterns of chlorophyll-a, total phosphorus and Secchi disk readings tend to mirror each other suggesting the lake's algal growth is directly related to phosphorus levels in the lake. See Figures 18-21 for the annual TSI, total phosphorus, chlorophyll-a and Secchi disk values.

Figure 18

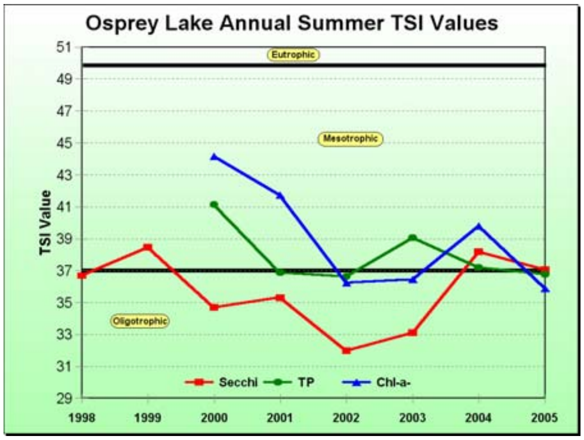


Figure 19

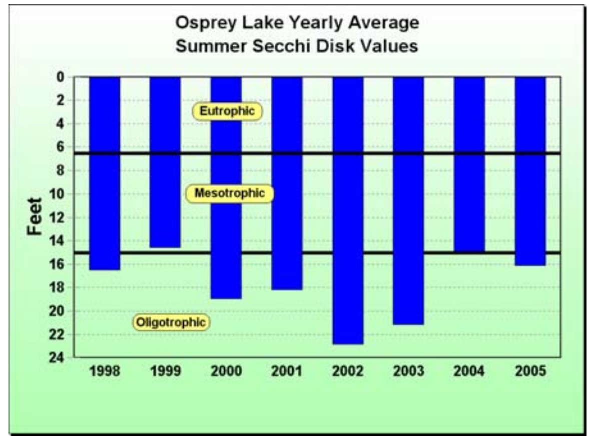


Figure 20

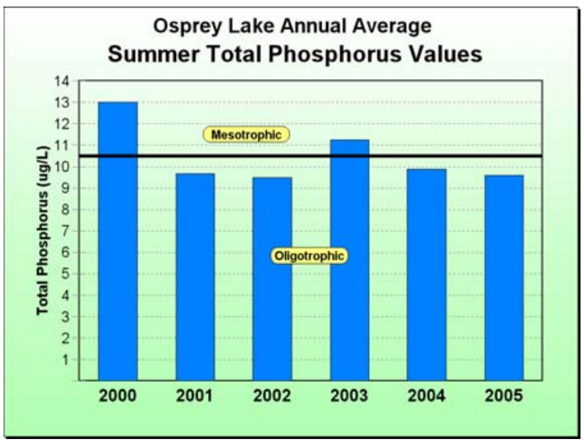
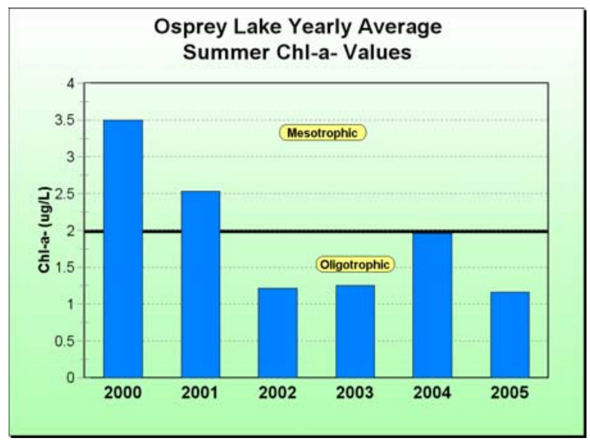


Figure 21

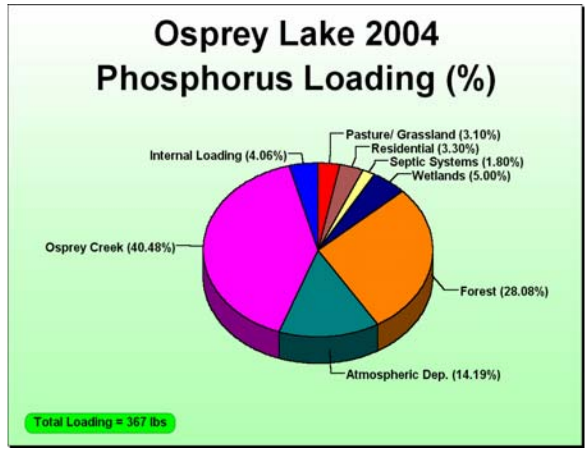


The zooplankton data collected for Osprey Lake during 2004 show that from June to September Osprey Lake had lower than average zooplankton density, with only two dates (early June and mid-August) having densities greater than 150 animals/feet3. There were few trends in individual taxa during the summer, except Calanoid copepods, which in general declined from June to September. Diversity was also fairly consistent across the sampling dates and near average compared to other lakes in the area. Productivity, according to the Gannon Index was near average at the beginning of the sampling period, but increased from June to September.

Small Cladoceran dominate over larger species on all dates except the first sample in June, indicating that size selective predation (SSP) by fish may be an important factor in shaping the plankton assemblage. Only in June were there more Daphnia than Bosmina in Osprey Lake, again showing the dominance of smaller species and pointing to possibly greater food quality after early June. Compared to other lakes in the area during August, Osprey Lake had near average total zooplankton density and diversity, high productivity, and possibly high SSP.

The phosphorus budget modeling indicated that the total annual phosphorus loading to Osprey Lake was 367 pounds, based on 2004 data. The inflow water from Osprey Creek contributed the largest amount of phosphorus at 149 pounds (40%). The next largest source was the forested portion of the watershed which contributed 103 pounds of phosphorus which is 28% of the total loading. The wetlands were estimated to contribute 18 pounds (5%). By applying a wet and dry atmospheric deposition rate of 0.25 pounds/acre/yr to the surface of Osprey Lake, the atmospheric component of the phosphorus loading is computed to be 52 pounds or 14%. Residential use and septic systems contribute 12 pounds (3%) and 7 pounds (2%) of the annual load respectively. The pasture/grassland contributed 11 pounds (3%). The computations reveal that internal loading contributes 15 pounds (4%) of the total phosphorus load. See Figure 22.

Figure 22



Long-term data going back to 1998 was available for Secchi Disk readings. Data was also available dating back to 2000 for total phosphorus and chlorophyll-a. An evaluation of the historic total phosphorus, chlorophyll-a, and Secchi disk monitoring data indicates that no statistically significant trends exist over the time frame for which data is available. The differences in total phosphorus, chlorophyll-a, and Secchi disk values can be attributed to natural variation. The summer TSI values indicate that water clarity is typically better than what would be expected based upon the total phosphorus and chlorophyll-a- readings. Even though the TSI values were not the same for all of the parameters, they tended to follow the same general pattern, once again suggesting that the lake is phosphorus limited.

In summary, an evaluation of the long-term monitoring data for Osprey Lake indicates that no statistically significant trends exist based upon the available monitoring data. The variations from year to year can be attributed to natural variation over this time period. It should be noted that even though the existing data may indicate that a trend doesn’t exist, one still may exist. There may just not be enough data to show or support the trend.

Osprey Lake Water Quality Recommendations

Collect water chemistry and Secchi disk data on an on-going basis. By collecting background water quality data on an annual basis, chemical and biological changes that take place in the future can be detected. If detrimental changes are detected, corrective action can often be taken before a lake's water quality becomes badly deteriorated and therefore avoiding expensive lake rehabilitation techniques.

It is also recommended that a paleoecological study be completed for Osprey Lake. This study would help to:

1. determine changes in nutrients during the last 130 years;
2. determine if the frequency of algal blooms has increased during the last century;
3. determine if the macrophyte growth has changed during the last century; and
4. estimate the major sources of increased nutrient input.

HYDROLOGY

Hydrologic budget estimates were completed for Round Lake and Osprey Lake in 1999 and 2004 respectively. A component of these hydrologic budgets included estimates of groundwater inflow and outflow to and from the lake. A hydrologic budget for the Tiger Cat Flowage has not been performed. It is important to note that the 1998-1999 water years saw precipitation that was 41% above normal for Sawyer County. This likely had a significant influence on the hydrologic budget components for that year. During a year with "normal" rainfall the groundwater component would likely be an even larger percentage of an overall hydrologic budget.

Tiger Cat Flowage Hydrology

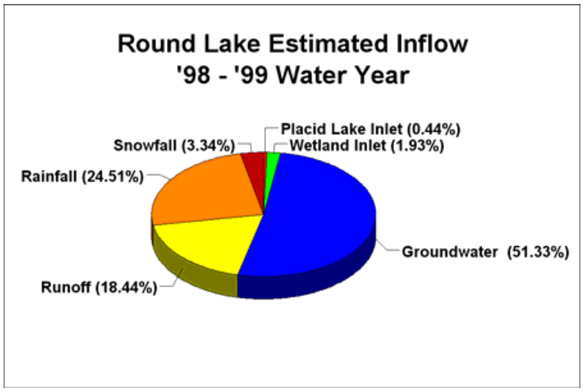
A hydrologic budget for the Tiger Cat Flowage has not been compiled. Completing a similar hydrologic budget for the Tiger Cat Flowage is highly recommended.

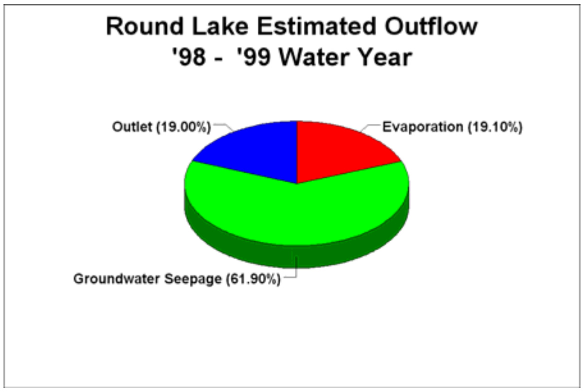
Round Lake Hydrology

The hydrologic budget for Round Lake is based on the 1998-1999 water year (October 1, 1998 through September 30, 1999). The important measurement components used to estimate the Round Lake budget include:

- precipitation
- runoff
- evaporation
- change in lake storage
- stream inflows
- lake outflow
- groundwater base flow

Figure 23 and Figure 24





Figures 23 and 24 represent the estimated hydrologic budget for Round Lake. As the budget indicates, groundwater flow contributes over half of the estimated annual water load to the lake. The significant amount of groundwater contribution is likely resulted from the creation of the Tiger Cat Flowage. The creation of the Flowage raised the hydraulic head of the groundwater up-gradient of Round Lake by approximately thirteen feet. This may benefit Round Lake in times of drought because of the increase in groundwater base flow but during times of heavy precipitation, it may also delay the lowering of the water level.

Direct precipitation on the lake surface was the next largest contributor. This includes rainfall and snowfall. Runoff was also a significant contributor. The inlets to the lake made up the remainder of the annual water load. The watershed runoff volume represents an annual water yield of approximately 17.3 inches from the Round Lake watershed. This runoff yield, divided by the 43.06 inches of total precipitation for the water year, results in a runoff coefficient of 0.402 (40.2% of the total precipitation is estimated to runoff the watershed and reach the lake). The large amount of watershed runoff to reach the lake indicates that watershed runoff can have a significant impact on the water quality of Round Lake.

Evaporation and water leaving Round Lake via the outlet were nearly identical. Both were approximately 19% of the outflow apiece. Groundwater seepage accounted for a major portion of the outflow comprising nearly 62%.

Osprey Lake Hydrology

The hydrologic budget for Osprey Lake based on the 2004 water year (October 1, 2003 through September 30, 2004) was calculated by measuring or estimating the same important components of the budget used for Round Lake.

Figures 25 and 26 present the estimated hydrologic budget for Osprey Lake. The inflow budget indicates that the inlet from Little Round Lake is the major contributor of water to

Osprey Lake. It accounts for over 68% of the inflow. This large contribution of water from Little Round Lake indicates that the water quality of Osprey Lake is influenced by the water quality of Big and Little Round Lakes which are upstream. As the water quality of those lakes change, a corresponding change would also be noted in Osprey Lake. Runoff from the watershed was the next largest with over 20%. The watershed runoff volume represents an annual water yield of approximately 12.2 inches from the Osprey Lake watershed. Direct precipitation on the lake surface, which is comprised of both rain and snowfall, accounted for just over 7% and lake storage comprised the remainder at 3.9%. Groundwater flow does not appear to be significant contributor of the inflow to Osprey Lake.

Water leaving Osprey Lake via the outlet accounted for 81% of the outflow budget. Groundwater seepage was the next largest output at over 13% and evaporation from the lake's surface comprised the remainder at nearly 6%.

Figure 25

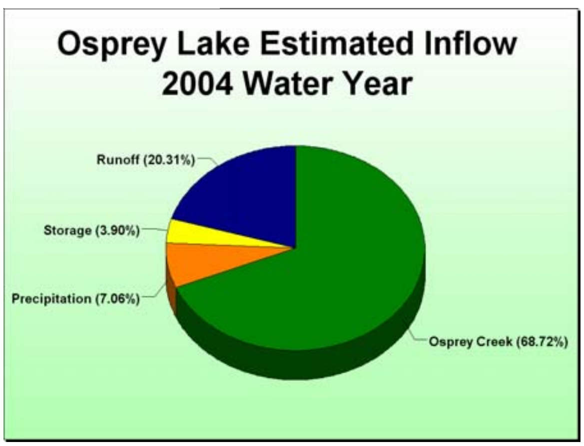
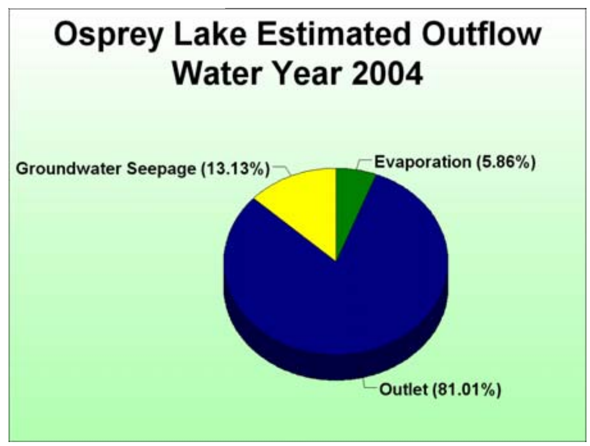


Figure 26



WATER LEVELS

Water level fluctuations are affected by natural and man-made occurrences. In addition, there are water control structures within the Round Lake Water System that are owned and operated by Sawyer County that may influence water levels. The structures are the Tiger Cat Dam, DNR File Number 57.30, Lake Placid Dam, DNR File Number 57.31, and the Little Round Lake Dam, DNR File Number 57.34. Each of these structures has orders issued by the Public Service Commission or the Department of Natural Resources that describe their operations and are included in the Appendix.

The technical team, a sub-group of the management planning work group, reviewed past surveys and agreed to accept the datum on the benchmark on the Little Round Lake dam. All surveyed points will be referenced to the dam benchmark. Historical water level data from 1949 to the present was also reviewed. The lowest water level reported was 75.6 and the highest level recorded at 78.19.

As with all recommendations within this Plan, the technical team and work group recommendations regarding water levels have been made with a strong commitment to fulfilling the stated vision statement:

To protect and enhance the ecological and cultural characteristics of the Round Lake chain-of-lakes through sustainable management.

Recommendations by Technical Team to Manage Water Levels

By consensus, the technical team recommended implementation of a passive system to manage water levels by:

- abandoning the Little Round Lake Dam;
- removal of the wetland fill for the snowmobile trail crossing Osprey Creek;
- removing and actively managing beaver dams on Osprey Creek;
- lowering the CTH NN culverts; and
- changing the Little Round Lake Dam order to reflect management.

A second option the technical team considered would be to maintain a range selected by the work group. The proposed range would be reviewed by engineers and the appropriate modeling accomplished to determine what physical changes may be necessary to maintain the range. This option would also require a request for a change in the Little Round Lake Dam order. The option of maintaining the status quo and making no changes was also considered.

In October 2006, Sawyer County hired the engineering firm of Short, Elliott, Hendrickson, Inc. (SEH) to evaluate the technical team options and various scenarios affecting the Round Lake water system and water levels. This action was discussed and approved by the work group.

Recommendations by Consultant to Manage Water Level

Include SEH findings and resulting actions or implementation

AQUATIC PLANTS

Surveys of the native aquatic plants in Round Lake, Little Round Lake, Osprey Lake and the Tiger Cat Flowage have not been conducted. Therefore, the aquatic plant communities and the roles they play in these lakes are relatively unknown at this time.

Recommendations

As funding becomes available, perform macrophyte and floristic quality index surveys of the lakes.

FISHERY RESOURCES

A stakeholder visioning session for Round and Little Round lakes was held by fisheries staff from the Department of Natural Resources on June 29, 2005. Specific outcomes from the visioning session can be found in Appendix D. The resulting fisheries management plan combines information from the session with statewide angler surveys, onsite creel surveys, input from tribal representatives, and ecosystem capabilities. Implementation of the fishery management plan will be flexible and dependent on resources and funding available to accomplish goals and objectives.

Based on discussions at the visioning session, species were identified that were most important to users in addition to general preferences for size, catch and harvest for the species noted. The sport fish of the most interest in the Round Lake fishery is walleye with a preference for maximizing harvest levels over large fish production. Strong support was shown for a yellow perch fishery characterized by high counts of harvestable-size fish. A previous trend to reduce muskellunge stocking will be reversed due to the strong interest in improving the muskellunge fishery. A balance will be sought to increase the density of muskellunge and to maintain trophy-size fish yet at the same time meet objectives for the walleye and yellow perch fisheries.

Recommendations

- encourage completion of Round and Little Round lakes fishery management plans
- encourage initiation of Tiger Cat Flowage and Osprey lake visioning process
- educate lake property owners and public on the value of maintaining natural, woody material in all lakes in the Round Lake system

SHORELINE RESOURCES

A useful measure is the shoreline development factor, which is a measure of the lake shoreline (Cole 1983). This term originated in limnology, but has been adapted by planners in several lake classification methods as a simple, common sense way to identify lakes subject to greater development and recreational user pressure and is described as "crowding potential" (Minnesota DNR 1976) or "shoreline development factor" (Lontz and Andrews 1981).

One way to measure this factor is by calculating the ratio of shoreline length to water surface area. Other factors being equal, lakes with an irregular shape and therefore a greater length of shoreline per acre of water, will be subject to a greater amount of shoreline development per surface acre of water. These lakes tend to receive a larger total nutrient input from the shoreland area than circular shaped lakes of the same size.

Lake	Acreage	Shoreline (miles)	Public Shoreline (miles)	Shoreline Development Factor	Average Feet/Structure
Little Round	229	6.9	0	1.63	728
Osprey	208	5	0.18	2.40	230
Round	3054	19.7	0.4	2.67	201
Tiger Cat	1911	20	0.4	2.44	830
**Source: Sawyer County Lakes Classification System, F. Goold, NWRPC 1999*					

Runoff Curve Numbers (RCN) are a procedure for estimating surface runoff from rainfall. Essentially, the less vegetative cover and more impervious the surface, the higher the number. Estimates for RCN's have been established using 1972 United States Geological Survey Topographic quadrangles to delineate watersheds within 1,000 feet of a water body, upland cover type, and wetlands. Assumptions were made regarding "improved" parcels, and structure densities from the County lakes classification system that utilized the shoreline development factor. Runoff curve numbers were selected using hydrologic group "B" and were all in the "Good" surface condition. Wetlands were considered to be internally drained. There are some scenarios when wetlands are given a factor of 78 for Runoff Curves, however, in soils in and around the study area they are seldom at capacity.

Lake	Watershed (acres)	Woodland (acres)	Wetland (acres)	Agricultural (acres)	Residential (acres)	Average Watershed RCN
Little Round	420	319.6	15.3	50.6	34.5	58
Osprey	460	379	74.1	0	6.9	55
Round	2148	1509.2	164.9	124.1	349.8	59
Tiger Cat	1778	1218.8	318.6	155.1	85.5	58
		Avg. RCN 55	Internally Drained	Avg. RCN 72	Avg. RCN 70	

Velocity of overland flowing water is determined with the factors or amount of rainfall, drainage area, steepness of slope, and cover type. Velocities (q) above 4 cubic feet/second are generally considered high enough to be able to erode through existing vegetation in a concentrated flow scenario. Since most of the factors are static, or at minimum are difficult to change, cover type appears to be the most easily influenced.

Many landowners are still under the assumption that their cleared shoreline was "grandfathered" in some regard from rules promulgated by the State and adopted by the County in 1972. Though this is untrue, taking the indirect approach may be the best fashion for re-establishing lakeshore buffers.

<u>Shoreline Resource Recommendations</u>
Sawyer County and the Wisconsin Department of Natural Resources should continue their approach to restoring shorelines to natural conditions by:

1. Requiring mandatory shoreline restoration for DNR water regulation violations.
2. Providing financial support for private landowners interested in voluntary restoration of natural vegetation.
3. Require shoreline restoration as a condition of permitted activities (i.e. rip-rap).
4. Maintaining an active education program for new shoreline property owners, lake associations and other interested individuals and groups.

<u>FORESTS</u>
Forested shorelines provide excellent protection for water quality and wildlife. The lakes in the Round Lake system have the following acres of forested area within their individual watersheds:

Lake	Watershed Acres	Forested Acres	Percent
Little Round	420	319.6	76.1
Osprey	460	379	82.4
Round	2148	1509.2	70.2
Tiger Cat	1778	1218.8	68.55

AQUATIC INVASIVES

Aquatic invasive species have been documented in all four lakes of this system. The following table provides an overview by lake of the species of most concern.

Species	*Tiger Cat*	*Big Round*	*Little Round*	*Osprey*
Purple Loosestrife	●			●
Eurasian Watermilfoil		●	●	●
Flowering Rush		●		
Zebra Mussel Veligers		●		
Rusty Crayfish		●		

Additional species of potential concern are: japanese barberry, narrow-leaf cattail, crack willow, Eurasian mints, reed canary grass, nightshade, and water forget-me-not. Surveying, mapping and control efforts have been accomplished with assistance from several organizations including: Great Lakes Indian Fish and Wildlife (GLIFWC), Wisconsin Department of Natural Resources, Sawyer County Land & Water Conservation, Lac Courte Oreilles Tribal Conservation staff and lake associations.

Control efforts for purple loosestrife on the Tiger Cat Flowage include chemical (cut-stem application) and biological (Galerucella beetles) controls. There have been chemical treatments on all the lakes with Eurasian watermilfoil and partial removal by hand of flowering rush on Big Round Lake. The purple loosestrife on Osprey Lake was removed by hand.

Education and participation in projects to control aquatic invasives are ongoing by all the lake associations.

Recommendations:

- conduct comprehensive plant surveys of all the lakes
- pursue Lake Management Planning grants
- develop and present educational programs for the public on invasive species, native species, ecological plant requirements, and shoreline stewardship practices
- establish *Clean Boats, Clean Waters* programs to monitor for invasive species
- continue control efforts
- provide education to new shoreline property owners.

RECREATION

The Tiger Cat Flowage is formed by a county-owned dam on the Chief River. As can be expected with a flowage, water levels are generally shallow, with many small islands making portions of the flowage unsuitable for some motorized recreation (i.e. water skiing). The less developed shorelines and surrounding wetlands provide recreational opportunities for wildlife viewing, fishing enthusiasts and other water sports. There are two public boat landings.

Round Lake is considered to be a fully developed lake with extraordinarily clear waters resulting in Secchi disk (water clarity) readings as deep as 29 feet. The clear water, sandy beaches and limited aquatic plants attracts a wide variety of recreational users to enjoy fishing, boating, sailing, swimming and other water sports. The lake has four public boat landings and one public beach. Motor trolling while fishing is allowed on Big Round Lake.

Little Round Lake is connected by a small channel to Round Lake and has similar recreational uses. However, it does not have public boat landings or beaches. A man-made channel connects Little Round Lake to a wetland adjacent to Osprey Lake. This connecting waterway is navigable by small craft.

Future recreational uses on Osprey Lake are expected to change due to the high rate of development on the lake. Prior to development, there were very few structures and the primary recreation was fishing. There is one public boat access that is within the tribal boundaries.

Recommendations

Utilize town or tribal ordinances to protect public safety and maintain the high quality of recreational experiences the lakes within the system are known for.

CULTURAL RESOURCES

It is logical to expect tribal archaeological sites including villages, burial grounds and ceremonial sites within the Round Lake management area. Some tribal memories have been passed from generation to generation including the memory of a village site on Little Round Lake and epidemics in the early 1900's that decimated the Lac Courte Oreilles tribe. Documented sites should be monitored to ensure they remain protected and intact. Discovery of new sites will be forwarded to the Lac Courte Oreilles Tribal Historic Preservation Office for assessment and possible registration with the State Historical Society.

Tribal staff will provide additional language

Chapter 4
SUMMARY of MANAGEMENT RECOMMENDATIONS

Water Quality Recommendations

Collect water chemistry and Secchi disk data on an on-going basis. By collecting background water quality data on an annual basis, chemical and biological changes that take place in the future can be detected. If detrimental changes are detected, corrective action can often be taken before a lake's water quality becomes badly deteriorated and therefore avoiding expensive lake rehabilitation techniques.

It is also recommended that a paleoecological study be completed for Osprey Lake. This study would help to:

- determine changes in nutrients during the last 130 years;
- determine if the frequency of algal blooms has increased during the last century;
- determine if the macrophyte growth has changed during the last century; and
- estimate the major sources of increased nutrient input.

Hydrology Recommendation

Complete hydrologic budget for the Tiger Cat Flowage similar to those completed for Round and Osprey lakes.

Water Level Recommendations

By consensus, the technical team recommended implementation of a passive system by:

- abandoning the Little Round Lake Dam;
- removal of the wetland fill for the snowmobile trail crossing Osprey Creek;
- removing and actively managing beaver dams on Osprey Creek;
- lowering the CTH NN culverts; and
- changing the Little Round Lake Dam order to reflect management.

In October 2006, Sawyer County hired the engineering firm of Short, Elliott, Hendrickson, Inc. (SEH) to evaluate the technical team options and various scenarios affecting the Round Lake water system and water levels. This action was discussed and approved by the work group.

Aquatic Plant Recommendations

As funding becomes available, perform macrophyte and floristic quality index surveys of the lakes.

Cultural Resource Recommendations

Monitor documented sites to ensure they remain protected and intact. Forward information regarding newly discovered sites to the Lac Courte Oreilles Tribal Historic

Preservation Office for assessment and possible registration with the State Historical Society.

Fishery Recommendations

- encourage completion of Round and Little Round lakes fishery management plans
- encourage initiation of Tiger Cat Flowage and Osprey lake visioning process
- educate lake property owners and public on the value of maintaining natural, woody material in all lakes in the Round Lake system.

Shoreline Recommendations

Sawyer County and the Wisconsin Department of Natural Resources should continue their approach to restoring shorelines to natural conditions by:

- Requiring mandatory shoreline restoration for DNR water regulation violations.
- Providing financial support for private landowners interested in voluntary restoration of natural vegetation
- Require shoreline restoration as a condition of permitted activities (i.e. rip-rap)
- Maintaining an active education program for new shoreline property owners, lake associations and other interested individuals and groups.

Aquatic Invasive Recommendations

- conduct comprehensive plant surveys of all the lakes
- pursue Lake Management Planning grants
- develop and present educational programs for the public on invasive species native species, ecological plant requirements, and shoreline stewardship practices
- establish *Clean Boats, Clean Waters* programs to monitor for invasive species
- continue control efforts
- provide education to new shoreline property owners.

Recreation Recommendations

Utilize Town or Tribal ordinances to protect public safety and maintain the high quality of recreational experiences the lakes within the system are known for.

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APPENDIX A

<u>Orders Related to Dams within the Management Plan Area</u>

<u>Tiger Cat, DNR File Number 57.30</u>

- 2-WP-298 Public Service Commission – A permit to divert surplus water into Round Lake from the North Fork of the Chief River below the outlet of Lower Twin Lake
- 2-WP-255 (Tiger Cat) Public Service Commission – Permit to construct, operate and maintain a dam across the North Fork of the Chief River, a navigable stream
- 2-WP-766 Public Service Commission – Permit to raise and enlarge an existing dam known as the Tiger Cat Dam in the Chief River
- 3-NW-83-806 State of Wisconsin, Division of Hearings and Appeals – Permit to raise the authorized water level on Tiger Cat Flowage

<u>Lake Placid, DNR File Number 57.31</u>

- 2-WP-298 Public Service Commission – A permit to divert surplus water into Round Lake from the North Fork of the Chief River below the outlet of Lower Twin Lake

<u>Little Round Lake, DNR File Number 57.34</u>

- 2-WP-513 Public Service Commission – Finding and Determination of the problem of what constitutes the normal water levels of Round and Little Round

APPENDIX B

<u>Maps</u>
Round Lake Management Plan Boundary
Round Lake Management Plan Topography

APPENDIX C

Documents

Paleoecological Study of Round Lake, Sawyer County, June 2005
Results of Visioning Session for Stakeholders in the Fishery of Round Lake in Sawyer County, Wisconsin

APPENDIX D

Jurisdiction