

**2004 SUMMARY REPORT  
of  
ROUND LAKE MARSH NORTH**

Lake County, Illinois

*Prepared by the*

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February 2005

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## **LAKE IDENTIFICATION AND LOCATION**

**Lake Name:** Round Lake Marsh North

**County:** Lake

**Nearest Municipality:** Round Lake

**Location:** T45N, R10E, Sections 29, 30

**Watershed:** Fox River

**Sub-Basin:** Squaw Creek

**Major Tributaries:** None

**Receiving Water Body:** Squaw Creek

**Surface Area:** 16.3 acres

**Shoreline Length:** 1.28 miles

**Maximum Depth:** 2.5 feet

**Mean Depth:** 1.25 feet (estimated)

**Volume:** 20.4 acre-feet (estimated)

**Lake Type:** Marsh

**Elevation:** Approximately 768 feet above mean sea level

## EXECUTIVE SUMMARY

An advanced identification assessment in Lake County was completed in 1992, and identified wetlands with high quality functional value. Round Lake Marsh North, located in the Lake County Forest Preserve District's Nippersink Forest Preserve, is designated as ADID wetland #76. This marsh is very shallow, averaging only 1.25 feet deep, and dominated by rooted aquatic plants. The aquatic plants in Round Lake Marsh North help maintain good water clarity by stabilizing the sediment, preventing resuspension into the water column. Water clarity, measured by a Secchi disk, was to the bottom of the marsh each month except July. Plant growth was most dense during July, obscuring the disk before it reached the bottom.

Total phosphorus concentrations in the marsh averaged 0.118 mg/L during 2004, which is almost twice as high as the Lake County median for near surface samples (0.063 mg/L). Although these concentrations were high, Round Lake Marsh North did not experience a nuisance algae bloom. One reason an algal bloom may not have occurred was that phosphorus was unavailable for algae to use if it is adsorbed to sediment particles or if it co-precipitates with calcium carbonate, such as marl. In July, we saw particles of marl floating in the water that had become dislodged from plants.

Dissolved oxygen and pH were higher than the median for near surface samples in Lake County. The heavy plant growth in Round Lake Marsh North is the most likely reason for the higher pH. The plants released dissolved oxygen and hydroxide through photosynthetic processes during the day, which increased the pH. The average conductivity in the marsh was lower than the Lake County median for near surface samples. From May through July there was a decrease in conductivity then increased in August and September. Usually, lakes that receive stormwater from areas using road salts will see a decrease in conductivity over the entire season as salt concentrations dissipate. Due to little rainfall throughout the summer, water levels dropped, and dissolved solids became concentrated in the smaller water volume.

The marsh has a very diverse aquatic plant community (19 species), covering 100% of the marsh bottom. The dominant aquatic plant in Round Lake Marsh North was sago pondweed, which was found at 61% of all sampled sites. White water crowfoot, found at 55% of all sites, was the next most common, and had its greatest occurrence in May and June. Curlyleaf pondweed, an invasive exotic species, was found in one small portion of the marsh in May and June.

The entire shoreline of Round Lake Marsh North was classified as undeveloped, typified as wetland (92% of the shoreline) and shrub (8%). Approximately 5% (309 feet) of the shoreline was moderately eroding. Several exotic plants were found along the shoreline, including glossy buckthorn, purple loosestrife, and reed canary grass. Removal or control of exotic species is recommended. No known fishery assessment has been conducted. The marsh had dried out before and is very susceptible to winter fish kills due to the shallow depth. Round Lake Marsh is an unlikely candidate to support a sport fishery.

## LIMNOLOGICAL DATA – WATER QUALITY

Round Lake Marsh North, located in the Nippersink Forest Preserve, has experienced many historical changes. The earliest aerial photograph in 1939 (Figure 1) shows that the current marsh was farmed. In the 1960's a manmade pond (hence referred to as the eastern bay) to the east was built, but was not directly connected to the marsh. An aerial image from 1974 shows that the marsh had filled in to almost its present shape. Between 1974 and 1993, the water level had increased enough that the marsh included the eastern bay to form the present day Round Lake Marsh North.

Water samples were collected monthly from below the surface from May to September at the deepest point in the marsh, which was approximately 2.5 feet (Figure 2). The eastern bay, which was hydrologically connected to the lake, is approximately 9.5 feet deep and was monitored with a multiparameter probe from June through September, but no water samples were taken. For this report, the analysis of the water quality data will focus primarily on the marsh. See Appendix B for water sampling methods and Table 1 in Appendix A for the water quality data.

Aquatic plants covered 100% of the marsh bottom, and affected many of the water quality parameters in Round Lake Marsh North. Dissolved oxygen (DO) concentrations of at least 5.0 mg/L in Round Lake Marsh North were recorded from the water's surface down to the bottom each month during 2004. In the eastern bay, DO concentrations were below 5.0 mg/L at the surface in August and September. This area stratified in each month it was monitored, with anoxic conditions (<1.0 mg/L) ranging from below four feet (July, August) to below six feet (June). The pH in the marsh fluctuated significantly. In June the pH was 10.28, the highest in Lake County lakes for data collected from 2000-2004. By September, the pH had dropped to 7.65. The aquatic plants influenced this fluctuation. The high pH was likely caused by plant photosynthesis during which plants use aqueous carbon dioxide (CO<sub>2</sub>) and release hydroxide, elevating the pH. Conversely, in September when plants were senescing and decomposing, pH declined. The shallow nature of the marsh also influenced the pH. In the eastern bay, pH in the oxic water ranged from 7.12 to 8.79.

Plants also had an affect on water clarity by stabilizing the sediment and preventing its resuspension into the water column. Total suspended solid concentrations (TSS) in high concentrations are associated with poor water clarity. TSS fluctuated greatly in Round Lake Marsh North, ranging from <1.0 mg/L (May) to 54.3 mg/L (July). One possible explanation for the high TSS is that plants were encrusted with marl, or calcium carbonate, and during the windy July sample date this marl was dislodged from plants contributing to the high TSS concentrations. In August and September marl particles in the water had noticeably diminished decreasing TSS concentrations. The Secchi depth reached the bottom every month except July when the disk was obscured by plants. The Secchi disk transparency four-month average in the eastern bay was 1.34 feet.

INSERT FIGURE 1 AERIAL

INSERT FIGURE 2, SAMPLE LOCATION

Nutrients such as nitrogen and phosphorus are key ingredients for algae growth and in high concentrations can cause nuisance algal blooms. Algae was not a problem in Round Lake Marsh North however, total phosphorus (TP) concentrations were high, averaging 0.113 mg/L. This is nearly twice as high as the Lake County median of 0.063 mg/L. Typically, lakes are either phosphorus (P) or nitrogen (N) limited, which means one nutrient is in short supply relative to the other and an addition of phosphorus or nitrogen to the lake may result in increased algal growth. Most lakes in Lake County are phosphorus limited, but to understand the availability a ratio of total nitrogen to total phosphorus (TN:TP) is used. Ratios less than or equal to 10:1 indicate nitrogen is limiting and greater than or equal to 15:1 indicate that phosphorus is limiting. Ratios greater than 10:1, but less than 15:1 indicate that there are enough of both nutrients to facilitate excess algal or plant growth. Round Lake Marsh North had TN:TP ratios that changed through the 2004 sampling season. In May the marsh was limited by phosphorus, with a ratio of 20:1. The TP concentration nearly quadrupled from May (0.052 mg/L) to June (0.203 mg/L) as a result of the marsh becoming nitrogen limited (7:1). When nitrogen is limited, aquatic organisms can not utilize the available phosphorus and in nutrient rich systems like Round Lake Marsh North, the TP and soluble reactive phosphorus (SRP) increase. In July, the ratio was 14:1 indicating that nutrients were in plentiful supply and subsequently both TP and SRP declined. An algal bloom may not have been seen because phosphorus may have co-precipitated with the marl in the water column. In August the marsh was again limited by phosphorus, with a ratio of 28:1 and plants may have been competing with algae. In September, the ratio changed again to 12:1, possibly due to decay of aquatic plants and the release of phosphorus into the water.

TP concentrations in the marsh may also be the result of historic and current land uses. The area was historically farmed, including most of what is now the marsh. Agricultural activities over time can add nutrients to the soil. Currently, stormwater from the surrounding watershed can add pollutants such as road salt to water bodies, as well as eroded soil, nutrients and other pollutants. The watershed surrounding Round Lake Marsh North is small, consisting of approximately 195 acres including the marsh itself (Figure 3). The watershed to lake ratio is also small at 12:1. Lakes with watershed:lake ratios of 40:1 or larger are considered to be difficult to manage. Often they are dominated by developed land which delivers more pollutants such as sediment and nutrients than undeveloped land. Two stormwater pipes enter the lake, one into the eastern bay and drains the areas north and east of the marsh. The other pipe enters the marsh from the northwest and drains a detention pond north of the marsh. This pond receives stormwater from another detention pond, residential homes and a school. Figure 4 contains the land uses within the watershed with the top two classified as single family (about 31%) and open space (about 17%). Table 2 in Appendix A lists the land uses and percentages within the watershed, along with their estimated runoff amounts. For Round Lake Marsh North, the land uses contributing the highest percentages of estimated runoff are from single family and transportation (i.e., roads), which are approximately 37% and 30% of the total, respectively. These land uses are primarily impervious surfaces such as driveways, roads and buildings that do not allow stormwater to infiltrate. Transportation makes up only 8% of the total watershed but is a major source of the estimated runoff

(about 30%). Water elevation was measured monthly in Round Lake Marsh North. Between May and June there was heavy rain which increased the marsh water level by one foot. The elevation then dropped continuously for the remainder of the season for a total water loss of 27 inches.

TP can be used to calculate the trophic state index (TSI), which classifies lakes according to the overall level of nutrient enrichment. The TSI score falls within the range of one of four categories: hypereutrophic, eutrophic, mesotrophic and oligotrophic.

Hypereutrophic lakes have excessive nutrients, with nuisance algal growth reminiscent of “pea soup” and have a TSI score greater than 70. Lakes with a TSI score of 50 or greater are classified as eutrophic or nutrient rich and are productive lakes in terms of aquatic plants and/or algae and fish which includes most lakes in Lake County. Mesotrophic and oligotrophic lakes are those with lower nutrient levels, clear water and have little algal growth. Round Lake Marsh North, although it is not plagued with nuisance algal blooms, was hypereutrophic based on phosphorus concentrations. It ranked 118<sup>th</sup> out of 161 Lake County lakes (TSI of 72.3) based on average total phosphorus concentrations (Table 3, Appendix A).

The IEPA has assessment indices to classify Illinois lakes for their ability to support aquatic life, swimming, or recreational uses. The guidelines consider several aspects, such as water clarity, phosphorus concentrations (for the trophic state index) and aquatic plant coverage. Round Lake Marsh North fully supports aquatic life uses according to these guidelines. Although recreational and swimming uses are not allowed, the marsh offers full support for swimming and nonsupport for recreational uses. It is impaired for recreational uses because of the high amount of plant biomass. Round Lake Marsh North has partial overall use support. It is important to keep in mind, however, that not all water bodies are intended for human use. As it stands, Round Lake Marsh North is a high quality, shallow marsh identified as an ADID wetland in Lake County.

Conductivity is a measurement of water’s ability to conduct electricity via total dissolved solids (TDS) made up of ions in the water column. Lakes with residential and/or urban land uses in their watershed often have higher conductivity readings and higher TDS concentrations than lakes that are not surrounded by development because of the use of road salts in residential/urban areas. Stormwater runoff from impervious surfaces, such as roads and parking lots, can deliver high concentrations of these salts to nearby lakes and ponds. The median conductivity reading for near-surface samples is 0.7652 milliSiemens/cm (mS/cm) for Lake County lakes. During 2004, the average conductivity readings in Round Lake Marsh North were lower (0.6090 mS/cm). The readings were highest in May, and decreased through July increasing again in August and September. Typically, lakes that receive road salts from stormwater runoff have a decline in conductivity readings throughout the season as no additional road salt is applied during the summer. In the marsh the water level dropped later in the summer due to low rainfall and dissolved solids became concentrated in a smaller volume of water.

INSERT FIG 3, WATERSHED

INSERT FIG 4, LAND USES

## LIMNOLOGICAL DATA – AQUATIC PLANT ASSESSMENT

We randomly sampled locations in the marsh each month for aquatic plants and identified 19 species (Table 4). We also recorded shoreline plants. Aquatic plants covered 100% of the marsh bottom. The dominant aquatic plant in Round Lake Marsh North was sago pondweed, which was found at 61% of all sites. White water crowfoot was found at 55% of all sites sampled but had its greatest occurrence in May and June. Curlyleaf pondweed, an invasive exotic species, was found in only five samples over the season, all found in the eastern bay. Table 5 in Appendix A lists the frequency in which aquatic plant species were found.

The floristic quality index (FQI) is a measurement designed to evaluate flora (plants species) of an area to an area with undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long term floristic trends, and 4) monitor habitat restoration efforts. Each floating and submersed aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). These numbers are then used to calculate the FQI. A high FQI number indicates that there are a large number of sensitive, high quality plant species present in the lake, and better plant diversity. Nonnative species are included in the FQI calculations for Lake County lakes. The FQI scores of 150 lakes measured from 2000 through 2004 range from 0 to 37.2, with an average of 14.3. Round Lake Marsh North has a floristic quality of 29, placing it fourth out of 150 lakes throughout Lake County, offering an excellent variety of native beneficial plants.

**Table 4. Aquatic and shoreline plants on Round Lake Marsh North, May – September, 2004.**

<u>Aquatic Plants</u>	
Chara	<i>Chara</i> , sp.
Coontail	<i>Ceratophyllum demersum</i>
Water Stargrass	<i>Heteranthera dubia</i>
Small Duckweed	<i>Lemna minor</i>
Star Duckweed	<i>Lemna trisulca</i>
Northern Water Milfoil	<i>Myriophyllum sibiricum</i>
Slender Naiad	<i>Najas flexilis</i>
Curlyleaf Pondweed <sup>#</sup>	<i>Potamogeton crispus</i>
Leafy Pondweed	<i>Potamogeton foliosus</i>
Sago Pondweed	<i>Potamogeton pectinatus</i>
Small Pondweed	<i>Potamogeton pusillus</i>
Flatstem Pondweed	<i>Potamogeton zosteriformis</i>
White Water Crowfoot	<i>Ranunculus longirostris</i>
Grass-leaved Arrowhead	<i>Sagittaria graminea</i>
Giant Duckweed	<i>Spirodella polyrhiza</i>

**Table 4. Aquatic and shoreline plants on Round Lake Marsh North, May – September, 2004, cont'd.**

Common Bladderwort	<i>Urticularia vulgaris</i>
Vallisneria (eel grass)	<i>Vallisneria americana</i>
Watermeal	<i>Wolffia columbiana</i>
Horned Pondweed	<i>Zannichellia palustris</i>
<u><i>Shoreline Plants</i></u>	
Prairie Dogbane	<i>Apocynum cannabinum</i>
Lady Fern	<i>Athyrium filix-femina</i>
Jewelweed	<i>Impatiens pallida</i>
Sensitive Fern	<i>Onoclea sensibilis</i>
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
Reed Canary Grass <sup>#</sup>	<i>Phalaris arundinacea</i>
Common Plantain <sup>#</sup>	<i>Plantago major</i>
Pickeralweed	<i>Pontederia cordata</i>
Multiflora Rose <sup>#</sup>	<i>Rosa multiflora</i>
Purple Loosestrife <sup>#</sup>	<i>Sagittaria latifolia</i>
Hardstem Bulrush	<i>Scirpus acutus</i>
River Bulrush	<i>Scirpus fluviatilis</i>
Three Square Bullrush	<i>Scirpus pungens</i>
Softstem Bulrush	<i>Scirpus validus</i>
Bittersweet Nightshade <sup>#</sup>	<i>Solanum dulcamara</i>
Common Cattail	<i>Typha latifolia</i>
Blue Vervain	<i>Verbena hastata</i>
.	
<u><i>Trees/Shrubs</i></u>	
Box Elder	<i>Acer negundo</i>
Glossy Buckthorn <sup>#</sup>	<i>Rhamnus frangula</i>
Elderberry	<i>Sambucus</i> sp.

<sup>#</sup> Exotic species

## LIMNOLOGICAL DATA – SHORELINE ASSESSMENT

The shoreline was assessed at Round Lake Marsh North on July 29, 2004 for a variety of criteria (See Appendix B for methods). Based on these assessments, several important observations were made. The entire shoreline of Round Lake Marsh North was classified as undeveloped, typified as wetland and shrub (Figure 5). The shoreline was also assessed for the degree of shoreline erosion (Figure 6) with approximately 5% (309 feet) eroding (classified as moderately eroding) along an area classified as shrub. This area was along the shoreline of the eastern bay, which originally was not part of the

INSERT FIGURE 5 TYPES

INSERT FIG 6, EROSION

marsh. Several invasive, exotic plants were found growing along this location, including glossy buckthorn, purple loosestrife, and reed canary grass (Figure 7). Frequently, invasive plants become established in disturbed areas. Removal or control of these exotic species is recommended before they spread, because they do not offer good habitat and are conducive to erosion problems.

## **LIMNOLOGICAL DATA – WILDLIFE ASSESSMENT**

Table 6 lists the wildlife species we noted around Round Lake Marsh North. In addition to the good wildlife habitat of native terrestrial and wetland plants, wildlife can also benefit from aquatic plant diversity. The birds seen on or around the lake were dependent on both marsh and upland ecosystems. No fishery assessment has been conducted within the marsh, so the condition of the fishery is unknown. Round Lake Marsh North will not support a high quality fishery, especially if it has a tendency to temporarily dry out and is susceptible to winter fish kills.

**Insert fig 7 invasives**

**Table 6. Wildlife species observed on Round Lake Marsh North,  
May – September, 2005.**

Birds

Canada Goose	<i>Branta canadensis</i>
Mallard	<i>Anas platyrhynchos</i>
Great Egret	<i>Casmerodius albus</i>
Great Blue Heron	<i>Ardea herodias</i>
Sora Rail	<i>Porzana carolina</i>
Belted Kingfisher	<i>Megasceryle alcyon</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Barn Swallow	<i>Hirundo rustica</i>
Tree Swallow	<i>Iridoprocne bicolor</i>
Rough-wing Swallow	<i>Stelgidopteryx ruficollis</i>
Bank Swallow	<i>Riparia riparia</i>
Chimney Swift	<i>Chaetura pelagica</i>
Blue Jay	<i>Cyanocitta cristata</i>
Marsh Wren	<i>Cistothorus palustris</i>
American Robin	<i>Turdus migratorius</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Warbling Vireo	<i>Vireo gilvus</i>
Yellow Warbler	<i>Dendroica petechia</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Common Grackle	<i>Quiscalus quiscula</i>
Northern Oriole	<i>Icterus galbula</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>
Indigo Bunting	<i>Passerina cyanea</i>
Song Sparrow	<i>Melospiza melodia</i>

Amphibians

American Toad	<i>Bufo americanus</i>
Bull Frog	<i>Rana catesbeiana</i>
Green Frog	<i>Rana clamitans melanota</i>

Reptiles

Snapping Turtle	<i>Chelydra serpentina</i>
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Fish

Black Bullhead	<i>Ameiurus melas</i>
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## EXISTING LAKE QUALITY PROBLEMS

Round Lake Marsh North has excellent aquatic and shoreline plant diversity, good water clarity, an undeveloped shoreline, minimal shoreline erosion present, and is recognized as an ADID wetland. Since the marsh is prone to periodic drying out and potentially winter fish kills, it is not a good candidate for a sport fishery. The aquatic and near shore biodiversity make this marsh of high ecologic value. Our recommendation is to manage it from this perspective.

- *Invasive Shoreline Plant Species*

Invasive shoreline plants around Round Lake Marsh North are not in large populations at this time. However, they can cause problems if they expand. The location of these plants is limited to a portion along the shoreline of the manmade pond. Their removal now would curtail their expansion. Because it is a relatively small area, it may be possible to remove them by hand through cutting or pulling them out. It may be faster to use an herbicide approved for use near water bodies.

- *Shoreline Erosion*

Approximately 5% of the shoreline on Round Lake Marsh North is moderately eroding. Even though only a small percentage is eroding, continued neglect of this shoreline could lead to further erosion. After the exotic species are removed, deep-rooted native species can be planted in their place. This would be a two-fold benefit, as it could protect the shoreline and add wildlife habitat.

- *High Phosphorus Concentrations*

Although algae blooms were not of nuisance proportions in 2004, Round Lake Marsh North has high phosphorus concentrations, nearly twice as high as the Lake County median. This is due to the shallow nature of the lake, the seasonal nitrogen limitation, and historic and current watershed sources.