2000 SUMMARY REPORT
of
Slough Lake

Lake County, Illinois

Prepared by the

LAKE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH SERVICES
LAKES MANAGEMENT UNIT

3010 Grand Avenue
Waukegan, Illinois 60085

Joseph Marencik
Michael Adam
Mary Colwell
Mark Pfister

July 2001

TABLE OF CONTENTS

LAKE IDENTIFICATION AND LOCATION

Lake Name: Slough Lake (formerly Douglas Lake)

State: IL

County: Lake

Nearest Municipality: Lindenhurst/Lake Villa

Township/Range: T45N, R10E, Section 3, SE 1/4

Basin Name: Des Plaines River Watershed

Subbasin Name: North Mill Creek

Major Tributaries: None

Receiving Water Bodies: Crooked Lake, Hastings Lake

Surface Area: 37.4 acres

Shoreline Length: 1.2 miles

Maximum Depth: 19.0 feet

Mean Depth: 8.0 feet

Storage Capacity: 299.2 acre-feet

Lake Type: Glacial (dammed in 1945)

Watershed Area: Unknown

HISTORICAL BACKGROUND

Slough Lake has been owned and managed by the Lake County Forest Preserve District since its purchase in the late 1980s from the Weber family. The Weber family owned and operated the Weber Duck Farm adjacent to and on Slough Lake. During the 1940's and 1950's it is estimated that over a 100,000 ducks were raised on the lake. After the Weber family took over operations of the farm, the number of ducks was reduced to 40,000. The fecal matter from these duck has led to the current severe water quality problems.

Slough Lake is the first lake in a series of three lakes located in the Hastings Creek drainage basin. The other two lakes are Crooked and Hastings Lakes, respectively. These downstream lakes also undoubtedly suffered as a consequence of the duck farm activities and subsequent inflow of nutrient rich waters. Hastings Creek leaves Hastings Lake and flows northeast into Mill Creek, which drains into the Des Plaines River. Slough Lake's watershed is made up of residential homes, agricultural fields and open land.

LIMNOLOGICAL DATA – WATER QUALITY

Samples were collected at the deep hole location at 3 feet below the surface and 2 feet from the bottom (16 feet)(Figure 1). Slough Lake was thermally stratified during the entire study (except September when fall turnover had occurred). This means that the lake was divided into warm upper water(epilimnion) and cool lower water (hypolimnion). The strength of stratification dictates whether these layers mix. Thermal stratification is measured in relative thermal resistance to mixing (RTRM). At an RTRM of 20, layers generally do not mix. On Slough Lake, peak RTRM ranged from 24 in September to 93 in July. Thermal stratification was strong enough to prevent extremely high nitrogen (16.7 mg/L) and phosphorus (1.03 mg/L) concentrations in the hypolimnion from mixing into the epilimnion. Mixing of these high levels of nutrients into the epilimnion could cause a variety of water quality problems. However, due to strong thermal stratification, the layers do not mix. This is apparent in the differences in the water quality data from the epilimnion and hypolimnion. The water quality of the epilimnion is much more pertinent to overall management of the lake so the discussion below applies to the epilimnion except where noted. The complete data set for Slough Lake is in Table 1.

The region between the epilimnion and hypolimnion is called the metalimnion and is an area of changing water temperature and dissolved oxygen (D.O.) concentration. Due to the process of stratification, oxygen is unable to mix into the hypolimnion. Therefore, as oxygen consuming biological processes (such as decomposition of plant and algae material) increase, oxygen is stripped from the water and becomes more anoxic as the summer progresses. Within the metalimnion is the anoxic boundary, which is the point at which D.O. drops below 1.0 mg/L. At this concentration, no aquatic organisms (except non-photosynthetic bacteria) can live. Depth of the anoxic boundary varies during the summer. In Slough Lake, the anoxic boundary was at its most shallow in May (7.7 feet) and was deepest in September (10.9 feet). D.O. levels in the epilimnion were very good at times. However, epilimnetic D.O. was low (< 5.0 mg/L) in June and September. In August, D.O. levels were extraordinarily high (>12.0 mg/L at the surface). These high D.O. levels were due to oxygen produced during photosynthesis by massive, lake wide algae blooms. These extensive algae blooms were present throughout the study and accounted for the good D.O. concentrations observed in the surface waters throughout the study. Without these massive algae blooms, D.O. levels would have been dangerously low.

Typically, glacial lakes have superior water quality when compared to man made lakes. Slough Lake, a glacial lake, has *poor* water quality, and in many respects, *worse* water quality than most man made lakes. This is mainly due to the extensive algae blooms, which are caused by extremely high nutrient levels (specifically phosphorus). In general, Secchi disk readings are a good indicator of water quality. The average Secchi disk depth on Slough was 1.53 feet (Lake County avg. is 5.0 feet). The deepest Secchi readings were in May (2.08 feet). The lowest Secchi disk depth was in September (0.79 feet). Typically glacial lakes have much better Secchi disk reading than man made lakes. These poor Secchi disk readings are the direct result of the algae bloom and suspended solids such as sediment resuspended by carp activity.

The average epilimnetic total suspended solids (TSS) during the study was 11.0 mg/L. TSS ranged from 19.0 mg/L (May) to a incredible high of 61.0 mg/L (August). August TSS was seven times the Lake County average (8.6 mg/L: 1995-2000 samples) and was the highest epilimnetic TSS ever measured by the LMU from 1995-2000 (352 samples from 72 lakes). These elevated TSS levels caused poor light penetration, which leads to problems such as reduced (in Slough Lake's case-minimal) aquatic plant growth. Lack of healthy aquatic plant growth leads to several water quality problems (*see Limnological Data – Aquatic Plant Assessment*). Measurements of other types of solids, unaffected by algae growth, were also considerably above the County average. The elevated concentrations of these other solids may also be due to sediment disruption by carp.

Algae need light and nutrients, most importantly carbon, nitrogen (N) and phosphorus (P), to grow. Light and carbon are not normally in short supply (limiting). This means that nutrients (N&P) are the limiting factors in algal growth. To compare the availability of these nutrients, a ratio of epilimnetic total nitrogen to total phosphorus is used (TN: TP). Ratios of <10:1 indicate nitrogen is limiting. Ratios of >15:1 indicate phosphorus is limiting. Ratios >10:1, <15:1 indicate that there is enough of both nutrients for excessive algal growth. Most lakes in Lake County are phosphorus limited. Slough Lake had an average epilimnetic TN: TP ratio of 6:1, which means that the lake is nitrogen limited. This means that either there was low levels of nitrogen or that there were extremely high concentrations of phosphorus. In Slough Lake there were extremely high levels of phosphorus. Nitrogen concentrations (NH_3 and NO_3) in the epilimnion were elevated but well below Country averages due to algal uptake. Total Kjeldahl Nitrogen (TKN) concentrations were slightly elevated but not problematic. Hypolimnetic nitrogen concentrations were high. Average hypolimnetic TKN was 7.02mg/L. August TKN concentrations were the highest hypolimnetic TKN levels recorded by the LMU from 1995-2000 (352 samples form 72 lakes). The NH_3-N concentration in August was 11.5 mg/L and was the highest hypolimnetic concentration measured by the LMU from1995-2000 (174 samples from 49 lakes). These high hypolimnetic nitrogen levels were separated from the epilimnion due to strong stratification. However, during fall turnover these nutrients are mixed into the surface waters. This could bring about problematic fall/winter blooms of algae, which could result in oxygen depletion, which may cause fish kills. This past winter there was a large fish kill on Slough Lake as a result of low D.O concentrations.

Phosphorus levels in Slough Lake were ***extremely*** high. Nuisance algae growth typically occurs when epilimnetic phosphorus concentrations are $\geq$0.05 mg/L. Epilimnetic phosphorus concentrations in Slough Lake ranged from 0.190 mg/L (May) to as high as 0.400 mg/L (September). The September epilimnetic phosphorus concentration were the highest phosphorus level measured by the LMU since 1995 (343 samples from 72 lakes). Consequently, as phosphorus levels in Slough Lake increased so did the degree of algal growth. Furthermore, soluble reactive phosphorus (SRP), which is the form of phosphorus most available to algae, was in problematic concentrations in the epilimnion in June through September. Typically SRP is undetectable in the epilimnion but the lack of available nitrogen inhibited algal uptake. Additionally, other water quality parameters, which are closely linked to phosphorus levels and algae growth such as Secchi disk depth and TSS, were also problematic during these months.

Phosphorus generally originates from two sources. One source is from within the lake (internal). This is a common source of phosphorus in manmade lakes, which by their nature contain rich sediment. Additionally, biological processes (such as decomposition) cause the release of phosphorus from the sediment and organic debris. Due to Slough Lake's past (duck farm), the sediment is extremely nutrient rich despite being a glacial lake. Due to feeding and spawning actions of carp these nutrients are resuspended. Additionally, nutrients build up in hypolimnion during the summer, and are released into the epilimnion during fall turnover. This has occurred year after year for decades. Historically, before the duck farm, Slough Lake may not have had nutrient problems and was probably a high quality glacial lake. The other main input of phosphorus is from sources outside of the lake (external). These external inputs consist of a variety of sources. They can include fertilizer runoff, failing septic systems and erosion. However, with regard to Slough Lake, these external sources are probably minor in comparison to internal sources. Rain data shows that during periods of elevated rainfall (spring) phosphorus levels were actually lower than when there was little rainfall (summer). This is typical when phosphorus is originating from an internal source. If phosphorus were coming from external sources the opposite would occur.

Another way to look at nutrient levels and how they affect lake health is to use a Trophic State Index (TSI) based on phosphorus. TSI values are commonly used to classify and compare lake productivity levels (trophic state). The higher the phosphorus levels the greater amount of algal biomass, which then results in a higher TSI and corresponding trophic state. Typically, the better the water quality, the lower the TSI. Based on a TSI phosphorus value of 85, Slough Lake is classified as hypereutrophic (>70 TSI). A hypereutrophic lake is defined, as a highly over-productive system that has above average nutrient levels and high algal biomass (growth). Based on the phosphorus TSI, Slough Lake is the second highest in the county and ranks 86 out of 87 lakes studied by the LMU (1988-2000).

TSI values along with other water quality parameters can be used to make other analysis of Slough Lake based on use impairment indexes established by the Illinois Environmental Protection Agency (IEPA). Using the TSI and IEPA indexes, Slough Lake has overall water quality impairments based on phosphorus and low D.O. levels. Based on Swimming Use guidelines, Slough Lake is categorized as providing only *Partial* support. This is due to poor Secchi disk readings and high phosphorus levels. Under Recreational Use impairment index, Slough Lake was categorized as *Nonsupport*. This is due to a high TSI value and high levels of suspended sediment, both of which result in poor visibility and contribute to an overall reduction in use of the lake. In the case of Aquatic Life Use impairment, Slough Lake was categorized as providing *Partial* support for aquatic life. Based on the above indices, Slough Lake is categorized as providing only *Partial* Overall Use support.

LIMNOLOGICAL DATA – AQUATIC PLANT ASSESSMENT

Aquatic plant surveys were conducted every month for the duration of the study (*Appendix A* for methodology). The extent to which these plants grow is largely dictated by light availability. Plants need at least 1% of surface light levels in order to survive. Based on the depth of 1% light level, depth at which plant growth could occur in Slough Lake varied on a monthly basis. Light measurements show that aquatic plants could have grown to a depth from 2.0 feet (July) to as deep as 4.25 feet (September). However, except for a small bed of sago pondweed (*Stuckenia pectinatus*) found growing near the cattails in June, there was no aquatic vegetation found anywhere in Slough Lake during the entire study.

LIMNOLOGICAL DATA – SHORELINE ASSESSMENT

The water-cattail interface does not experience erosion or other problems that plague normal shorelines. This is due to sediment stabilization and wave action buffering provided by the cattails. However, a major concern with regard to the “shoreline” on Slough Lake is the continual encroachment by cattails. Slough Lake is at an elevated risk of encroachment due to the expansive, shallow shelf around the perimeter of the lake. The current extent of the cattails should be maintained and expansion should not be allowed. This will help to slow the gradual filling in of the shallow areas of Slough Lake. Another major concern is eliminating/preventing the spread of invasive species, which were observed at scattered locations around the lake. Species that were noted and are of concern are purple loosestrife, buckthorn, and extensive stands of garlic mustard.

LIMNOLOGICAL DATA – WILDLIFE ASSESSMENT

Wildlife observations were made on a monthly basis during water quality and plant sampling actives. All observations were visual. Several types of waterfowl were observed during the course of the study (see Table 3). Several species, such as the black crowned night heron, are on the State of Illinois threatened and endangered species list. The secluded nature of Slough Lake, combined with the excellent surrounding wetlands, provides excellent habitat for waterfowl and marsh birds. In the large wetland complex north of Slough Lake, an active Great Egret rookery was observed (Figure 1). Two types of terns were observed on Slough Lake and more than likely nest in adjacent wetlands. Other types of wildlife such as deer were also documented. As mentioned previously, purple loosestrife (*Lythrum salicaria*), buckthorn (*Rhamnus cathartica*), and garlic mustard have been noted in several areas around the lake. These species are very invasive and provide no ecological value and should be controlled/eradicated.

Table 3. Observed Wildlife Species on Slough Lake.

Birds/Waterfowl	
Black-crowned Night Heron*	*Nycticorax nycticorax*
Canada Goose	*Branta canadensis*
Common Tern*	*Sterna hirundo*
Double Crested Cormorant	*Phalacrocorax auritus*
Forster's Tern*	*Sterna forsteri*
Great Blue Heron	*Ardea herodias*
Great Egret	*Casmerodius albus*
Green Heron	*Butorides striatus*
Mallard	*Anas platyrhnchos*
Red-winged Blackbird	*Agelaius phoeniceus*
Ring-billed Gull	*Larus delawarensis*
Wood Duck	*Aix sponsa*

* Endangered in Illinois

EXISTING LAKE QUALITY PROBLEMS AND MANAGEMENT SUGGESTIONS

The cattail fringe and multiple wetland complexes the surround Slough Lake help shelter it from outside impacts. For this reason Slough Lake's best use is as a wildlife area for waterfowl and other wetland species. However, there are several management issues that should be dealt with in order to improve the water quality of Slough Lake. These improvements would benefit not only Slough Lake but also the lakes that receive drainage from Slough (Crooked Lake and Hastings Lake).

- *Bathymetric Map*

  An important tool in any lake management plan is a good quality bathymetric map. Many times if a bathymetric map does exist it is old and/or of poor quality. The information provided by these old maps is only as good as their quality - poor. The existing bathymetric map for Slough Lake dates back to 1969 and needs to be updated. Current high quality maps can be of great use to fishermen as well as lake managers. Bathymetric data can show where possible problematic areas may be located (i.e., shallow areas). Bathymetric maps can also provide volumetric data that can be utilized for management techniques such as herbicide application and rotenone and aluminum sulfate applications. These practices can not be properly executed without a good bathymetric map and accompanying data. These maps can be easily made using different methods. Costs can range from $3,000 – 10,000 depending on the size of the lake. Slough Lake is a small body of water and costs would be on the low end of the price range.

- *Excessive Phosphorus Concentrations*

  A possible remedy to excessive phosphorus concentrations (and resulting algae blooms) in Slough Lake is through the use of aluminum sulfate (alum). Alum binds phosphorus making it unavailable, thus reducing algal growth. Alum binds water-borne phosphorus and forms a flocculent layer that settles on the bottom, which can then prevent sediment bound phosphorus from entering the water column. Phosphorus inactivation using alum has been in use for 25 years. However, cost and unreliable results deterred its widespread use. Alum treatment typically lasts 1 to 20 years depending on various parameters. Lakes with low mean depth to surface area are good candidates. This encompasses many lakes within Lake County. Lakes that are thermally stratified experience longer inactivation than non-stratified lakes due to isolation of the flocculent layer. Lakes with small watersheds are also better candidates because external phosphorus sources can be limited. Alum treatments must be carefully planned and carried out by an experienced professional. If not properly done, there may be many detrimental side effects.

Phosphorus inactivation is a possible long-term solution for controlling nuisance algae and increasing water clarity. This makes alum more cost effective in the long-term compared to continual treatment with algaecides. Studies have shown reductions in phosphorus concentrations by 66% in spring and 68% in summer. Chlorophyll *a*, a measure of algal biomass, can be reduced reduced by 61%. Reduction in algal biomass caused an increase in dissolved oxygen and a 79% increase in Secchi disk readings. Effects of alum treatments can be seen in as little as a few days. The increase in clarity can have many positive effects on the lake's ecosystem. With increased clarity, plant populations could expand or reestablish. This in turn would improve fish habitat and provide improved food sources for other organisms. Recreational activities such as swimming and fishing would be improved due to increased water clarity and healthy plant populations. Typically, there is a slight invertebrate decline immediately following treatment but populations recover fully by the following year.

There are several drawbacks to alum. External nutrient inputs must also be reduced or eliminated for alum to provide long-term effectiveness. With larger watersheds this could prove to be physically and financially impossible. Slough Lake's watershed is small and watershed inputs should be of minimal concern. Phosphorus inactivation may be shortened by excessive plant growth or motorboat traffic, which can disturb the flocculent layer and allow phosphorus to be released. Slough Lake does not have either one of these so they are not of concern at this time. Also, lakes that are shallow, non-stratified, and wind blown typically do not achieve long term control due to disruption of the flocculent layer. The large shallow shelf at Slough Lake may be an area of some concern. The biggest problem Slough Lake would face during an alum treatment would be the overabundance of common carp. Carp, by their nature, can greatly disrupt the flocculent, which can lead to phosphorus resuspention. The carp population must be brought under control before any alum treatment should be attempted. If alum is not properly applied toxicity problems may occur. Typically aluminum toxicity occurs if pH is below 6 or above 9. Most of Lake County's lakes are in this safe range. However, at these pH's, special precautions must be taken when applying alum. By adding the incorrect amounts of alum, pH of the lake could drastically change. Due to these dangers, it is highly recommended that a lake management professional plans and administers the alum treatment.

Costs for an alum treatment based on volume and phosphorus concentrations in Slough Lake could be approximately $35,000. This is based on full lake volume. A water drawdown would decrease the costs proportionally. Drawdown could be easily carried out on Slough via the drain to Crooked. Additionally, whole lake rotenone treatment for carp could also be carried out during drawdown to save money. These costs are approximate and include labor. When doing an alum treatment it is best to hire an *experienced* applicator. If alum treatments are not properly done, the alum may be ineffective and/or bring about several unwanted effects.

- *Severe Algal Blooms*

  Severe algal blooms occurred during the study of Slough Lake. Blooms consisted largely of planktonic blue-green algae. These blooms are caused by the lack of aquatic vegetation, which compete with algae for available resources and stabilize sediment, and minimize high phosphorus concentrations. The growth of nuisance or excessive algae can cause a number of problems. The increase in algal blooms over the course of the summer leads to the drastic decrease in water clarity, decrease in light penetration, increased TSS, and increased pH. These can lead to several major problems such as loss of aquatic plants, decline in fishery health, and interference with recreational activities. Health hazards, such as swimmer's itch and other skin irritations have been linked to excessive algal growth. Normally, excessive algal growth is a sign of larger problems such as excessive nutrients and/or lack of aquatic plants. Some treatment methods, such as copper sulfate, are only quick remedies to the problem. Solving the problem of excessive algal growth involves treating the factors that cause the excessive growth not the algae it self. Long term solutions to excessive algae typically include an integrated approach such as alum treatments, revegetation with aquatic plants, and limiting external sources of nutrients. Interestingly enough, these long-term management strategies are seldom used, typically because of their high initial costs. Instead, the cheap, quick fix of using copper sulfate, though temporary, is much more widely used. However, the costs of continually applying copper sulfate over years, even decades, can eventually far exceed the costs of a slower acting, eventually more effective, integrated approach. In Slough Lake to control these nuisance algae using algaecides would be futile considering the magnitude of the blooms. Additionally, constant use of lake-wide algaecide treatments would be very expensive. When the usage of Slough Lake is taken into consideration these costs would be even harder to justify.

- *Lack of Aquatic Vegetation*

  One key to a healthy lake is a healthy aquatic plant population. Slough Lake has no aquatic plant population. Lack of quality aquatic plants, and subsequent loss of water quality, is mainly the result of years of excessive nutrients, carp and low light penetration caused by lake-wide algae blooms. The negative impacts associated with lack of quality aquatic plant communities are wide spread including those on water quality and fishery health. Before submersed aquatic vegetation can be reintroduced, actions must be taken to improve light penetration, which included carp eradication and phosphorus reduction.

- *Unhealthy fishery*

  Based on past fishery studies and current observations, Slough Lake has a very unhealthy fishery. Past surveys by the IDNR have shown an overabundance of undesirable species including common carp, green sunfish, and black bullhead. These species have directly caused the decline in fishery health and by their nature will continue to disrupt the fishery of Slough Lake. Furthermore, common carp are contributing to excessive nutrient resuspension (and algae problems) that plague Slough Lake as well as the lakes that receive Slough's drainage. For any improvement in water quality to be seen in Slough Lake, these undesirable fish species (especially carp) must be removed

There are several techniques to remove carp. However, rarely does any technique eradicate carp from a lake. Commonly, once a lake has carp, it has carp forever. However, it is up to the management entity to dictate how big the problem is allowed to become. Rotenone is the only reliable piscacide (fish poison) on the market at this time, but it kills all fish that is comes into contact with. Currently, there is a rotenone laced baiting system that may selectively remove carp. While the process is a step in the right direction, several factors still need to be worked out in order for it to be a viable alternative to the whole lake treatment. Until this baiting technique is further developed and produces consistent results, it is not recommended.

Rotenone is a piscacide that is naturally derived from the stems and roots of several tropical plants. Rotenone is approved for use as a piscacide by the USEPA and has been used in the U.S. since the 1930's. It is biodegradable (breaks down into CO_2 and H_20) and there is no bioaccumulation. Because rotenone kills fish by chemically inhibiting the use of oxygen in biochemical pathways, adult fish are much more susceptible than fish eggs (carp eggs are 50 times more resistant). Other aquatic organisms are less sensitive to rotenone. However, some organisms are effected enough to reduce populations for several months. In the aquatic environment, fish come into contact with the rotenone by a different method than other organisms. With fish, the rotenone comes into direct contact with the exposed respiratory surfaces (gills), which is the route of entry. In other organisms this type of contact is minimal. More sensitive nonfish species include frogs and mollusks but these organisms typically recover to pretreatment levels within a few months. Rotenone has low mammalian and avian toxicity. For example, if a human consumed fish treated with normal concentrations of rotenone, approximately 8,816 lbs. of fish would need to be eaten at one sitting in order to produce toxic effects in humans. Furthermore, due to its unstable nature, it is unlikely that the rotenone would still be active at the time of consumption, and warm-blooded mammals have natural enzymes that would break down the toxin before it had any effects.

Rotenone is available in 5% and 2.5% concentrations. Both concentrations are available as synergized formulations. The synergist (piperonal butoxide) is an additive that inhibits fish detoxification of rotenone, making the rotenone more effective. Rotenone has varying levels of toxicity on different fish species. Some species of fish can detoxify rotenone quicker than it can build up in their systems. Unfortunately, concentrations to remove undesirable fish, such as carp, bullhead and green sunfish, are high enough to kill more desirable species such as bass, bluegill, crappie, walleye, and northern pike. Therefore, it is difficult to selectively remove undesirable fish while leaving desirable ones. Typically, rotenone is used at concentrations from 2 ppm (parts per million) – 12 ppm. For removal of undesirable fish (carp, bullhead and green sunfish) in lakes with alkalinities in the range found in Lake County, the target concentration should be 6 ppm. Sometimes concentration will need to be increased based on high alkalinity and/or high turbidity. Rotenone is most effectively used when waters are cooling down (fall) not warming up (spring) and is most effective when water temperatures are <50^{o}F. Under these conditions, rotenone is not as toxic as in warmer waters but it breaks down slower and provides a longer exposure time. If treatments are done in warmer weather they should be done before spawn or after hatch as fish eggs are highly tolerant to rotenone.

Rotenone rarely kills every fish (normally 99-100% effective). Some fish can escape removal and rotenone retreatment needs to occur about every 10 years. At this point in time, carp populations will have become reestablished due to reintroduction and reproduction by fish that were not removed during previous treatment. To ensure the best results, precautions can be taken to assure a higher longevity. These precautions include banning live bait fishing (minnows bought from bait stores can contain carp minnows) and making sure every part of the lake is treated (i.e., cattails, inlets, and harbored shallow areas). Restocking of desirable fish species may occur about 30-50 days after treatment when the rotenone concentrations have dropped to sub-lethal levels. Since it is best to treat in the fall, restocking may not be possible until the following spring. To use rotenone in a body of water over 6 acres a *Permit to Remove Undesirable Fish* must be obtained from the Illinois Department of Natural Resources (IDNR), Natural Heritage Division, Endangered and Threatened Species Program. Furthermore, only an IDNR fisheries biologist licensed to apply aquatic pesticides can apply rotenone in the state of Illinois, as it is a restricted use pesticide.

Costs

As with most intensive lake management techniques, a good bathymetric map is needed so that an accurate lake volume can be determined. To achieve a concentration of 6 ppm, which is the rate needed for most total rehabilitation projects (remove carp, bullhead and green sunfish), 2.022 gal/Acre-Foot (AF) is required. Based on 300 AF (LMU estimate of Slough Lake volume) total cost would range in price from $30,330 - $45,495. Utilizing a lake drawdown could reduce costs. A reduction in lake volume would proportionately reduce cost of treatment. Drawdown would also serve to dry out the cattail areas that surround the lake, which could harbor carp that would be unaffected by a whole lake treatment. By using a draw down these areas would be dried out and any carp that remained in the cattails would die of asphyxiation.