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Subject: 2006 Cedar Lake Report

Dear Mike:

Enclosed is my 2006 Cedar Lake Fisheries report. It is very similar to the draft report I sent earlier, but I wanted you to have a copy of the approved report. I have also enclosed a copy of my 1994-95 survey report. I am sorry that it took so long for this report to be finalized.

If you have any questions, please let me know.

Steve Hogler
Fisheries Biologist

INTRODUCTION

Cedar Lake (WBIC-0045100, T17N R21E S23-24) is a 142 acre lake located in the southwest corner of Manitowoc County (Figure 1). It is a seepage lake with a maximum depth of 21 feet, and is the largest lake in the county. The water is clear and hard, with a gravel and muck bottom. Much of the Cedar Lake shoreline is developed with cottages as well as year-round residences. Many permits for sea walls and sand blankets/pea gravel have been issued over the years. Heavy use of the lake by anglers, boaters and other water users occurs on a regular basis. Currently there are boating and water skiing restrictions on the lake. The Cedar Lake Association has a weed management program and harvests much of the rooted aquatic vegetation that grows in the lake. Traditionally the lake has been managed as a largemouth bass, northern pike, bluegill lake, although other species have been introduced into the lake. Cedar Lake has a long history of stocking that dates back to the 1930's when largemouth bass, walleye, bluegill and yellow perch were stocked. In the years since, most of the fish stocked into the lake were largemouth bass or northern pike. Recently the Cedar Lake Association has stocked walleye, yellow perch, and black crappie.

A 1945 fisheries survey of the lake with fyke nets indicated that bluegill were the most abundant fish, with crappies, largemouth bass, rock bass, bullheads, and warmouth also captured. All fish collected were reported to be in good condition. It was also reported that there was lots of motor boat traffic and the lake was heavily fished. There was a recommendation to stock no more than 5,000 largemouth bass fingerlings but no other species.

A survey conducted in 1961 used seines and electroshocking gear to assess the fish populations of the lake (Schultz, 1963). The most common fish in seine hauls were bluegill, black crappie, largemouth bass, and northern pike. Bluegills ranged in length from 75 mm to 230 mm. The majority of bluegills were greater than 150 mm in length. Black crappies ranged in length 70 mm to 240 mm, with most between 178 mm and 190 mm. Largemouth bass ranged in size from 150 mm to 508 mm in length, with most less than 250 mm in length. Northern pike were 330 mm to 585 mm in length. Other captured species included yellow perch, sunfish, bullhead and carp. Electroshocking produced results similar to the seine data. Comments on the lake included those on: the conflict between anglers and water skiers, excess aquatic vegetation, some septic leakage, and water level fluctuations. The fish community was in good condition, with carp present but not a problem. Northern pike stocking had been successful, while no evidence was found that walleye stocking had been successful. No new management recommendations were made.

A 1974 survey used fyke nets, seine, and electroshocking gear to assess the fisheries of the lake (Belonger, 1975). A total of 1,188 fish representing 14 species were measured. Results from the survey indicated that bluegill was the most common fish with an average length of 150 mm. Yellow perch had an average length of 185 mm, largemouth bass ranged in size from 100 mm to 508 mm with an average length of 226 mm, and northern pike averaged 523 mm in length. Other fish captured included walleye, black crappie, pumpkinseed, rock bass, warmouth, bullhead, white sucker, carp, and golden shiner. Similar conclusions to those from the previous survey were made. The panfish population was dominated by bluegill, which were of fair size. Northern pike populations were also fair, with probable heavy harvest occurring during winter. Largemouth bass were common, with a stable population. Walleye were present in low number due to stocking, but no evidence of natural reproduction was found. One management recommendation was to reestablish northern pike stocking at 3 fish per acre.

A 1985 survey (Peeters, 1985) utilizing fyke nets and electroshocking gear produced results similar to the previous two surveys. Bluegills ranged in length from 90 mm to 218 mm. Growth appeared to be above state averages. Yellow perch were also very common, ranging in size from 122 mm to 305 mm. Growth was also very good and above state averages. Black crappie and bullhead were also abundant. Largemouth bass was the most common predator in the lake. Bass length ranged from 110 mm to 499 mm, with growth rates slightly below the state average. Northern pike were 320 mm to 739 mm in length with growth below state averages. Walleye were collected, but in low number. All appeared to be the result of stocking.

Since the 1985 survey, Fisheries Management has done little work on Cedar Lake. Beginning in August 1994 and continuing through June 1995 a comprehensive survey was conducted to determine the status of the fish community in Cedar Lake. With the information collected in this survey, and in conjunction with earlier surveys, a long term management plan for this lake should be constructed. This plan would address problems common to Cedar Lake, and other similar lakes in Manitowoc County such as: over exploitation of predators, slow growing panfish, and loss of fish habitat.

METHODS

A comprehensive survey on Cedar Lake was conducted between August 1994 and June 1995. Shoreline seining was conducted twice a month from August through October at six selected sites (Figure 2). Sites were selected to be representative of the available bottom and habitat types. The beach seine was seven meters wide with a

continuous mesh size of 3/8 inch, and a collection bag. Each haul was perpendicular to the shore and was eight to ten meters in length. Water depth at the beginning of each haul was measured. Fish were identified to species, and enumerated. Effort was calculated as the volume of water seined in cubic meters.

Fall electroshocking was conducted at night on October 25, and November 1 using pulsed D.C. at 250 volts and 3 to 4 amperes of current. Each night, one complete circuit of the lake was completed and all fish netted. Fish were identified, measured to the nearest 1 mm, and a subsample (10 per 10 mm size class) of each species were weighed and had scales removed for age analysis.

Shortly after ice-out, 6 standard fyke nets (3 foot hoop diameter, and 1 1/2 inch stretch mesh length) were fished from April 6 through April 20. Net locations were selected to cover the majority of habitat types found in Cedar Lake (Figure 3). The nets were lifted every day or every other day, and all fish were removed and identified. All game species were measured, weighed, and floy-tagged. A subsample of fish had scales removed for age analysis. All other species were counted and marked, and if conditions permitted, measured, weighed and had a scale sample taken. Immediately following the fyke netting, a nighttime electroshocking run was completed using pulsed D.C. at 250 V. and 3 to 4 amperes of current to recapture marked fish for population estimates. During the circuit of the lake, all fish were netted, identified, and checked for marks. Panfish were measured, and gamefish were measured, weighed, marked, and had a scale sample collected.

A second series of electroshocking runs, with similar voltage and current settings, were conducted on the nights of May 17, 25, and 31. These runs were made before centrarchid spawning in order to characterize their populations. As in earlier runs, the entire shoreline was shocked, and all fish were netted, identified, marked and measured or counted.

Standard statistical analysis of the collected data was performed. Length frequencies with average sizes and standard deviations were calculated. Populations estimates using the Peterson and Schnabel methods and 95% confidence intervals were calculated. Ages were determined by counting scale annuli with the use of a microfiche reader. Two independent estimates of age were made.

RESULTS

SEINING

Shoreline seining was begun on August 17, 1994, and performed twice a month through October. Six sites were selected to represent the variety of bottom and habitat types found in the lake. A total of 297 fish were collected representing nine species

(Table 1).

Seine hauls during August captured the most fish, with the number of fish collected declining throughout the remainder of the survey (Table 2). The majority of fish that were captured during the seining survey were collected August 18 and September 15. Seine hauls from other dates captured substantially fewer fish. Bluntnose minnows were the most abundant fish, followed by bluegill and largemouth bass.

Total number of fish and species composition varied by site. Site A was dominated by bluntnose minnows and bluegill (Table 3). Very few other fish species or fish were captured. Site A habitat was characterized by a sand/small gravel bottom with small, scattered patches of algae.

Seining within Site B captured very few fish (Table 4). Largemouth bass and bluntnose minnow were the most common fish. Most of the yellow perch collected were captured at this site. Habitat at this site consisted of a sand and silt bottom, with a dense covering of aquatic macrophytes.

Seining at Sites C, D, and E was not productive. Total number of fish captured ranged from seven at Site C to nine at site D. Bluntnose minnow dominated Site C which was characterized by a sand and silt bottom with scattered cattails (*Typha spp.*) present (Table 5). Bluegill and largemouth bass were collected the most often at Site D (Table 6). This site had a hard sand and gravel bottom with coontail (*Ceratophyllum demersum*), and pondweed (*Potamogeton spp.*) present. Site E, which had a sand-silt bottom with coontail and pondweed, was dominated by bluegill (Table 7).

Site F had the greatest diversity of fish species, and the second highest total number of fish collected (Table 8). Most of the fish captured in October during the seine survey came from this location. Bluegill was the dominant species collected followed by largemouth bass and bluntnose minnow. The habitat at this site consisted of a sand/gravel bottom with scattered pondweed.

FALL ELECTROSHOCKING

The entire shoreline was shocked once on the nights of October 25 and November 1. All fish were netted and identified (Table 1). A total of 359 fish were captured representing fifteen species (Table 9).

On the night of October 25, 144 fish were captured in 1.97 hours of shocking for a catch per unit effort (CPUE) of 73.1 fish per hour shocked. Catches of bluegill and largemouth bass dominated the collection. All other species were collected in substantially fewer number.

During the second night of shocking, 215 fish were collected in 2.18 hours of shocking for a CPUE of 98.6 fish per hour shocked. Once again the catch was dominated by largemouth bass and bluegill. Yellow perch, bluntnose minnow and northern pike were also caught in good number.

The 105 largemouth bass captured during this survey period ranged in length from 109 mm to 493 mm with an average length 284.9 mm (Table 10). Average weight was 378.5 g (Table 11). Age classes 1+ through 6+ were present, with age 4+ fish the most common, followed by ages 5+ and 3+ (Table 12). Length at age indicate largemouth bass in Cedar Lake grow at a slower rate than those reported by Snow (1969) at all sampled ages, but were within minus one standard deviation of state averages (WDNR, 1990). Catch curve analysis indicates an annual mortality rate of 71.0% for age classes 4+ through 6+.

Forty yellow perch were collected during fall sampling. Yellow perch ranged in length from 79 mm to 289 mm, with an average length of 192.4 mm (Table 10). Average weight was 94.2 g (Table 11). Age as determined from scale analysis indicated ages 0+ through 5+ were present in the sampled population. Ages 1+ and 3+ were the most common followed by ages 2+ and 4+ (Table 13). Length at age comparisons with Snow's results (1969), and statewide averages (WDNR, 1990) show that yellow perch in Cedar lake grow faster than other sampled populations at all ages. Catch curve analysis indicates that age classes 1+ through 5+ have a mortality rate of 15.0%.

Bluegill was the other species commonly caught during the fall survey period. The 117 collected fish ranged in size from 58 mm to 210 mm, with an average length of 150.3 mm (Table 10). Average weight was 65.4 g (Table 11). Ages 0+ through 6+ were present, with age 2+ the most common followed by age 3+ (Table 14). As compared Snow's (1969) data and statewide averages (WDNR, 1990), bluegill in Cedar Lake grew at faster rate then in other sampled lakes for the first two years of life, thereafter had growth rates near state averages. Mortality for age classes 2+ through 6+ was estimated to be 41.0%.

SPRING FYKE NETTING

Shortly after ice-out six standard fyke nets were set on April 6 and fished for the next 14 consecutive nights for a total effort of 84 net nights. This survey targeted fish that spawn during early spring such as northern pike, walleye, and yellow perch.

A total of 2,837 fish, representing eighteen species (Table 1), were captured with a CPUE of 33.8 fish/net-night (Table 15). The most commonly caught fish were bluegill, yellow perch and northern

pike. Other gamefish collected included largemouth bass and walleye.

Northern pike was the most commonly caught gamefish with 404 captured during the fyke net survey. Length ranged from 227 mm to 640 mm with an average of 430.3 mm (Table 15). Average weight was 565.8 g. A population estimate made using the Schnabel method indicated a northern pike population of 641, with a 95% confidence interval of 527 to 798. This translates to 4.5 northern pike per surface acre of lake.

Males comprised 49.4% of the sampled population with an average length of 430.4 mm (Table 16). Age classes 1 through 6 were present in the sample with age 2 followed by age 3 the most common aged fish (Table 17). Very few fish older than age 3 were collected. Male fish exhibited similar length at age as those reported by Snow (1969) and were near state averages (WDNR, 1990). Mortality was calculated at 54.1% for ages 2 through 6.

Females comprised 37.3% of the population and had an average length of 438.5 mm (Table 16). Ages 2 through 4 were present in the sample with age 2 the most common (Table 18). Lengths at age were greater than those reported by Snow (1969) and slightly above state averages (WDNR, 1990). The small number of fish aged and the limited number of age classes may have affected the length at age averages. Catch curve analysis indicates a 77.3% mortality for ages 2 through 4.

Pike that were of unknown sex comprised the remaining 13.3% of the sampled population. Fish in this category had an average length of 407.1 mm (Table 16). Ages 2 through 4 were present with age 2 the most common (Table 19). Growth was similar to known sex fish with average to above average growth as compared to values reported by Snow (1969) and very near state averages (WDNR, 1990). Mortality was calculated to be 75.4% for ages 2 through 4.

Largemouth bass and walleye were the other gamefish caught during the fyke net survey. A total of 72 largemouth bass were collected (Table 15). Length ranged from 99 mm to 500 mm with an average length of 269.1 mm (Table 16). Average weight of the sampled bass was 425.4 g (Table 15). A population estimate of 420 with a 95% confidence range of 191 to 1680 was calculated using the Schnabel method. Walleye were rarely encountered, with only 3 being caught during the fyke net survey.

Bluegill was the most abundant fish caught by fyke net with 1,210 captured (Table 15). Schnabel estimates put the population at 36,908 with a 95% confidence interval of 24,132 to 63,773 (Table 15). Length ranged from 83 mm to 237 mm with an average of 153.2 mm (Table 16). Average weight was 66.9 g (Table 15). Age derived from analysis of scales indicate ages 1 through 7 were present,

with age 2 bluegill the most common (Table 20). Length at all ages was above values reported by Snow (1969) and Becker (1983). Growth appears to be good although very few fish greater than 200 mm were captured (Table 16). Catch curve analysis indicates a mortality rate of 60.0% for ages 2 through 7.

Yellow perch was the second most abundant panfish encountered during the fyke net survey (Table 15). The Schnabel estimate of the population size of perch in the lake was 1,846, with a 95% confidence interval of 1,459 to 2,417. Yellow perch ranged in length from 118 mm to 280 mm, averaging 183.9 mm in length (Table 16) and 80.0 g in weight (Table 15). Age classes 2 through 6 were present in the sample, with age 3 the most common followed by age 2 fish (Table 21). At each age, length, was similar or slightly larger than values report by Snow (1969) and state averages (WDNR, 1990). Mortality was calculated to be 42.3% for ages 3 through 6.

A total of 105 black crappie were caught during fyke netting (Table 15). Their population was estimated to be 1,085 using the Schnabel method, with a 95% confidence range of 528 to 3,530. Length ranged from 103 mm to 300 mm, with an average length of 133.5 mm (Table 16). Average weight was 61.2 g for black crappie (Table 15). Ages 2 through 7 were found in the sampled population, with age 2 fish the most common (Table 22). Black crappie in Cedar Lake exhibited growth (length at age) that was less than values reported by Snow (1969), but was greater than state averages (WDNR, 1990) for all age classes. Catch curve analysis indicates a mortality rate of 52.0% for ages 2 through 7.

Other panfish collected during fyke netting in decreasing abundance were green sunfish, warmouth, rock bass, and pumpkinseed. Similar to bluegill, these species of panfish were small in size ranging in average length from 139.8 mm for warmouth to 166.2 mm for rock bass (Table 16). Schnabel population estimates were calculated although small capture numbers and few recaptures increased the variability of the estimates. Population numbers were 149 for rock bass, 349 for warmouth, and 403 for green sunfish (Table 15). Generally, ages 2 through 7 were represented in the sample, although one older rock bass was collected (Tables 23-25). Length at age for rock bass is greater than averages reported by Becker (1983), while length at age for warmouth, pumpkinseed, and warmouth were near reported state averages (WDNR, 1990). Mortality rates varied by species with warmouth having a mortality rate of 35.1%, rock bass 33.7%, and green sunfish 69.9%.

Other species captured during fyke netting included black and yellow bullhead, white sucker, carp, and golden shiner (Table 15). None of the species except for yellow bullhead were caught in substantial number. Enough yellow bullhead were captured, marked, and recaptured to yield a population estimate of 229, with a 95%

confidence range of 169 to 330 using the Schnabel method.

SPRING ELECTROSHOCKING

During the night of April 25, one complete circuit of the lake was electroshocked. All fish were netted, identified, and checked for marks (Table 1). A total of 476 fish were collected during the 2.43 hours of shocking for a CPUE of 195.9 fish/hour shocked (Table 26). Bluegill and largemouth bass were the most commonly caught fish, with substantially lower numbers of green sunfish, yellow perch, and other species.

The focus of the electroshocking run was to look for marked fish to facilitate calculation of Peterson population estimates. A total of 27 recaptures were observed with the majority being bluegill. Other species with recaptures included green sunfish, warmouth, largemouth bass and yellow perch although in substantially lower number which will yield a more variable estimate of population. The Peterson estimate of bluegill abundance was 16,280 with a 95% confidence range of 9,511 to 27,899 (Table 15). The Peterson population estimates for largemouth bass, green sunfish, warmouth and yellow perch were 3,558, 1,326, 161, and 5,877 respectively.

Electroshocking runs were conducted at night on May 17, 25, and 31 to assess panfish and largemouth bass populations. Bass and panfish were the targeted species during this survey because the fish are on spawning beds and very susceptible to sampling gear, and the fish sampled should be the most representative of the population of the lake.

The May 17 run only sampled 1/3 of Cedar Lake because of mechanical problems, while on the other dates one complete circuit of the lake was electroshocked. During this sampling period a total of 921 fish were captured during the 4.55 hours of electrofishing for a CPUE of 202.4 (Table 26). Although total number during each night of survey in May was less than the April 25 run, CPUE was greater during May surveys.

Largemouth bass and bluegill were the most abundant fish during each night of electroshocking, as well as for the entire survey period (Table 26). The sampled bass ranged in length from 62 mm to 586 mm and averaged 266.4 mm (Table 27). Scales collected during the entire spring were used to determine that ages 1 through 10 and age 12 were present in the sampled population (Table 28). Age 4 fish were the most common, followed by age 5 and age 3 fish. Age at length analysis indicates that bass in Cedar Lake for their first two years of life grow faster than averages reported by Snow (1969) and state averages (WDNR, 1990), but later in life are shorter at each age. The mortality rate for bass ages 4 through 12 was calculated to be 52.6% from analysis of the catch curve.

A total of 370 bluegill were captured during May, and had an average length of 146.8 mm (Table 27). Ages 1 through 7 were present in the sampled population, with age 2 the most abundant (Table 29). Length at age was similar to those observed during fyke netting, and above averages reported by Snow (1969), and near plus one standard deviation above state averages (WDNR, 1990). Catch curve analysis indicates a mortality rate of 56.2% for ages 2 through 7. This rate is comparable to the rate calculated during spring fyke netting.

Other fish collected during May shocking included yellow perch, green sunfish, pumpkinseed, and bluntnose minnow in decreasing abundances (Table 26).

TAGGING

During electroshocking and fyke net surveys many fish were marked with floy tags to help assess population numbers and to determine angler harvest. A total of 848 fish, of eleven different species were tagged (Table 30). During the period, November 1994 through May 1997, anglers have returned 57 tags for a total return rate of 6.7%. This return rate is slightly less than return rates from other Manitowoc County lakes reported by Hogler (1995) and Peeters (1983). The majority (37 of 57) of tag returns came from open water anglers.

Largemouth bass, northern pike, and yellow perch comprised the majority of tagged fish. Of the 424 bass tagged, anglers returned 36 tags for a return rate of 8.5%. Most of these returns (31 of 36) were during the open water fishing season.

Anglers have returned ten tags from the 317 northern pike tagged for a return rate of 3.2%. This rate is substantially lower than the 24% to 28% return rate observed by Hogler (1995), and Peeters (1983) on other Manitowoc county lakes. Unlike returns from bass, the majority of northern pike returns (9 of 10) were from anglers fishing during the ice fishing season.

Yellow perch anglers have returned seven of 83 tags for a return rate of 8.4%. Nearly equal numbers of returns have come from open water and ice anglers.

DISCUSSION

Surveys of Cedar Lake collected 21 species of fish, with bluegill and largemouth bass the most abundant species. These results are similar to those observed by Belonger (1975) and Peeters (1985).

LARGEMOUTH BASS

Largemouth bass were collected during each survey, and appear to

have a good population in the lake although growth is slower than state averages. A Peterson population estimate indicates 3,558 bass or 25.1/surface acre present in the lake. Average size of bass ranged from 284.9 mm for fall electroshocking, to 270.6 mm in spring shocking. Total length ranged from 62 mm to 585 mm. Belonger (1975) had an average length of 226 mm with a size range of 100 mm to 508 mm and collected fewer bass during each of his surveys. Results from the two surveys indicate an improved size structure for bass in Cedar Lake. Comparison of the length frequencies (Figure 4), show a large number fish in the 250 mm to 350 mm range during the 1995 survey, while the 1974 survey had many fish in the 200 mm to 250 mm range. Improvements in size may be due to a combination of the 14" size limit on bass and catch and release practiced by many anglers. Although increased size was noted, age structure, and mortality rate indicate bass are heavily harvested by anglers despite the 14" size limit. Growth may be limited by a lack of forage.

NORTHERN PIKE

Northern pike were commonly collected during fyke netting. Average length in 1995 was 430.3 mm compared to 523.2 mm seen by Belonger (1975), with total number collected during fyke netting higher in 1995 than in 1974. Belonger estimated the northern population to consist of 171 adults. The 1995 population was estimated to be 641, or 4.5 pike/surface acre. Length at age is at, or above State averages indicating the small size of northern pike may be from the harvest of large fish by anglers, not because of slow growth. High mortality rates as calculated from the catch curve may also support this conclusion. It appears most of the northern harvest occurs during winter months as evidenced by tag return data.

WALLEYE

Walleye have been stocked into Cedar Lake as recently as 1973 and 1994. Only four walleye were captured during this survey. Past surveys have also looked for stocked walleye but found few. It was felt by Belonger (1975) that no natural reproduction occurs and there was limited survival of stocked fish. This survey reconfirms limited potential for walleye in Cedar Lake.

PANFISH

Bluegill is the dominant panfish of the lake, although other centrarchids, and yellow perch are also present. Bluegill numbers are down from previous surveys, as well as the percentage of fish over 150 mm. Black crappie which were common during earlier surveys have also declined in number and size despite occasional stocking by the Cedar Lake Association. Yellow perch number and size have remained consistent over the time between surveys, although this may be due to stocking done by the Lake Association. Warmouth and green sunfish which were uncommon in previous surveys were collected often in the current survey.

Decreases in panfish numbers and size may be attributed to overharvest by anglers, or from loss of habitat due to weed harvesting, legal or illegal fills and placement of other structures nearshore in former spawning, nursery, or feeding areas. High mortality rates on older (larger) fish, a population with a large percentage of small fish, and good growth rates indicate any of the above or a combination factors have contributed to the decline of panfish numbers and size.

OTHER FISH

Carp are present in the lake and were captured in low number. Their presence and number are not affecting water quality or other fish populations. Bullhead are present but similar to carp are not a problem. Forage species such as minnows, shiners, darters and white sucker were present although not collected in great number. Loss of weed beds needed for spawning, feeding, and as a refuge from predators may have contributed to their low number.

CONCLUSIONS

The 14" largemouth bass size limit appears to have been successful in increasing the average size of bass. Bass were abundant, although few large fish were captured. Angler harvest during the open water fishing season may remove many fish once they reach 14 inches.

Northern pike are present in good number but are small in size, and exhibit average growth rates. The newly instituted 26" size limit should increase the size of northern pike. Larger northern pike will be welcomed by anglers, although because of concerns about low forage abundance, pike growth rate and forage abundance should be monitored in several years with another survey. Anglers harvest many northern pike during the ice fishing season as seen by tag returns.

Panfish numbers and size have declined since the 1974 survey. Growth rates are at or above state averages indicating overharvest or low recruitment due to habitat loss from weed cutting or placement of fill on the lake bed.

Forage fish numbers are also low in the lake. Low forage fish number affects both panfish and gamefish growth. Protection of weed beds are critical in maintaining healthy forage fish numbers and ultimately panfish and gamefish.

RECOMMENDATIONS

1. Work with the Cedar Lake Association in developing and

maintaining a weed management program that protects larger areas of aquatic vegetation that would enhance the fisheries of the lake. These growths of aquatic vegetation are important spawning, feeding, and refuge areas for small fish and are needed to produce a healthy, balanced fishery.

2. Work with the Cedar Lake Association and Water Regulation and Zoning to educate lake residents on the importance of habitat for fish and to reduce the amount of fill and number of other structures placed on the lake bed that may destroy fish habitat. It was estimated that between 1960 and 1974 over 1.0 million pounds of pea gravel was placed into Cedar Lake. This trend has continued today with many new applications pending. Fill reduces the available habitat needed by fish for spawning and feeding. Sea walls have also fragmented habitat and should be discouraged.

3. Survey Cedar Lake in the future to determine the effects of the largemouth bass and northern pike size limits, and reduced panfish bag limits on the fishery. Results from this survey have indicated the size limit on largemouth bass has increased the populations size structure. It will be important to know if this trend will continue and if northern pike show a corresponding increase in length with their new size limit. As importantly, it must be determined if increased size and number of predators have negatively affected panfish number and size.

4. Work with the Cedar Lake Association to develop long term lake objectives. Long term goals are critical in maintaining the quality of Cedar Lake. Habitat loss, water quality, and recreational water usage are issues that are critical for a healthy fishery. Careful long term planning that addresses these concerns will enhance and protect the fisheries of Cedar Lake. Short term solutions such as stocking, or weed cutting to more complex problems should be discouraged.

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