Hutchins Lake
Allegan County, Clyde and Ganges Township
Surveyed May and August 2007

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Environment

Hutchins lake (Figure 1) is located in western Allegan County, Michigan, approximately 2 miles southwest of Fennville. The shape and size of a lake basin affect nearly all physical, chemical, and biological parameters of lakes. The forms of lake basins are extremely varied and reflect their mode of origins, primarily glacial origin in Michigan. Hutchins Lake has a surface area of 376 acres, a maximum depth of 34 feet, and an average depth of 10.1 feet. Hutchins Lake has extensive shallow areas, particularly on the east side of the lake. The hypsographic curve indicates that 64.6% of the bottom area of the lake and 56.5% of the volume of water is less than 10 feet deep (Figure 2). The total volume of water in the lake is 3,897 acre-feet. The Hutchins Lake watershed comprises 1,632 acres, a land area that is about 4 times larger than the lake itself. Hutchins lake basin occurs within surface geology described as an end-moraine of fine textured till. Water drains from this end-moraine to Hutchins Lake primarily from the north creating the headwaters to the North Branch Black River. The outlet, located near the southernmost point of the shoreline, drains through the Mud Lake Swamp where it enters the Black River Drain, a tributary stream to the North Branch Black River. Water level in the lake was originally controlled in the late 1960's by the height of a culvert in the outlet under 122nd street on the south side of the lake. A concrete sill was constructed as a two stage dam to control the water level during the early 1970's and rebuilt during the 1990's. There is one public access site located off the 59th Street road ending that is owned by Clyde Township. Hutchins Lake is a moderately developed lake compared to other lakes in the region. The dwelling density during this survey was measured at 28 houses/mile (17 houses/kilometer) of shoreline length.

Important components of water quality include phosphorus, nitrogen (ammonia, nitrate, and nitrite), water temperature, oxygen, carbon dioxide, pH, and a number of metals and salts. Water temperature and dissolved oxygen are critical habitat components for aquatic organisms. Water temperature influences internal structure, chemistry, biological metabolism, and the types of aquatic organisms that live in lakes. Water temperatures in Michigan lakes vary from the southern portion of the state to the northern portion. Internal lake water temperatures also vary. The warmest water temperatures are found near the surface of the lake (epilimnion) during summer months and near the bottom of the lake (hypolimnion) during winter months. This condition is called stratification. Stratification is most pronounced during summer months when temperature changes are the greatest. A zone of rapid temperature change occurs in the metalimnion (also called thermocline) and this often forms a physical barrier that prevents interchange of water, gases, organic material, and nutrients between the epilimnion and the hypolimnion. A temperature profile was obtained from the deepest basin of Hutchins Lake during mid-August 2007. This temperature profile illustrates that summer stratification occurred in the lake with the metalimnion beginning at approximately 15 feet.

Dissolved oxygen is important for sustaining aquatic life. The solubility of oxygen and other gases depend on water temperature. Colder water can contain more dissolved gases. Oxygen enters the water from the atmosphere and it is produced by aquatic plants during photosynthesis. Oxygen is used by all

animals and microorganisms in lakes and it is removed by plants during respiration when sunlight is not available. Oxygen depletion can occur in lakes with high plant and animal oxygen demand, especially in areas of lakes where waters do not mix freely or come in contact with the atmosphere. Water quality standards (related to discharges) in Michigan require maintenance of 7 mg/l dissolved oxygen for all Great Lakes and connecting waters, designated trout streams, and coldwater inland lakes. The water quality standard for other water bodies is 5 mg/l. Minimum dissolved oxygen levels for suitable summer habitat are approximately 3.0 mg/l for coldwater and cool-water fish and 2.5 mg/l for warm-water fish. The influence of water temperature stratification, dissolved oxygen, and trophic status determine the types of aquatic organisms that live in a lake. Dissolved oxygen profiles in Hutchins Lake showed a clinograde curve where the oxygen content of the hypolimnion depleted rapidly (Figure 3). The hypolimnion remains anaerobic in Hutchins Lake throughout the summer stratification period. Dissolved oxygen concentrations were above the warm-water fish levels of 2.5 mg/l at a depth of 16 feet with anaerobic conditions in the hypolimnion. Critical depth is defined as the point at which dissolved oxygen concentrations are less than 0.5 mg/l and refers to conditions below which microorganisms like zooplankton will not occur below this depth. The critical depth in Hutchins Lake occurred around 19 feet.

Hutchins lake is mesotrophic and is characterized by moderate phosphorus (14 ug/l), moderate Secchi disk transparency (8.5 ft.), and high chlorophyll a (5.4 ug/l). Secchi depth measurements were typical of conditions for lakes in the region. Chlorophyll a concentrations were higher than average for conditions of lakes in the region. Phosphorus is an important nutrient for plant growth and often is referred to as the limiting nutrient for plant growth in water. Phosphorus accumulates in sediments where it becomes readily available to be extracted by rooted aquatic plants. Phosphorus does not dissolve easily in water, limiting its availability for algal growth under low concentrations. Phosphorus concentrations were slightly higher than average for conditions in typical lakes in the region. Total alkalinity (100-170 mg/L) was indicative of a hardwater lake with good buffering capacity. pH values (7.0-8.0) also indicated slightly alkaline conditions of the water.

History

Creel census surveys were conducted on Hutchins Lake from 1954 to 1963 by the Institute for Fisheries Research at the University of Michigan. These early census surveys indicated that most of the catch in the lake at the time consisted of bluegill, largemouth bass, pumpkinseed, black crappie, rock bass, and yellow perch. Surprisingly, no northern pike were reported in the catch during this time. The first netting survey conducted in Hutchins Lake occurred in June 1962. During this survey, three seine hauls were used to document 17 fish species present in the lake. A total of 4,622 fish were captured during these seine hauls with most of the fish less than six inches. Seines target mostly young age classes of fish that are located near the shoreline. This survey documented a large number of fish utilizing nearshore habitats.

Stock enhancement in Hutchins Lake has primarily involved northern pike. In an effort to build up a better population, a northern pike spawning marsh was developed in 1963 along the north shore of the lake as a cooperative rearing marsh with the Fennville Rod and Gun Club. Northern pike were transferred from Swan Creek below the lower water level control structure at the High Banks, commonly referred to as Palmer Bayou. This area was near the confluence of Swan Creek and the Kalamazoo River at Highway M-89 (High Banks Unit, Allegan State Game Area). Annual electro-fishing surveys were conducted from 1969 to 1972 to evaluate the northern pike stocking efforts. The

1970 survey indicated good northern pike growth and survival; however, the overall catch was not very high during any of these surveys. Spawning marsh operation was discontinued in 1972 because of poor production. In 1976 the northern pike marsh program was reinstated at a new site. A general electro-fishing survey was conducted in October 1977 that captured 17 fish species with good numbers and size of bluegill and largemouth bass. Northern pike were not represented well during the survey as the notes indicate that fish were possibly out in deeper water. This survey documented the first presence of alewife in Hutchins Lake.

In 1986, the first survey using entrapment gear to document the fish community in Hutchins Lake was conducted with five trap nets and two fyke nets. This survey documented 13 fish species previously captured during past surveys. Channel catfish were also observed in the lake for the first time during this survey. Additionally, low numbers of white sucker, carp, gar, grass pickerel, and hornyhead chub were observed from catches with these gear types. Trap and fyke nets are selective for larger sized fish, so the survey documented larger size compositions of bluegill, black crappie, largemouth bass, yellow perch, and northern pike still growing at similar state average rates.

In 1992 spring fingerling northern pike produced at Wolf Lake State Fish Hatchery were stocked in the lake because of the loss of the cooperative rearing marsh. In 1994 and 1995 spring fingerling northern pike from the hatchery were fin clipped to evaluate hatchery fish survival and natural production in the lake. During a 1994 electro-fishing survey no clipped fish were collected. In 1997 a trap net survey conducted during March to collect northern pike resulted in 278 fish ranging in length from 12-33 inches. Blacknose shiner, Johnny darter, banded killifish, and sand shiner were new fish species documented in the lake during this survey. The last northern pike stocking occurred in 1998.

Current Status

Sampling effort followed the status and trends protocol for medium sized lakes (Wehrly et al. in review), which included nine trap net lifts, nine fyke net lifts, six experimental gill net lifts, four seine hauls, three electrofishing transects for ten minute intervals, and three additional electrofishing transects that collected only largemouth bass. Composition of the catch during this survey included 24 species of which four have been introduced to the lake (Table 1). The four introduced species include alewife, channel catfish, flathead catfish, and common carp. Alewife, channel catfish, and carp have been observed in previous surveys, but the flathead catfish are recent introductions to the lake. A total of 1,808 fish were caught during the survey and 23 turtles including musk, snapping, map, and spiny softshell. The fish community of Hutchins Lake is dominated by centrarchid fish (black crappie, bluegill, largemouth and smallmouth bass, pumpkinseed sunfish, rock bass, and warmouth) that comprised 88% of the catch by number. Benthic fish species including brown and yellow bullheads, and common carp consisted of only 4.6% of the catch by number. Predator fish species including northern pike, bowfin, and spotted gar consisted of only 2.6% of the catch by number. Sand shiners and bluntnose minnows were the most common minnow species represented in the seine hauls. Additional fish collected during the survey included blacknose shiner, banded killifish, central mudminnow, and fathead minnow. Lake chubsuckers and white suckers were not captured during this survey but were caught in low numbers during previous surveys. Yellow perch relative abundance was higher than average compared to other populations in the region (Figure 4).

Largemouth bass consisted of 14% of the centrarchid species captured. Electrofishing catch per unit effort of largemouth bass was above average compared to other lakes in the region (Figure 5).

Average lengths of largemouth bass at all age classes were similar to lengths compared to the growth of largemouth bass from other populations in the state. Annual mortality estimates could not be calculated because our catch of older age groups was not represented in proportion to the abundance of younger age groups. An indication that survival to older age groups (> age 5) is very low.

Bluegills consisted of 53% of the total centrarchid species captured. Trapnet catch per unit effort of bluegills was below the average catch compared to other bluegill populations in the region (Figure 6). Seven year classes of bleugills were collected. Bluegill average length at all age classes was within the average range compared to the growth of bluegill populations in the state. Age 4 fish were particularly well represented, composing 34% of the bluegill catch, whereas age 3 fish were underrepresented in the catch.

Pumpkinseed and warmouth were well represented in the catch that consisted of 16 and 7% of the centrarchids captured. Northern pike relative abundance was higher than average compared to other populations in the region (Figure 7). Northern pike growth was acceptable for populations within the region, but well above state average.

Analysis and Discussion

In addition to limnological information collected by Fisheries Division staff during this study, the Hutchins Lake Association has contracted water samples to be tested on an annual basis to determine if the water quality is experiencing any changes. I analyzed this water quality data collected from 1988-2007 to assess trends in parameters over time. Chlorophyll a and phosphorus levels show an increasing trend over this period. Chlorophyll-a is a component of plant cells. High chlorophyll-a levels indicate high levels of algal growth and productivity in Hutchins Lake. High phosphorus levels also indicate that this nutrient is not being used by optimal plant growth. No additional nutrients have had a significant trend since 1988.

Early seine haul surveys conducted by Fisheries Division staff indicated a high fish community assemblage using nearshore habitats. Fewer fish were collected in seine haul surveys conducted during this sampling period. This change in the nearshore fish community may be an indication of habitat loss within the nearshore lake environment. Significant aquatic herbicide treatments have occurred in the lake, which has reduced the diversity of plants available for fish and their prey. The loss or significant decline of lake chubsuckers compared to previous surveys is also an indication of habitat alterations that have changed the original fish community structure.

Hutchins Lake is dominated by centrarchid fish that continue to be within state average growth rates and abundance. The fishery of the lake continues to provide anglers with catches of largemouth bass, bluegills, rockbass, black crappie, and a few yellow perch. Northern pike abundance is similar to historic levels and their growth is well above state average, and should continue to provide an acceptable fishery to anglers.

The low relative abundance of larger sized largemouth bass appears to be the result of low survival (>age 5) rather than poor growth. The reasons for poor survival in this system are not known. The lake does not appear to have an abundant predator species causing the low survival, however forage species may be low due to habitat alterations. Forage species such as bluegills appear to be abundant,

however other species such as lake chubsuckers are low. Angler exploitation of largemouth bass may be another reason causing the skewed size distribution.

Management Direction

The fish community of Hutchins Lake has changed considerably since the earliest assessments. Recent introductions of fish to Hutchins Lake have occurred because of illegal transfers of fish by local citizens. These introductions of fish pose serious risks to the fish community that include conveying pathogens and spreading aquatic invasive species. All water bodies contain some fish pathogens. Some pathogens are ever-present and generally have only minor effects on fish communities. Other pathogens (referred to as pathogens of concern or POCs) can seriously damage fish populations. Pathogens of concern often have localized distributions, so proper precautions should be taken during fish transfers to prevent the spread of these pathogens to new waters.

Another serious risk associated with fish transfers is the potential spread of aquatic invasive species or AIS (e.g. zebra mussel Dreissena polymorpha, Eurasian water milfoil Myriophyllum spicatum, rusty crayfish Orconectes rusticus, and round goby Neogobius melanostomus). Once introduced into a new water body, these species can dramatically affect the fishery through, direct consumption of gamefish species, competition for resources, or alteration of fish habitat. Local citizens should not transfer organisms to Hutchins Lake without consulting the MDNR Fisheries Division. A stocking permit is required to introduce fish into public waters of the state.

There are three ecologically sensitive areas in Hutchins Lake. In the southeast corner there is a diverse wetland community that provides a buffer from nutrient loading and development pressure. In the south area of the lake is a large emergent plant community dominated by pickerelweed that provides spawning and juvenile habitat for bluegills and largemouth bass. The nearshore area along the north side of the lake is undeveloped and provides good habitat for aquatic insects, fish, and waterfowl. Protection of these areas from aquatic weed treatment, aquatic weed harvesting, and dredging and filling are critical to the survival of aquatic organisms that use these habitats.

The quality of bluegills inhabiting a lake depends on their relative abundance, population size structure, and growth. Bluegill relative abundance was moderate in Hutchins Lake while their growth was acceptable. Attributes of bluegill predators, mainly largemouth bass, are generally associated strongly with bluegill population size structure. Largemouth bass populations comprised of larger size structure and low relative abundance are associated with bluegill populations with poor size structure in many southern Michigan lakes (Schneider 1993). High bluegill quality is typically associated with high relative abundance of small largemouth bass less than 12 inches. Sustaining a population of bluegills through all size ranges requires constricting the population size structure of the bass that prey on them. Currently largemouth bass are at above average relative abundance and growing at acceptable rates. There appears to be a good balance between bluegill and largemouth bass and no management action is necessary at this time.

References

Schneider, J.C. 1993. Dynamics of good bluegill populations in two lakes with dense vegetation. Fisheries Division Research Report 1991. Michigan Department of Natural Resources. Lansing, MI.

Wehrly, K.E, G.S. Carter, and J.E. Breck. In Review. Standardized Sampling Methods for the Inland Lakes Status and Trends Program. Michigan Department of Natural Resources. Lansing, MI.

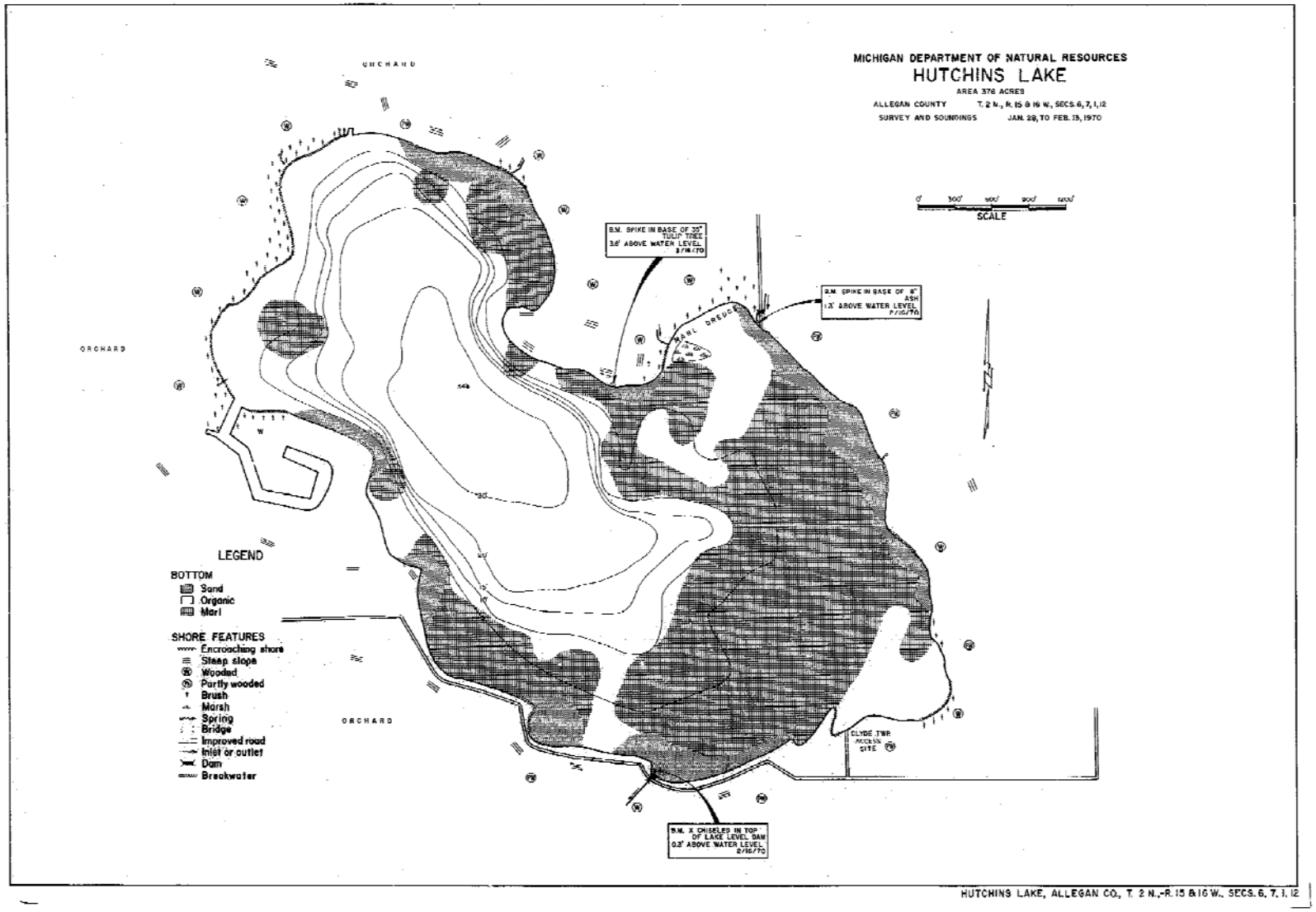

Figure 1. Physical habitat map of Hutchins Lake, Allegan County, Michigan.

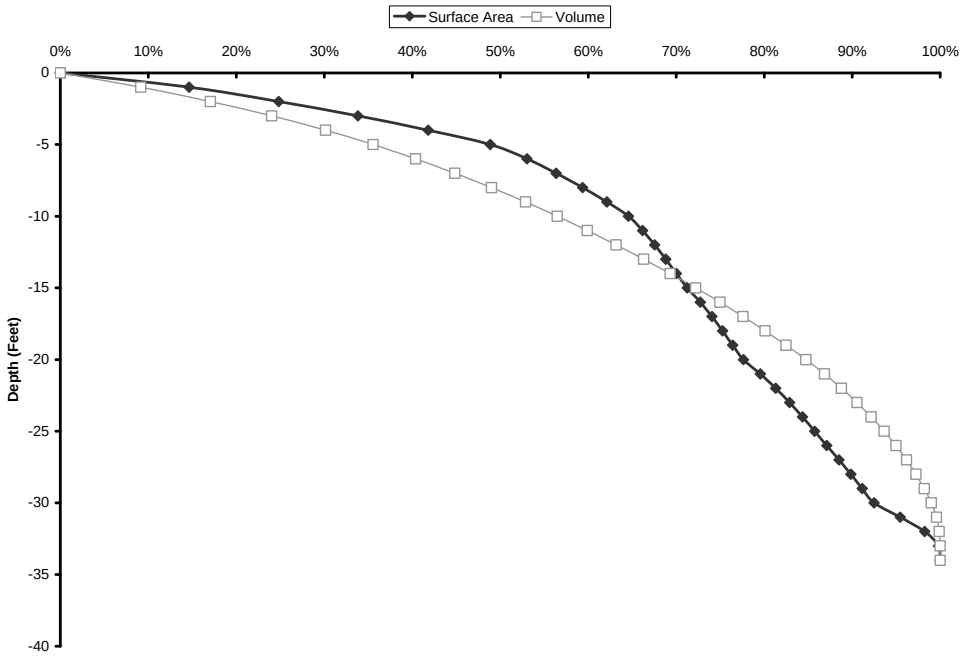

Figure 2. Hypsographic curves of Hutchins Lake, Allegan County

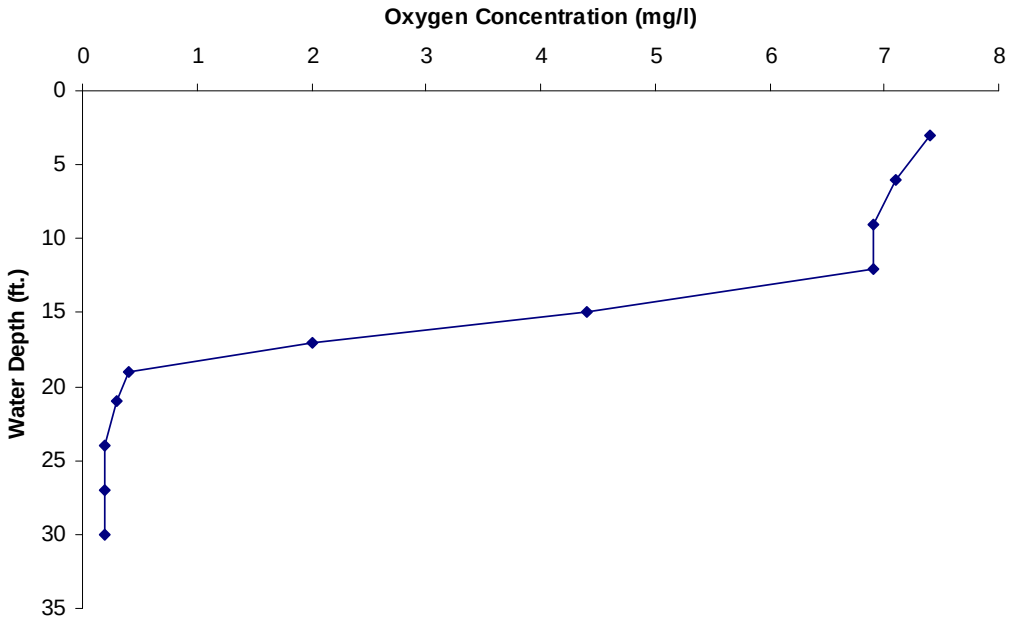

Figure 3. Dissolved oxygen profile for Hutchins Lake, Allegan County on August 2007.

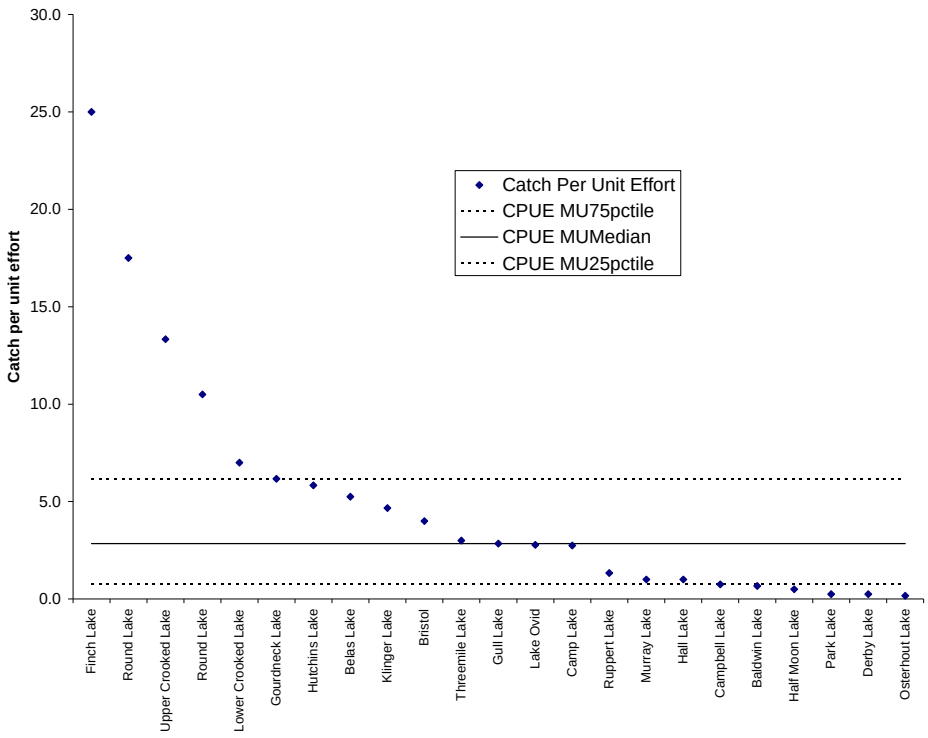

Figure 4. Experimental gill net catch per unit effort for yellow perch in Hutchins Lake, Allegan County and compared to other status and trends lakes in the region.

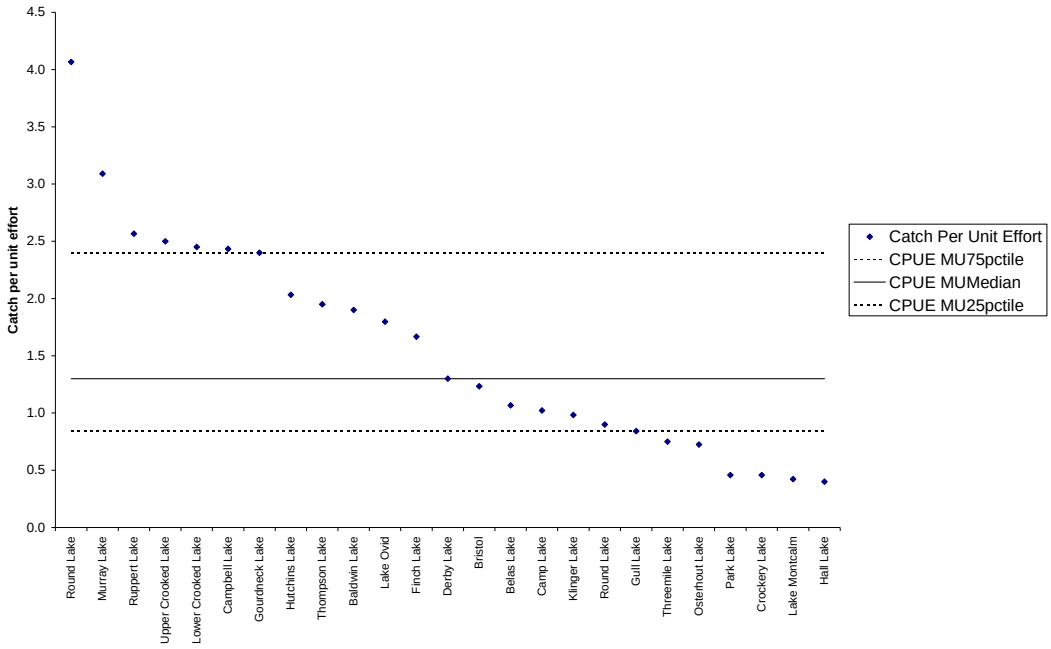

Figure 5. Electrofishing catch per unit effort of largemouth bass from status and trends lakes in the Southwest Michigan Region (2002-2007).

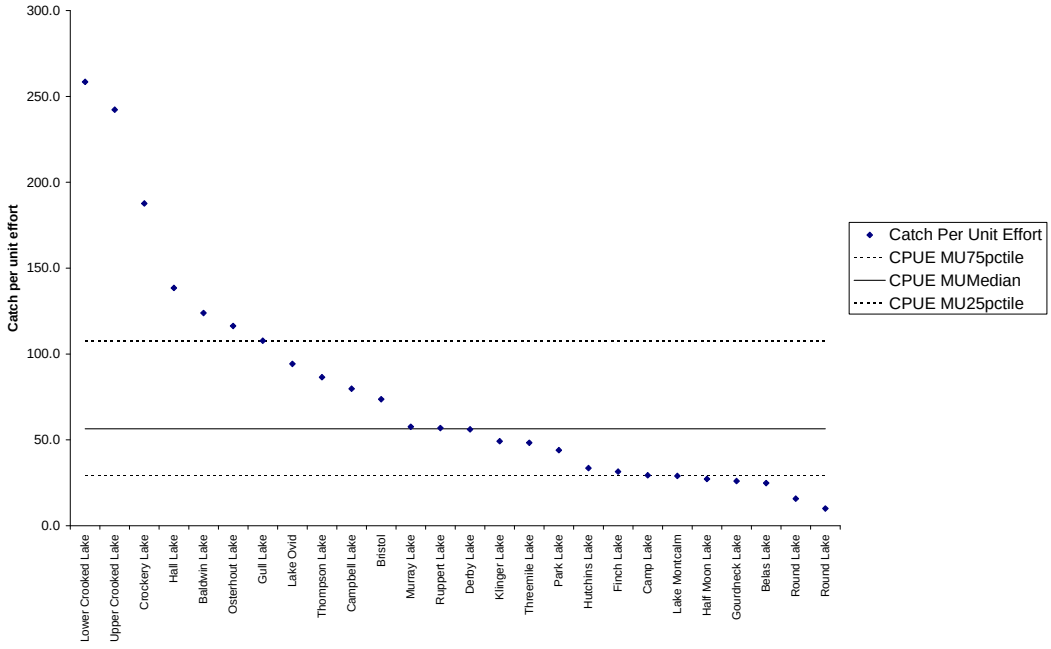

Figure 6. Trapnet catch per unit effort for bluegills from status and trends lakes in the Southwest Michigan Region (2002-2007).

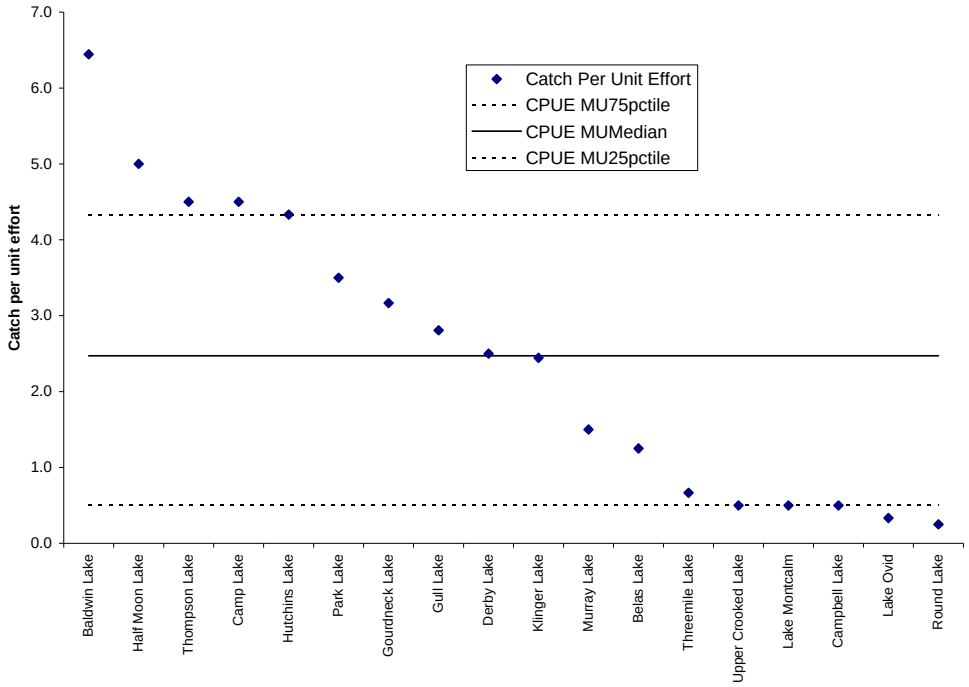

Figure 7. Experimental gill net catch per unit effort for northern pike in status and trends lakes in the Southwest Michigan region**.**

Table 1. List of fishes captured in Hutchins Lake, Allegan County during the 2007 Status and Trends Survey. * Indicates introduced species of fish not represented by the original fish community surveys of the lake.

Inch_Group	Alewife*	Black crappie	Banded killifish	Bluegill	Bluntnose minnow	Blacknose shiner	Bowfin	Brown bullhead	Common carp*	Channel catfish*	Largemouth bass	Northern pike	Pumpkinseed	Rock bass	Yellow Perch	Yellow bullhead	Flathead catfish*	Fathead minnow*	Johnny darter	Central mudminnow	Sand shiner	Smallmouth bass*	Spotted gar	Warmouth
1			18	146	431	52							6	1					2		613			1
2			4	95	7						1		8					1		1	302			4
3				53							2		9		3									7
4		1		67							8		8	2	1							2		23
5				146							1		18	9										32
6	1			132							17		67	6	17									33
7		3		197							21		68	11	17									16
8		17		50							30		73	2	18	2								7
9		20									31		4		2	4								1
10		9							1		38			1	2	16								
11								1			39					22						2		
12		1						4			14					17						1		
13								4			5					7						2		
14								3			5											2		
15										1	3											2		
16											2													
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38												1												
41																	1							
Total	1	51	22	886	438	52	5	12	4	3	226	28	261	32	60	68	1	1	2	1	915	11	15	124