LTBB NRD
2008

LITTLE TRAVERSE BAY BANDS
OF
ODAWA INDIANS

Draft Wycamp Lake Management Plan

TABLE OF CONTENTS

I. INTRODUCTION....3
II. STUDY SITE DESCRIPTION....5
III. WYCAMP LAKE ASSESSMENT....9
A. History and Cultural Significance Research....10
B. Water Quality....11
1. Lake and Creek Monitoring....11
2. Wetland Monitoring....18
C. Biological Communities....21
1. Cultural, Endangered, AND Threatened Species....21
2. Fish Communities....24
3. Wildlife Communities....34
4. Plant Communities....41
5. Invasive Species....46
IV. LAKE MANAGEMENT ISSUES AND OPTIONS....47
A. Overall Management Goal....47
B. Water Level Management....48
1. Summer Water Level....48
2. Winter Water Level....48
C. Ecosystem Management....52
1. Cultural, Endangered, and Threatened Species....52
2. Fisheries Management....52
3. Wildlife Management....53
4. Habitat Management....54
5. Invasive Species Management....56
D. Water Quality Management....57
E. Recreation/Land Use Management....57
V. PUBLIC INVOLVEMENT....59
A. LTBB Tribal Membership Input Meeting....59
B. LTBB Wycamp Lake Post-Card Survey....61
VI. FUTURE RESEARCH AND MONITORING....64
A. Cultural Research....64
B. Water Level Monitoring....64
C. Biological Community Monitoring....64
1. Cultural, Endangered, and Threatened....65
2. Fisheries Assessments....65
3. Wildlife Assessments....66
4. Habitat Assessments....67
5. Invasive Species Monitoring....67
D. Water Quality Monitoring....67
E. Recreation/Land use Monitoring....68
VII. LITERATURE CITED....69
VIII. ACKNOWLEDGEMENTS....72
IX. LIST OF APPENDICES....73
X. APPENDICES....74

I. INTRODUCTION

The Little Traverse Bay Bands of Odawa Indians (LTBB) is a federally recognized Indian Tribe reaffirmed by the United States Congress on September 21, 1994. The Tribe exercises sovereign governmental authority over the people, land, and water within its jurisdiction. The Tribe preserves its sovereign right to hunt, fish and gather both on the land and waters of the 1836 Ceded Territory through the operation of the Natural Resources Department (NRD). The NRD is committed to wisely utilizing natural resources in order to promote, honor, and respect the traditional, spiritual, and physical relationship with the land and waters. The NRD strives to implement management strategies that protect natural resources on, above, below, and within the land and waters for the future benefit of the tribe as well as for the benefit of the fish and wildlife and their habitats. This mission is addressed through the services and duties of the NRD which include gathering and analyzing specific fish and wildlife data, developing management plans, strategies and tribal regulations.

The Tribe is geographically located in northern-lower Michigan. The LTBB reservation area encompasses a portion of Emmet and Charlevoix Counties adjacent to Lake Michigan. The reservation covers 216,763 acres and it is within this reservation area that the Tribe's NRD defines its primary jurisdiction (Figure 1). The reservation area encompasses several bodies of water. Wycamp Lake is a culturally significant lake located in Emmet County and the entire lake is within the LTBB 1855 Reservation. No MDNR fish or wildlife data were available for this lake. Consequently, a management plan for Wycamp Lake does not exist nor has there been a study to determine a baseline of the biological communities.

LTBB NRD received funding from the United States Fish and Wildlife Service (USFWS) Tribal Wildlife Grant (TWG) to conduct the baseline research and write this lake management plan. The purpose of this lake management plan is to provide baseline cultural, biological and water quality data to guide the future management direction for Wycamp Lake and establish LTBB's cultural and historic significance to this lake and its natural resources. The LTBB NRD contracted a cultural and historical study and an aquatic plant study of Wycamp Lake to compliment the NRD fisheries and wildlife assessments. Water quality and wetland monitoring was completed by LTBB Environmental Services Department (ESD) and GIS mapping for the project was conducted by the LTBB GIS Department.

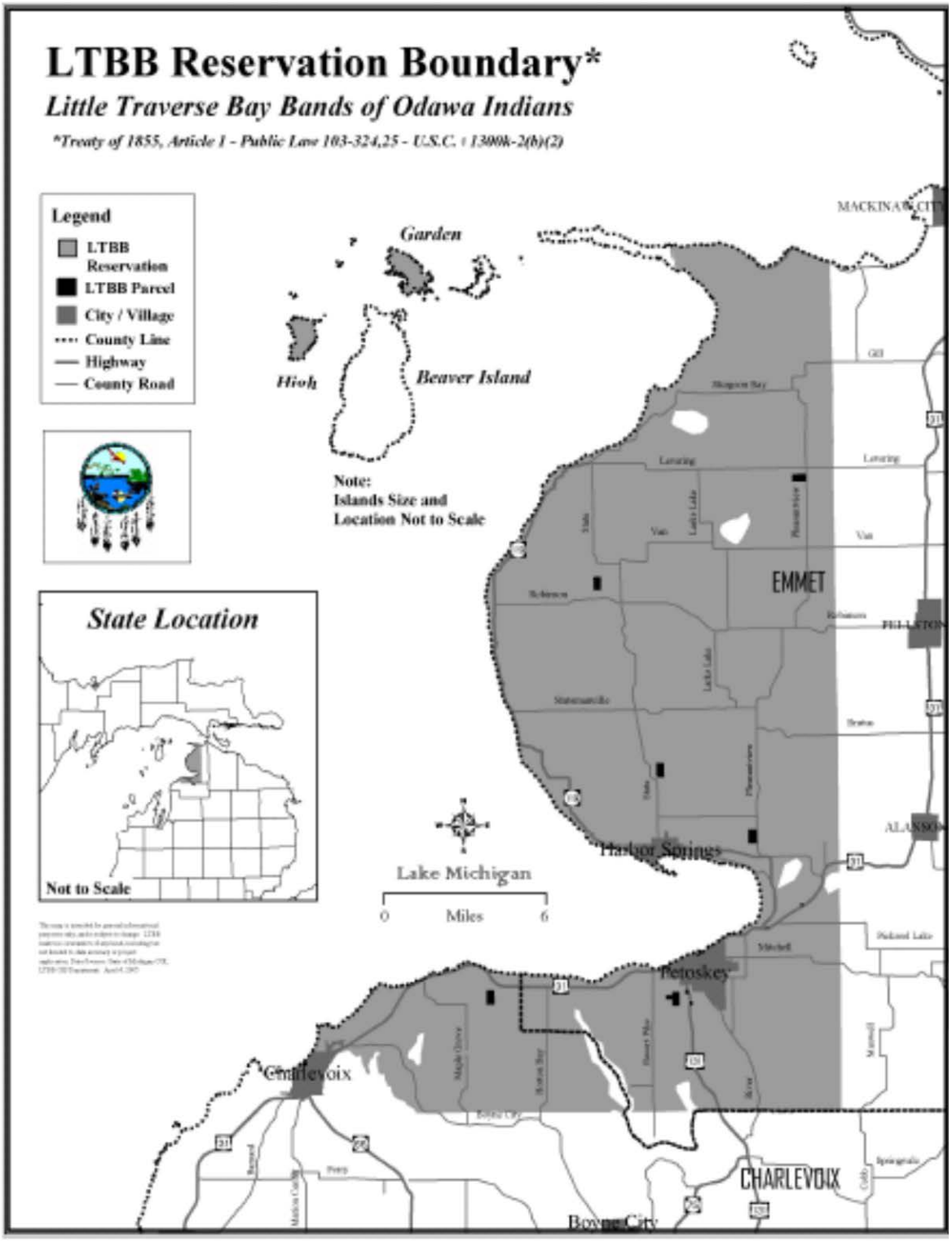


Figure (1). A map of the LTBB 1855 Reservation.

II. STUDY SITE DESCRIPTION

Wycamp Lake is a shallow lake located in the LTBB 1855 Reservation in Bliss and Cross Village Townships, Emmet County, Michigan. Emmet County is the northwestern-most county in Michigan's Lower Peninsula. The lake is just over 700 acres in size, with nearly ten miles of shoreline (Cronk 2007). Wycamp Lake is divided into distinct eastern and western basins (Figure 2). The east basin is about 363 acres in size and is shallow and marshy in character (Cronk 2007). The west basin is the deeper of the two, but does not exceed seven feet in depth and is 340 acres in area (Alan Proctor, LTBB GIS Department, Personal Communication; Cronk 2007) A map of the land ownership was created (Figure 3). The LTBB GIS department created a bathymetric map of Wycamp Lake in 2006 (Figure 4).

Wycamp Lake is a drainage lake with several inlets in the east basin, the largest of which is Collins Creek (Jansma 1960; USGS 1990; Cronk 2007; Appendix A). The outlet of the lake is Wycamp Creek. At the outlet, the lake's water level is regulated by a dam that was built in the early 1960's to establish and maintain a legal lake level of 611.8 feet above mean sea level for summer, with the winter level being 611.0 feet above mean sea level (Jansma 1960). The land owners and the State of Michigan petitioned the courts in the early 1960s to establish a legal lake level (Jansma 1960). Emmet County was charged with regulating water levels by removing stop logs from the dam and removing the beaver dam above the outlet dam site (Jansma 1960).

The total watershed area of the lake is over 12,500 acres (Cronk 2007; Appendix A). Kevin Cronk (2006; Appendix A) generated land cover data for the watershed using existing Costal Great Lakes Land Cover Project (Table 1). The majority of the watershed consists of natural, undeveloped land (Cronk 2006; Appendix A).

According to Andrews (2006) Wycamp Lake looks today like it did in 1840. The area surrounding Wycamp Lake is primarily forested and forested wetland. The majority of the land that surrounds Wycamp Lake is owned by the State of Michigan, approximately 200 acres are owned by a private owner, and over 800 acres of the land surrounding Wycamp Lake is used for a private hunting preserve (Figure 3).

Table (1). Wycamp Lake watershed land cover (From Cronk 2007).

Land Cover Type	Acreage	Percent
Agriculture	2141.98	17.01
Barren	4.51	0.04
Forested	4308.70	34.22
Grassland	2343.61	18.61
Scrub/shrub	307.38	2.44
Urban	150.98	1.20
Water	699.31	5.55
Wetlands	2634.48	20.92
TOTAL	12590.95	100.00

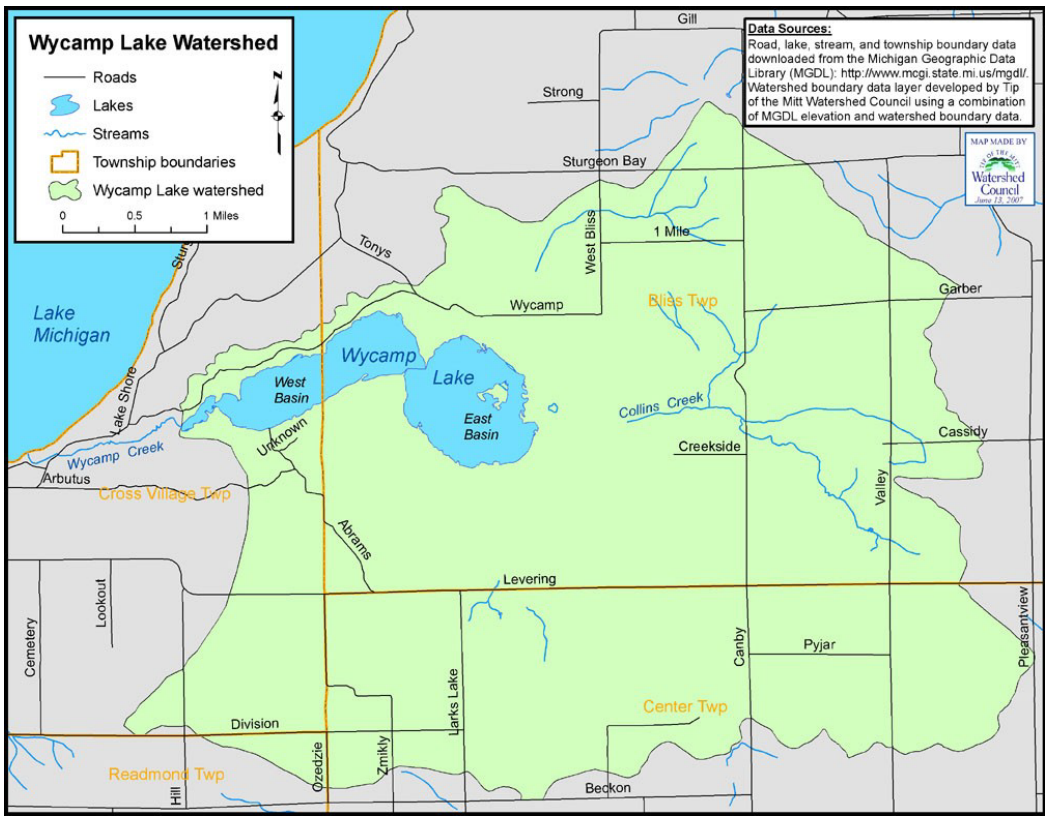


Figure (2). A GIS map of the Wycamp Lake Watershed (From Cronk 2007)

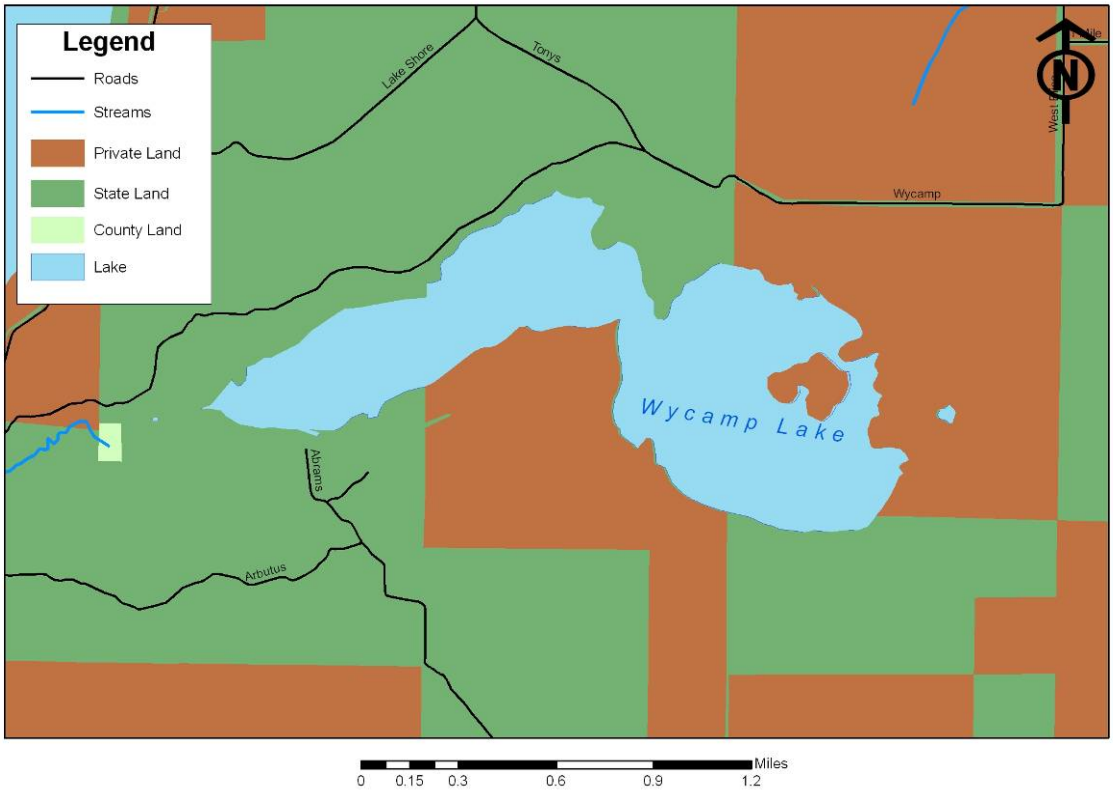


Figure (3). Land ownership of lands surrounding Wycamp Lake. The Majority of land around the lake is owned by the state of Michigan and is open to the public. The rest of the lake frontage is owned by two private land owners. Emmet County owns a small parcel at the outlet of the lake, where the dam is located.

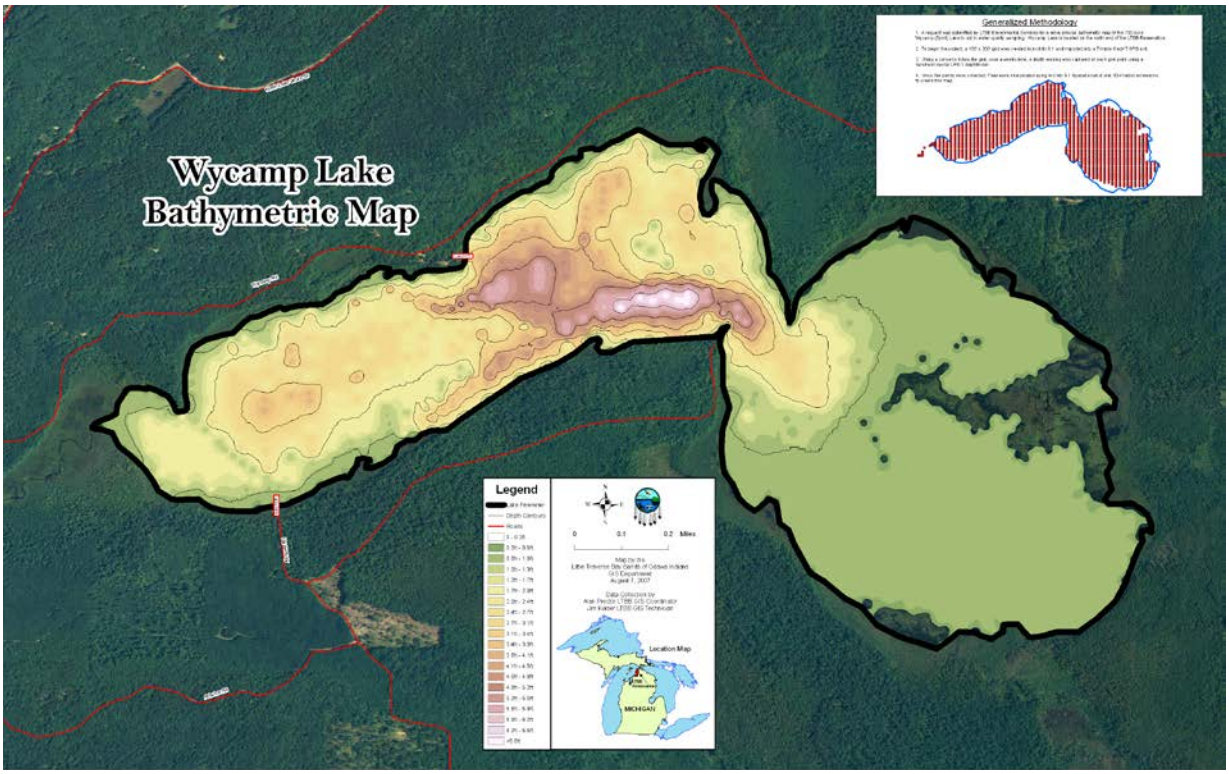


Figure (4). The LTBB GIS department created a bathymetric map of Wycamp Lake in 2007.

III. LAKE ASSESSMENT

The LTBB NRD and ESD conducted or contracted the following assessments to provide base-line data from which to make informed management decisions:

A. Cultural and Historic Research Assessment

Wesley L. Andrews, of Andrews Cultural Resources, a LTBB tribal member was the principal investigator for the cultural and historical land use study of Wycamp Lake and Creek (Andrews 2006). The purpose of the project was to identify and assess historical, cultural and archaeological resources that are associated with LTBB in the Wycamp Lake project area.

B. Water Quality and Wetland Monitoring

LTBB ESD conducted water quality and wetland sampling of Wycamp Lake and Creek and has provided data to contribute to this lake management plan. For a more detailed description of the water quality monitoring and the resulting data see Davis (2006).

C. Biological Community Assessments

LTBB NRD conducted base-line fish and wildlife surveys for this lake management plan. This research included: cultural, endangered and threatened species monitoring; fisheries assessments; waterfowl brood surveys; and surveys for invasive species. For a more detailed description of the fish and wildlife research methods and results see Appendix C (LTBB NRD 2008). NRD contracted with Tip of the Mitt to survey the aquatic vegetation and more detailed information of this base-line plant community assessment is in Appendix D (Cronk 2007).

A. WYCAMP LAKE HISTORY and CULTURAL SIGNIFICANCE

Wesley L. Andrews, of Andrews Cultural Resources, an LTBB tribal member was the principal investigator for the cultural and historical land use study of Wycamp Lake and Creek. (Andrews 2006) The purpose of the project was to identify and assess historical, cultural and archaeological resources that are associated with LTBB in the Wycamp Lake project area.

The investigator reviewed documentary literature and conducted oral history interviews and field investigations to prepare the cultural report. The investigator worked with Joe Mitchell, Cultural Preservation Coordinator, LTBB Archives and Records Cultural Preservation Department. He also interviewed LTBB tribal elders and members to provide historic and cultural information. The report identified a total of five cultural resources at Wycamp Lake and Creek. Cultural resources identified included:

1. Wycamp Creek Village
2. Water Spirit at Wycamp Lake
3. Historic Campgrounds- elder gatherings
4. Natural Resources- gathering, fishing, hunting
5. Saw Mill

The principal investigator concluded that three of the cultural resources identified during this project, sites 2-4, are associated with LTBB and are eligible for inclusion to the National Register of Historic Places. Only 1 of the 5 cultural sites identified was registered within the project area prior to this research. The first cultural resource identified, Wycamp Creek Village, is classified as an archaeological resource that is listed on the National Register of Historic Places.

According to the cultural report, in the survey of 1840, the lake was similar in size and shape and called “Pierce” or “Wiecamp” Lake. Other names for the lake include “Spirit” or “Rainy” Lake. The fourth cultural resource identified is the lakes Natural Resources. The primary activities the tribe reported were hunting, fishing and plant gathering at Wycamp Lake and Creek. Gathering of plants provides food, medicine, ceremonies and crafting materials. To learn more details about the cultural and historic importance of Wycamp Lake, see Appendix A (Andrews 2006).

B. WATER QUALITY MONITORING

LTBB Environmental Services Department (ESD) Surface Water Quality Monitoring Program was funded in July of 2000 through the Environmental Protection Agency 106 Clean Water Act. The ESD surface water quality program has three main goals: assess natural variability in LTBB reservation water-bodies by completing a Baseline Assessment; maintain, protect, and improve water quality in LTBB water-bodies within and adjacent to the reservation; and create and adopt LTBB water-body specific Tribal Uses and Standards. To accomplish these three goals; biological, chemical, and physical parameters were collected at fixed water quality monitoring sites.

1. Lake and Creek Monitoring

The LTBB ESD Surface Water Quality Monitoring Program began monitoring Wycamp Lake and Creek in 2000. The LTBB ESD Water Quality Specialist has collected monthly data at fixed sampling locations for Wycamp Lake and Wycamp Creek on even years, beginning in 2000 (2000, 2002, 2004, 2006, and 2008). Biological data was collected in May for macro-invertebrates and July for habitat assessments. A data gap was identified because there was no winter sampling. This data gap was addressed through the initiation of winter sampling in 2008. Winter sampling was a collaborative effort between LTBB NRD and ESD.

Wycamp Lake has one water monitoring site and two sites are located on Wycamp Creek. The Wycamp Lake water quality sampling site is located near the channel between the two basins (Figure 5). Wycamp Creek has two sampling sites with one located just downstream of the county dam, and the other located near the creek mouth at Lake Michigan (Figures 6 and 7).

Wycamp Lake sampling was conducted May-October and included biological, chemical, and physical parameters. Biological monitoring consisted of macro-invertebrate sampling in May at five sampling sites throughout the lake. Water samples were collected for an analysis of chlorophyll-a. Water was also sampled for chemical analysis of TP, TKN, N (N02 + N03), and chloride. Physical parameters measured with the Hydrolab include: temperature, conductivity, pH, dissolved oxygen, and turbidity. The following parameters were measured for Wycamp Creek: macro-invertebrates were sampled in May at 3 riffle locations; water chemistry was analyzed for total suspended solids (TSS), chloride, TP, total Kjedahl Nitrogen (TKN), and N (N02 + N03). Physical parameters measured at

Wycamp Creek with the Hydrolab included temperature, conductivity, pH, dissolved oxygen, and turbidity. All the above parameters have an ecological role in the quality of Wycamp Lake and Creek.

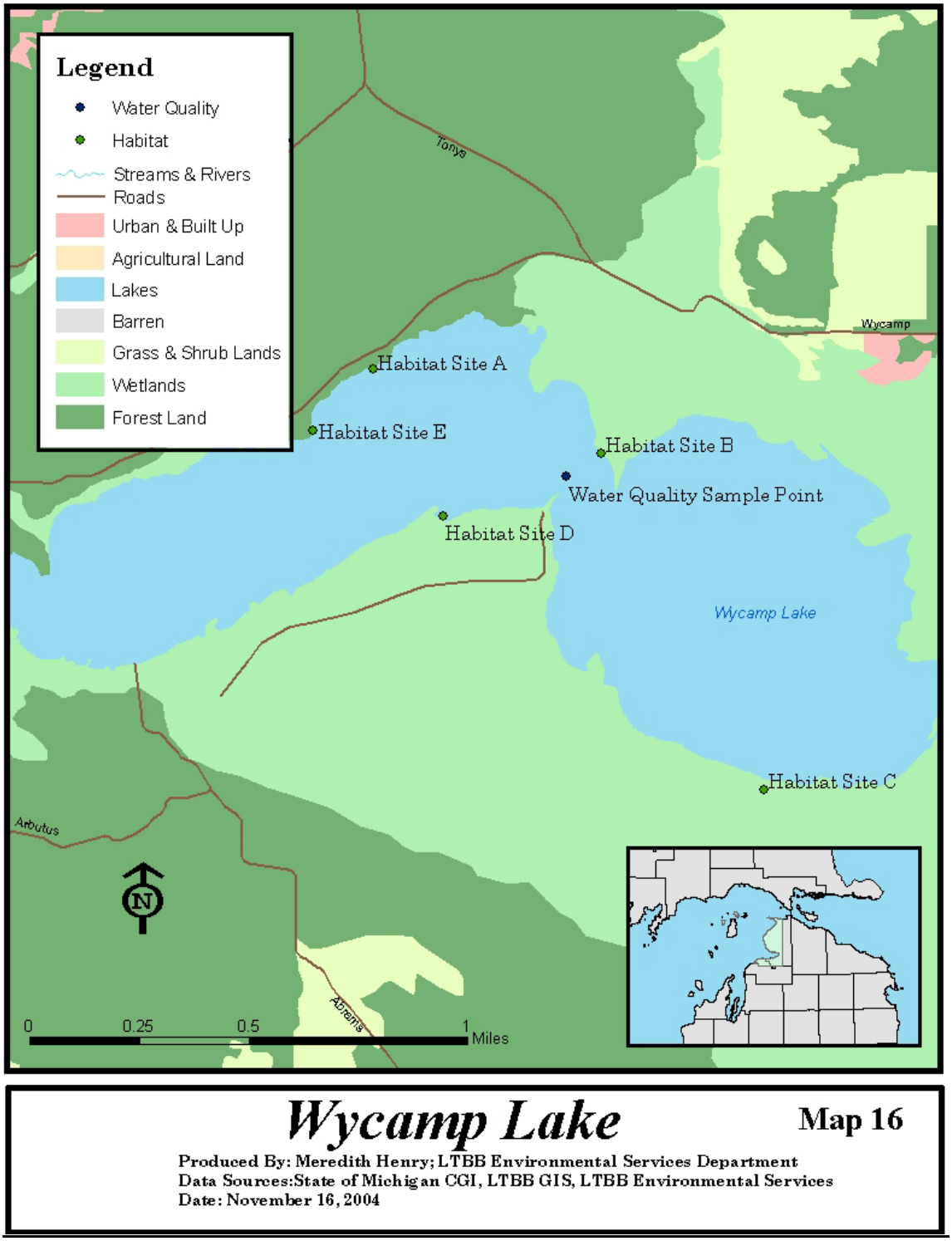


Figure (5). A GIS map of Wycamp Lake water sampling sites (From Davis 2008).

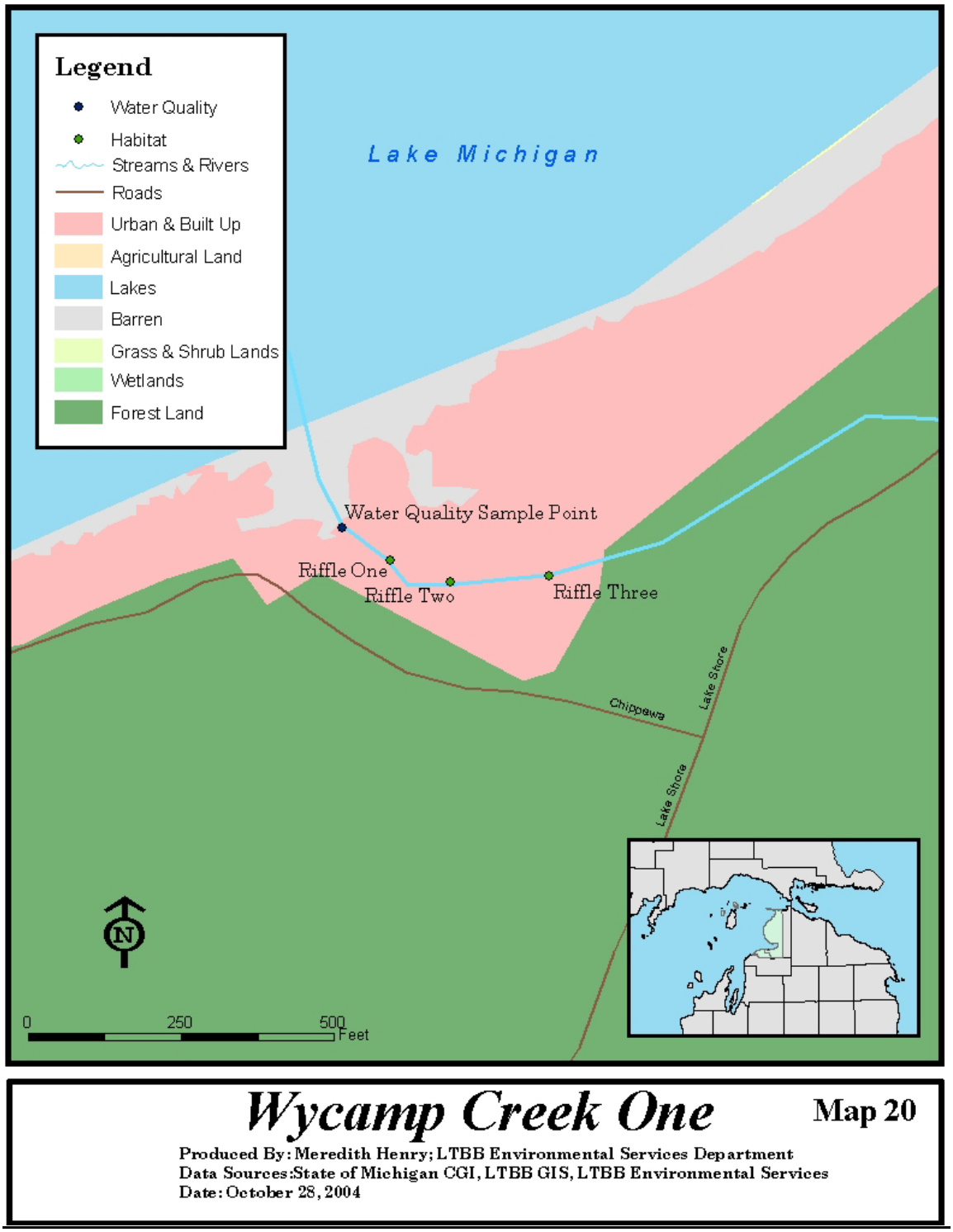


Figure (6). A GIS map of Wycamp Creek water sampling sites (From Davis 2008).

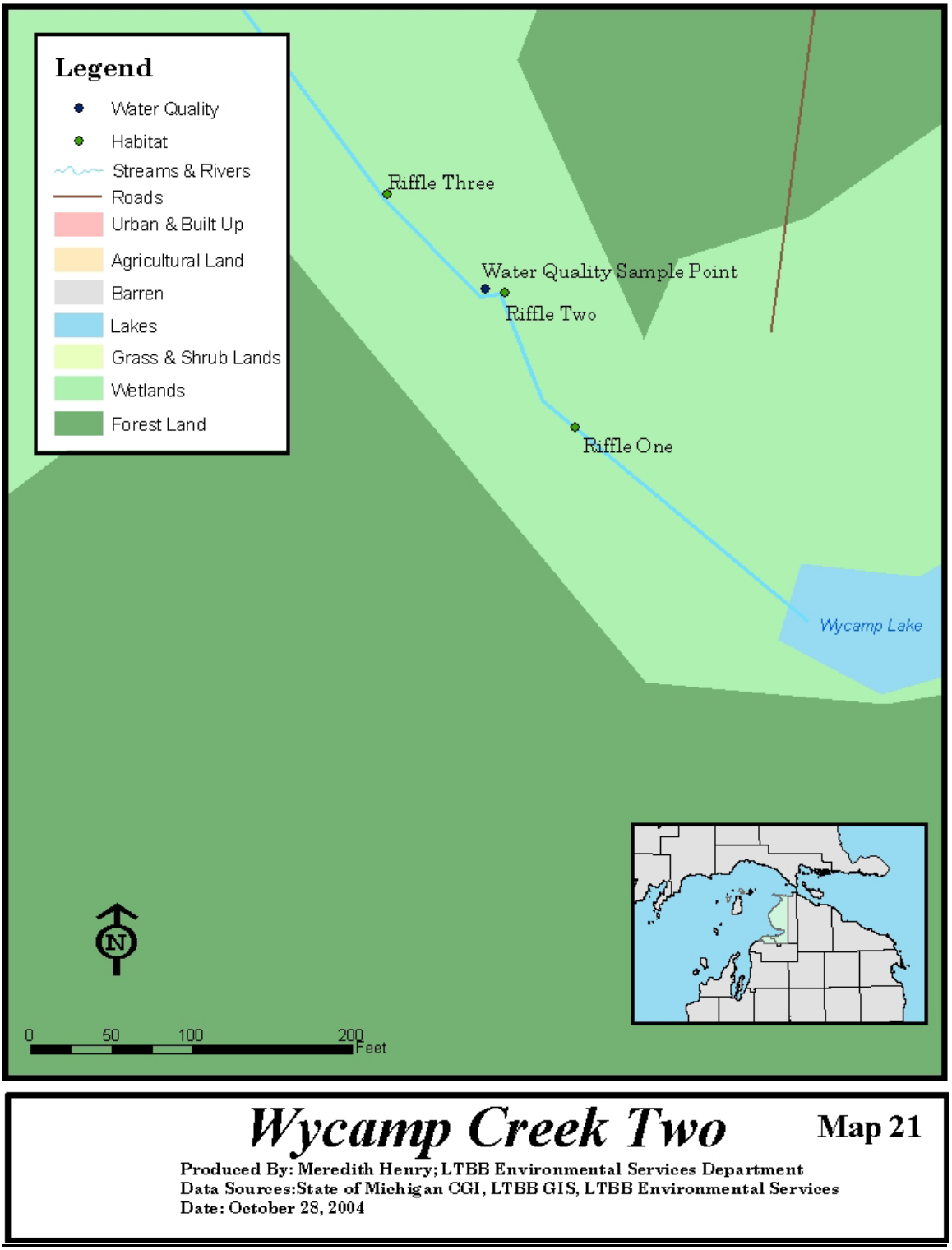


Figure (7). A GIS map of Wycamp Creek water sampling sites (From Davis 2008).

WATER QUALITY RESULTS

The water quality of Wycamp Lake and Creek were analyzed by comparing each parameter to data from previous years to determine whether the data is statistically the same by performing ANOVA tests. This will aid in to determining natural threshold values for these parameters in this lake and creek. Temperature is analyzed by determining whether the water body is supporting temperatures to meet the LTBB draft primary/designated use classification as a warm water fishery. Temperature readings support a warm water fishery. The primary draft use identified for Wycamp Lake was a warmwater fishery. Chloride, dissolved oxygen, and pH were all within MDEQ threshold values. Wycamp Creek has been identified as a principal migratory route for anadromous salmonids including steelhead and Chinook salmon. Wycamp Lake has also been designated for other draft uses. LTBB ESD drafted LTBB Tribal Uses and definitions of each tribal Wycamp Lake use are as follows:

1. **Warmwater fishery (WF) -** Warm water fisheries support fish able to tolerate water temperatures above 80F/26.6C. Waters which support or are managed for populations of warm water game fish and lack significant populations of salmonids.
2. **Warm water fishery with principal migratory routes for anadromous salmonids (WFMAS) -** Waters which will support populations of salmon and trout when the fish return to rivers, creeks, or streams to breed.
3. **Coldwater Fishery (CF) -** Support fish that prefer clear, cold waters; are not tolerant of extreme temperature changes; and cannot survive for long periods with temperatures above 68F/20C degrees and having average minimum dissolved oxygen levels of 6.0 mg/L.
4. **Primary Contact Recreational (PCR) -** Means any activities normally involving direct contact with water to the point of complete submergence, particularly immersion of the head, with considerable risk of ingesting water, including swimming.
5. **Partial/Secondary Contact Recreational (PSCR) -** Means any activities normally involving direct contact of some part of the body with water, but not normally involving immersion of the head or ingesting of water, including fishing, wading, hunting, and dry boating.
6. **Public Water Source Supply (PWS) -** Surface waters that are used as a source of drinking water.
7. **Indigenous aquatic life and wildlife (IAW) -** Supporting a population of aquatic life originating in and naturally living, growing, or occurring in a particular water body or wildlife populations that utilize the water body for subsistence, sustained growth and propagation .
8. **Subsistence Fishery (SF) -** Waters fished by indigenous people of the geographical area to provide food for their families and community as done for generations.
9. **Wild Rice Harvesting (WRH)-**any waters that may have the potential to or do produce wild rice that is, could or would be harvested by indigenous people of the geographical area.
10. **Cultural or ceremonial uses (CCU) -** Any waters that support cultural uses and ceremonies practiced by indigenous people of the geographical area.
11. **Navigation Uses (NU) -** Water is used for the transfer (via boats) of persons, animals, and goods.

Carlson's Trophic State Index (TSI) system was used to measure algal biomass and classify trophic states of Wycamp Lake. TSI is estimated using Chlorophyll *a*, Total Phoshporus, and Secchi Depth means (when all three parameters are applicable) as independent variables. The trophic state is compared to previous years to identify any changes in Wycamp Lake's productivity. LTBB ESD determined that Wycamp Lake's trophic state in 2000, 2002, 2004, and 2006 was oligotrophic. Total Phosphorus and Chlorophyll *a* readings were not statistically different than previous years. However, Total Phosphorus and Nitrate/Nitrite concentrations had at least one reading that was statistically different. Statistical methods will be applied at a later date to identify these particular data points. Total Nitrogen was within the range of 0 to 5 Mg/L. The Total Phosphorus field season average was below the state average of 12.2 ug/L for Michigan lakes according to Wetzel (2001). Chloride and pH have been within threshold values to support these uses. Depth changes of the lake can affect temperature and dissolved oxygen. Trends between depth and these two parameters will be examined every year the lake is monitored. Currently temperature and dissolved oxygen support a warm-water fishery. The use of primary contact recreational is supported by all parameters currently measured. However, *E. coli* bacteria is not measured at Wycamp Lake. This was identified as a data gap in evaluation of the Surface Water Quality Program in 2006. Total Phosphorus and Chlorophyll *a* readings were not statistically different than previous years. However, Total Kjehdahl Nitrogen and Nitrate/Nitrite concentrations had at least one reading that was statistically different. These outliers could be caused from lab errors or may be peaks in these particular parameters. Further analysis will be applied in 2008 to see if there are more outliers for the same parameters. Total Nitrogen has been within the range of 0 to 5 Mg/L and Total Phosphorus field season averages have been below the state average of 12.2 ug/L for Michigan Lakes.

Both Wycamp Creek monitoring sites share the same draft uses. The draft primary use is a warm-water fishery with migratory routes for anadromous salmonids. Other draft uses identified include: subsistence fishery, indigenous aquatic life and wildlife; and primary contact recreational use. Data gathered for Chloride, pH, and Dissolved Oxygen support all draft uses proposed. Temperature readings were under 20C during periods of salmon migration supporting this draft primary use. Total Phosphorus, Total Suspended Solids (TSS), Nitrate/Nitrite (WPC1 only) and TKN concentrations have

not been statistically different than previous years. WPC2 had at least one reading that was statistically different than previous years for Nitrate/Nitrite.

In 2006, Total Suspended Solid (TSS) values increased significantly in October during salmon migration and spawning. The dam controlled by Emmet County was opened by county staff. The LTBB fish biologist was at the dam that morning duck hunting and was able to witness the removal of boards from the dam. A large amount of sediment that had backed for the previous two years surged downstream. Coincidentally, LTBB ESD carried out a survey in Wycamp Creek the next morning. The dam had not been manipulated for some time and consequently a large amount of sediment was released down stream. Many studies have shown that increased TSS can have physiological, behavioral, and habitat effects on salmonids. The ESD is concerned about sedimentation of spawning and rearing habitat of anadromous salmonids. Sand and organic matter entering substrate interstices depletes oxygen and reduces dissolved oxygen concentrations harming any salmon eggs in Wycamp Creek. TKN concentrations were over the average every month that is found in unpolluted rivers but never exceeding the maximum average found in unpolluted rivers (Wetzel, 2001). Nitrate/Nitrite and Total Phosphorus concentrations were under the average found in unpolluted rivers (Wetzel, 2001). It is important to note that Wycamp Creek is on the Michigan Department of Environmental Quality (MDEQ) 303(d) category 2 list from the headwaters to the crossing of M-119 road. Category 2 states that available data and/or information indicate that some, but not all of the designated uses are supported by (MDEQ).

2. Wetland Monitoring

The LTBB ESD Wetland Specialist has collected monthly data at Wycamp Lake at fixed locations from to May-October, 2007. The Wycamp Lake wetlands/water quality sampling site is located midway between the two basins. Hydrolab data was also collected at additional locations in both basins for future comparison. Physical parameters collected with the Hydrolab included temperature, conductivity, pH, dissolved oxygen, Total Kjedahl Nitrogen (TKN), Total Suspended Solids (TSS), Nitrogen (N), Phosphorous (P), Total Phosphorous (TP), and Silicate (SiO2). Water samples are collected to measure the following chemical parameters: chlorophyll-a; TSS, chloride, N (N03), N (NH4), TN, P, TP, SiO2, and alkalinity. Also, algae were collected, identified and relative

abundance determined. A culturally significant plant survey is needed in the future. Wycamp Lake wetland sampling will be collected yearly through at least 2009. Wetland maps of Wycamp Lake and its associated wetlands are found in Figures (8 and 9).

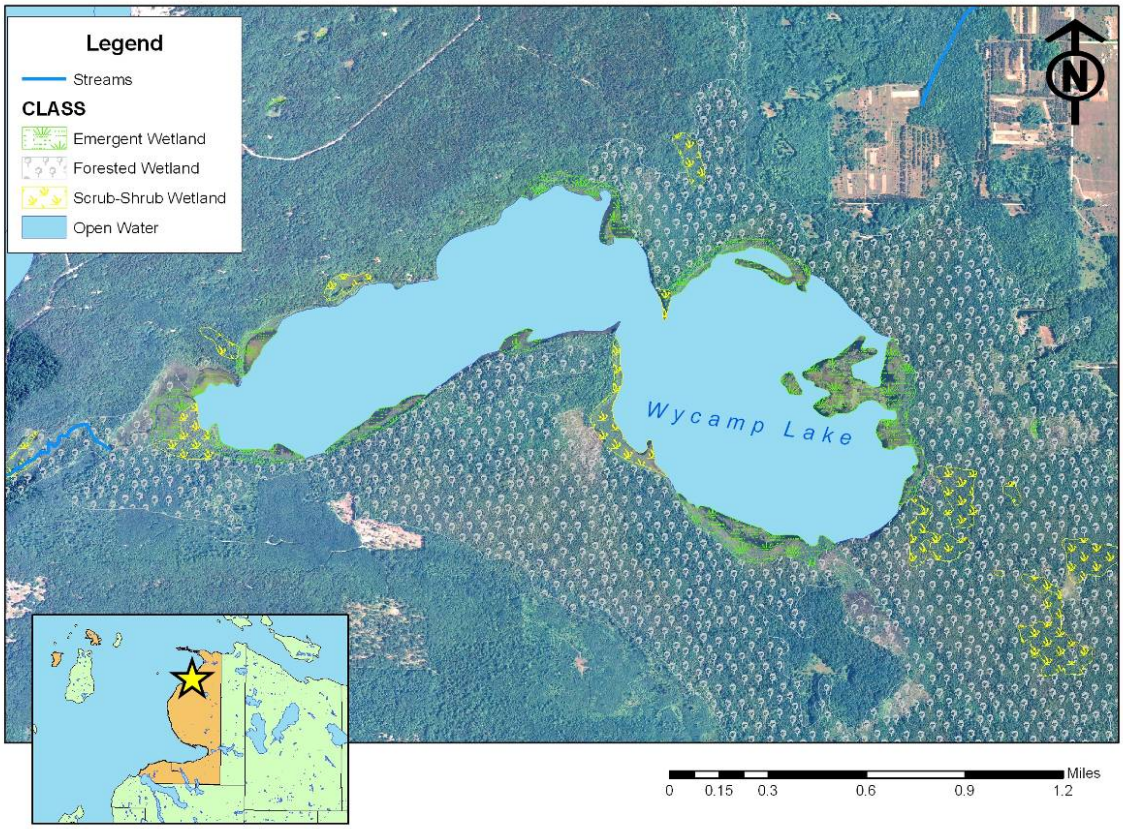


Figure (8). Wycamp Lake and surrounding areas. Wetland Types are shown on the map. Other than wetlands, the lake is surrounded by upland hardwood and mixed hardwood-coniferous forest. The location of Wycamp Lake (star) and the LTBB 1855 Reservation (orange area) shown in the inset map.

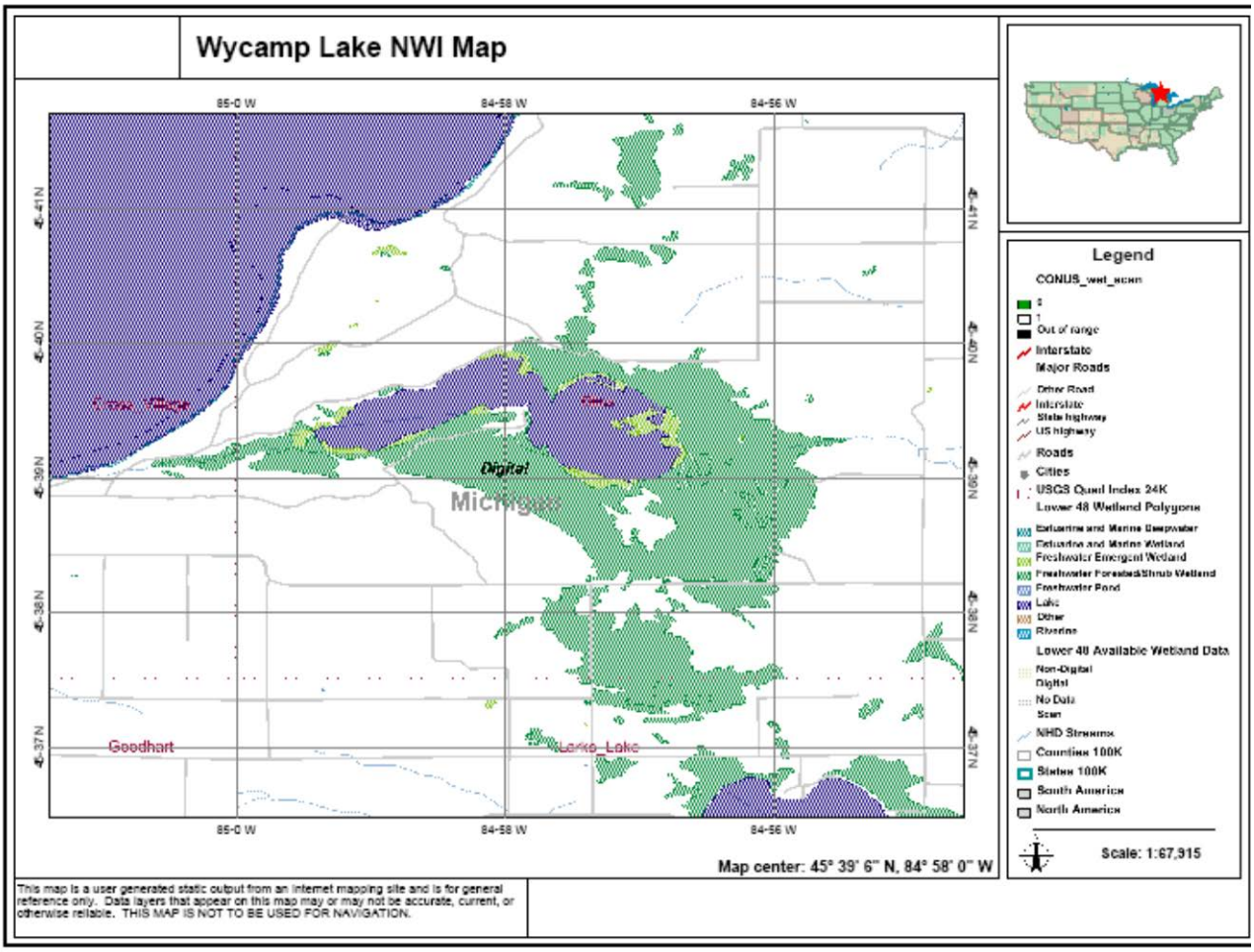


Figure (9). A map of Wycamp Lake showing wetland habitats.

III. WYCAMP LAKE ASSESSMENT

C. BIOLOGICAL COMMUNITY ASSESSMENTS

Biological assessments were conducted to determine the baseline status of the Wycamp Lake fish, wildlife and plant communities. Culturally important species research included: bald eagle monitoring through the USFWS bald eagle TWG project; and common loon monitoring funded by the Bureau of Indian Affairs (BIA), Circle of Flight Program. The LTBB NRD has conducted several fisheries assessments since 2002 including fyke netting, seining, and electro-fishing surveys with assistance from both LRB and GTB boom-shocking boat crews. Collectively, the biological assessments completed by LTBB and the aquatic plant research conducted by Tip of the Mitt have provided baseline biological data for the future management of this culturally and naturally significant ecosystem. A Wycamp Lake species list was compiled from the fish, wildlife and aquatic plant species identified in the base-line biological assessments (Appendix E).

1. Cultural, Endangered and Threatened Species Monitoring

LTBB NRD has researched both bald eagles and common loons at Wycamp Lake. Both species are important to the Odawa people for cultural purposes. The bald eagle was recently de-listed by the USFWS and monitoring needs to continue in the future. The common loon is listed as a state threatened species and is losing habitat statewide due to development.

a. Bald Eagle Research

Wycamp Lake is the only historic Bald Eagle breeding area known in Emmet County and was occupied in 1963. LTBB NRD has monitored the Wycamp Lake nesting territory, with two nests located on private land in a forested area approximately 0.25 miles from the lake shoreline. The nests were visible from the lake allowing LTBB NRD biologists to monitor nesting success. The nests were also monitored with aerial surveys by LTBB NRD and the MDNR.

Recently this breeding territory had included two nest trees, for 2005 and 2006 the eagles nested in a dead aspen. In 2005 the nest produced two eaglets. In 2006 the bald eagles nested but were unsuccessful. In the winter of 2006 the dead aspen nest fell down. In 2007 the bald eagles nested in a live aspen in the same proximity and produced 1 eaglet. This nest tree blew down,

however in the winter of 2007. Bald eagles have continued to use Wycamp Lake in early 2008, but a new nest has not yet been observed.

Wycamp Lake is an inland breeding area but the eagles do feed on anadromous fish including steelhead and Chinook salmon that run Wycamp Creek annually. Also, this breeding territory is very close to the Lake Michigan shoreline. Reproduction could be impaired due to the Great Lakes fish comprising part of the bald eagles diet. Fisheries management of Wycamp Lake should maintain fish species foraged by bald eagles. This means managing for a warm-water fishery that includes: northern pike, large and smallmouth bass, and rough fish like brown bullheads and suckers.

b. Common Loon Research

LTBB NRD has monitored common loons nesting at Wycamp Lake (Figure 10) for this grant research conducting waterfowl brood surveys. Loon data is discussed in the waterfowl brood survey results and more information is found in Appendix C (LTBB NRD 2008).

c. Other Cultural, Endangered or Threatened Species

The LTBB NRD needs to contact the Michigan Natural Features Inventory (MNFI) to identify any species occurrences reported. The LTBB NRD biologists identified many species that are considered Culturally significant by LTBB or listed by the state or federal government as Endangered, Threatened or Special Concern: Blanding's turtle, osprey, merlin, and the black tern. Black terns, a state threatened species, made up 5-11% of the total bird species recorded during 2005-2007 waterfowl brood surveys on Spirit Lake. Black terns nest at Wycamp Lake but these birds have not been specifically monitored.

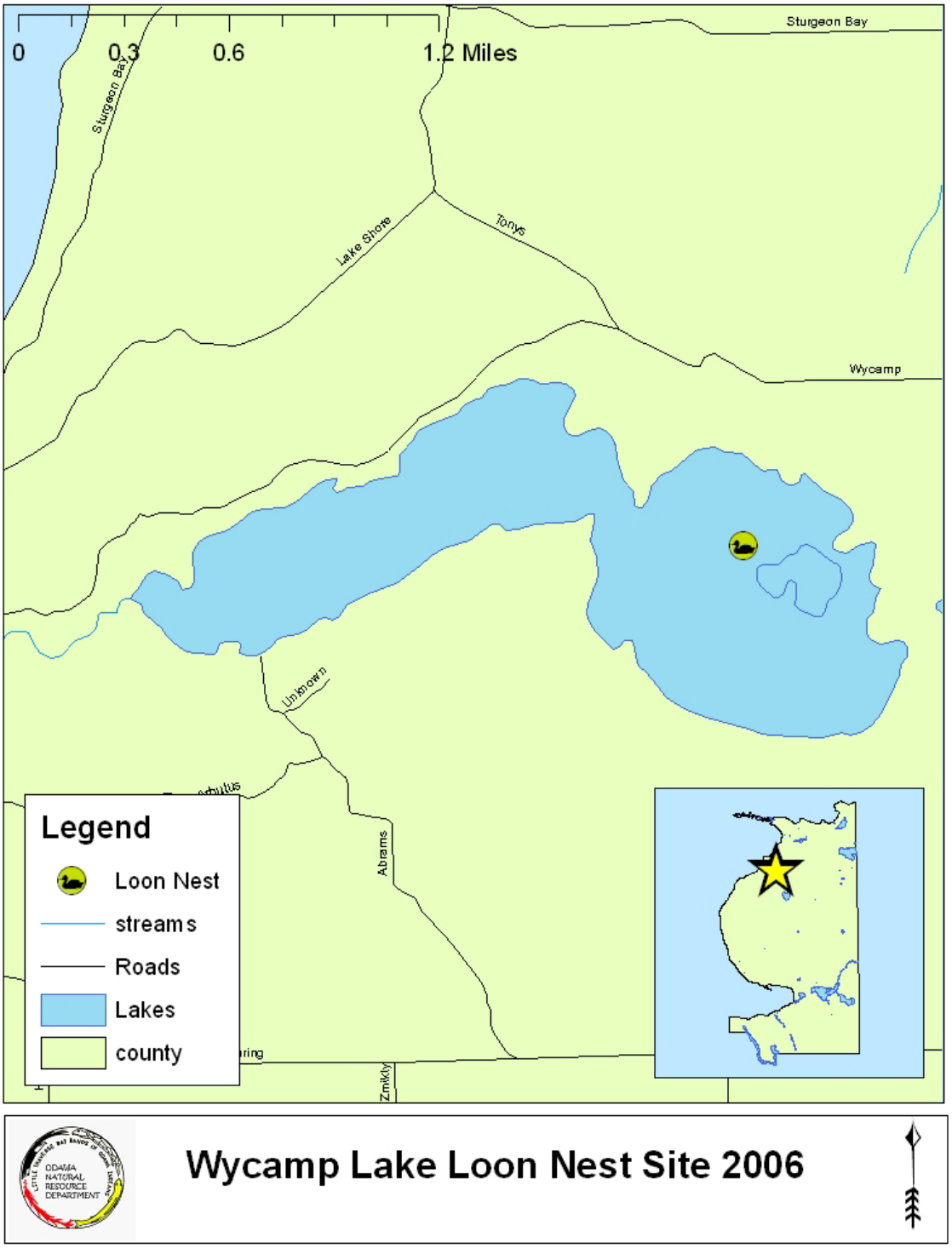


Figure (10). A GIS map of Wycamp Lake loon nesting site.

2. Fish Community Assessments

WYCAMP LAKE BASELINE FISH ASSESSMENTS

Fyke net assessments were carried out on Wycamp Lake in October 2002 and 2004; as well as in August 2005 and June 2006 (Figures 11 and 12). Electro-fishing and seining surveys were conducted in October 2004 and 2005 (Figures 13 and 14). All electro-fishing surveys occurred after sundown. Pulsed-DC boats were used in transects primarily along the lakeshore. In these surveys, all fish seen were dipped. Low water levels prevented the launching of the LTBB NRD electro-fishing boat in Wycamp Lake in autumn 2006.

In all assessments, length was collected on all fish species and grouped by centimeter class. Scales and spines were collected for fish age and growth analysis. Range of total length and mean total length were determined. Length-frequency histograms were also constructed for bluegill, northern pike, yellow perch, largemouth, and smallmouth bass. Age-frequency histograms were created for bluegill captured during 2005 and 2006 fyke net samples. Growth indices were also calculated for fish in Wycamp Lake.

For purposes of seasonal and gear comparisons, percent by frequency of catch for each species was calculated for all years and each assessment analyzed. Data were pooled by species for largemouth and smallmouth bass as well as northern pike captured during 2005 and 2006 to make certain sample sizes were large enough. The growth indices used were calculated by determining the difference between the observed average lengths of a given age group of fish to the Michigan state average length for that age group in the month sampled (Schneider et al. 2000). For 2005 and 2006 samples, the percent of northern pike, largemouth, and smallmouth bass that met the tribal size limit was calculated. According to LTBB fishing regulations, the legal size limit for northern pike is greater than or equal to 50 cm (20 inches); the size limit for both largemouth and smallmouth bass is greater than or equal to 30 cm (12 inches).

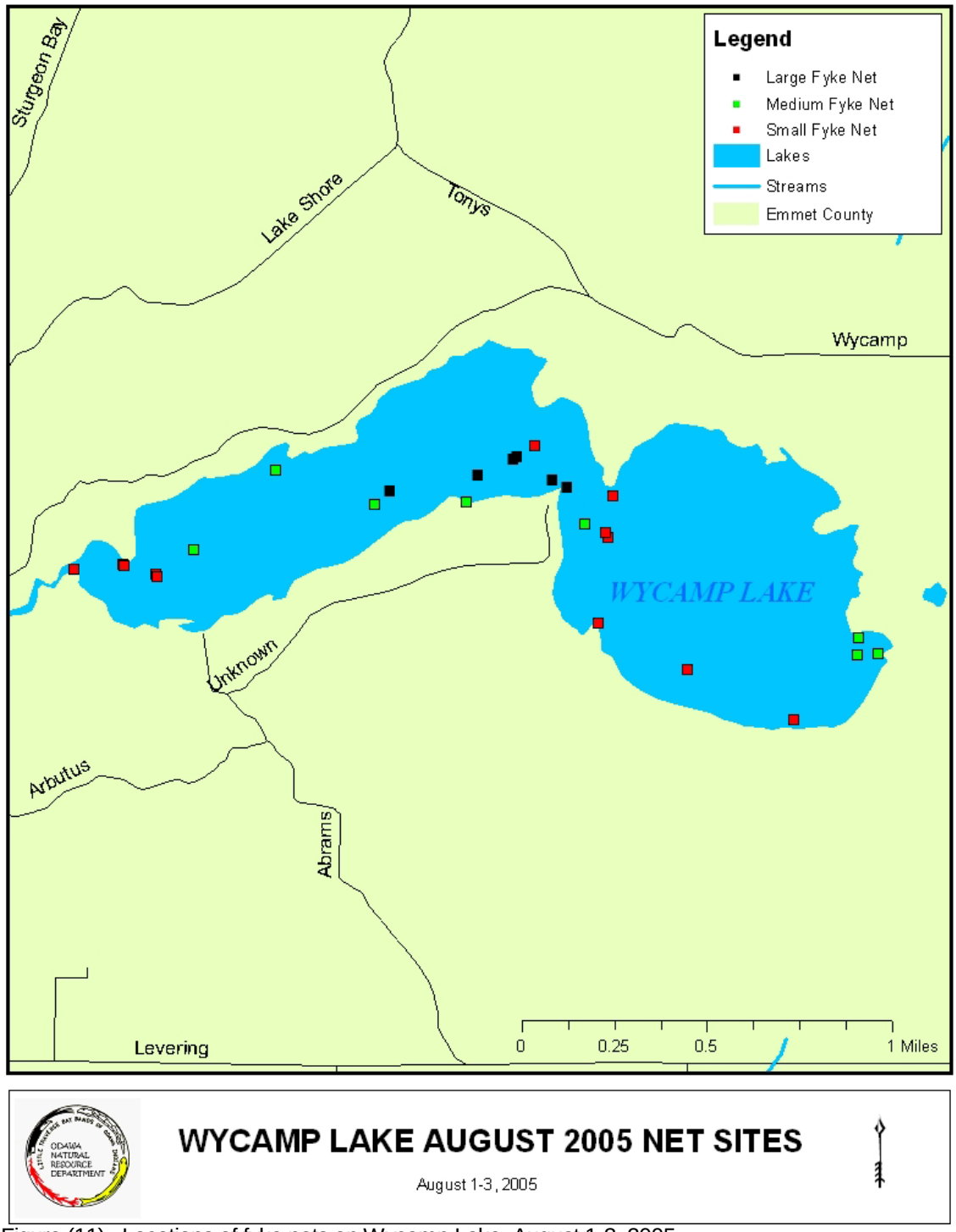


Figure (11). Locations of fyke nets on Wycamp Lake, August 1-3, 2005

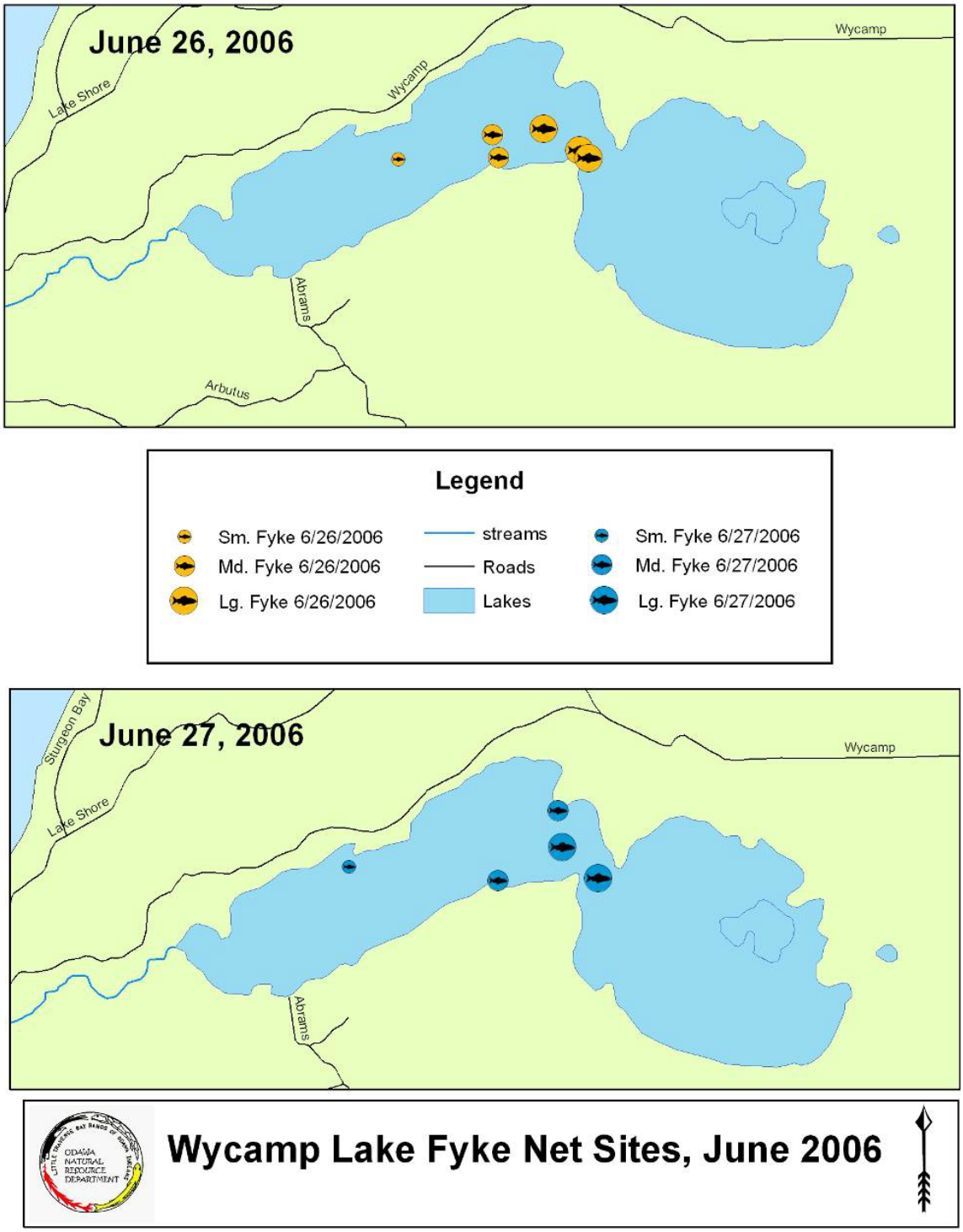


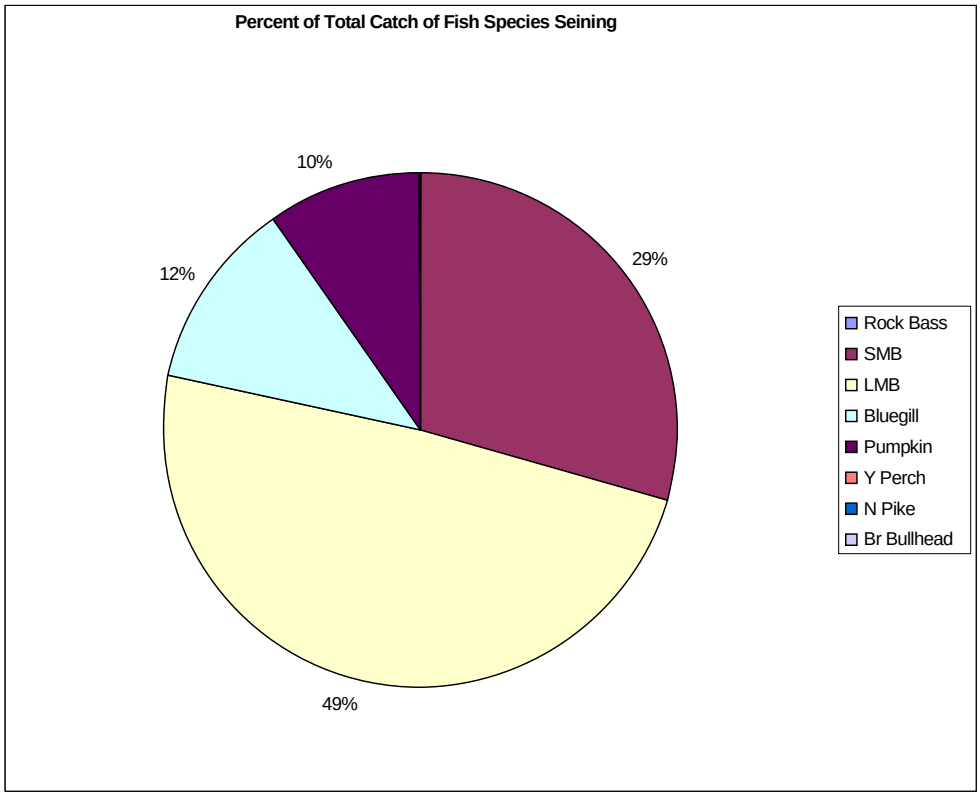
Figure (12). Locations of fyke nets on Wycamp Lake, June 26 and 27 2006.

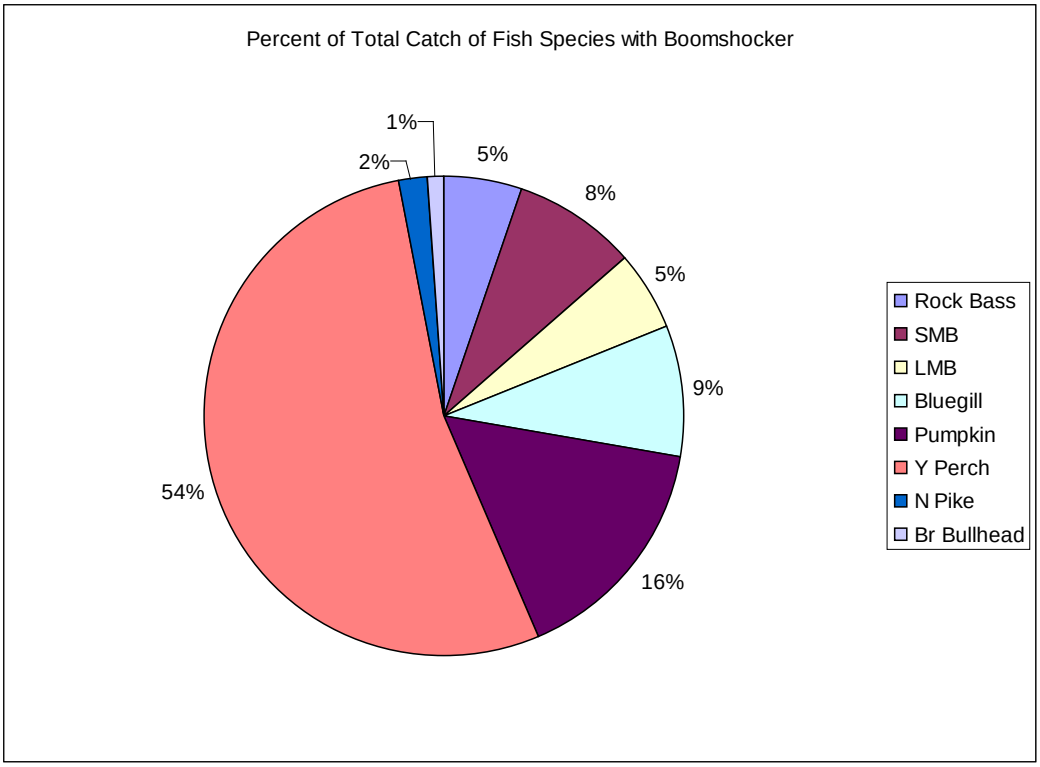
FISH COMMUNITY ASSESSMENT RESULTS AND DISCUSSION

During all LTBB NRD fish assessments, 13 species of fish were captured, with bluegill being most abundant (Table 2). Six-hundred-forty-one bluegill were captured 2002-2006, comprising approximately 31% of fish captured (Table 2). Largemouth bass were the second-most abundant species, making up 16.9% of captures, followed by smallmouth bass at 12.2% (Table 2). Rock bass, brown bullhead, yellow perch, and pumpkinseed were at 10.7%, 10.3%, 7.8%, and 6.9% respectively (Table 2). Common carp, common shiners, bluntnose minnows, sand shiners, and Johnny darters comprised less than one percent of the fish sampled (Table 2). During sampling, fish from many size classes were captured for all species where lengths were recorded (Table 2). Length data was not collected on brown bullhead, common carp, common shiners, bluntnose minnows, sand shiners, or Johnny darter. Bluegill lengths ranged from 3 to 27 cm, with the average being 16.3 cm (Table 2). Largemouth bass lengths ranged from 4 to 48 cm, and averaged 30 cm (Table 2). Smallmouth bass, northern pike, rock bass, yellow perch, and pumpkinseed averaged 21.3, 49.9, 15.9, 16.2, and 15.6 cm in length respectively (Table 2).

In Wycamp Lake 2002-2006, it was found that a warmwater fish community existed, with bluegill and largemouth bass dominating the fish community. Smallmouth bass, a fish species typically found in coolwater systems, also made up a significant portion of fish community, as is typical of many warmwater systems (Schneider 2000). The other species that made up the remainder of the community were typical of a warmwater fish community (Schneider 2000).

Other positive community characteristics that describe warmwater fish communities were also evident in Wycamp Lake. Often, when bluegill and pumpkinseed exceed 78% of the fish community, poor growth and therefore poor fishing results (Schneider 2000). This is not the case in Wycamp Lake. Bluegill and pumpkinseed made up approximately 38% of the population, well below the 78% threshold. If predators make up less than 20% of the population, or more than 50% of the population, then poor growth of these populations can result (Schneider 2000). Again, this was not the case with Wycamp Lake. Cumulatively, largemouth bass, smallmouth bass, and northern pike comprised slightly more than 32% of the community.

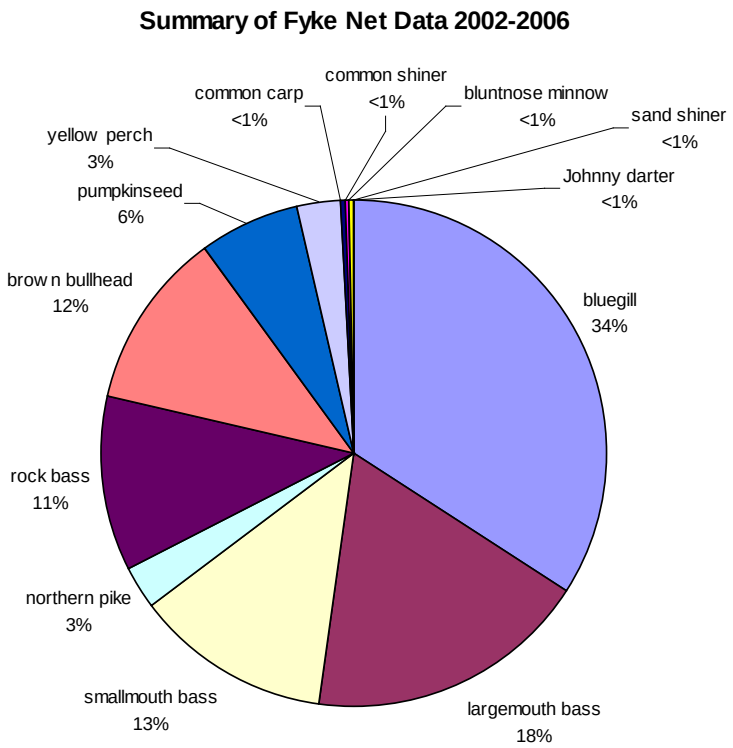


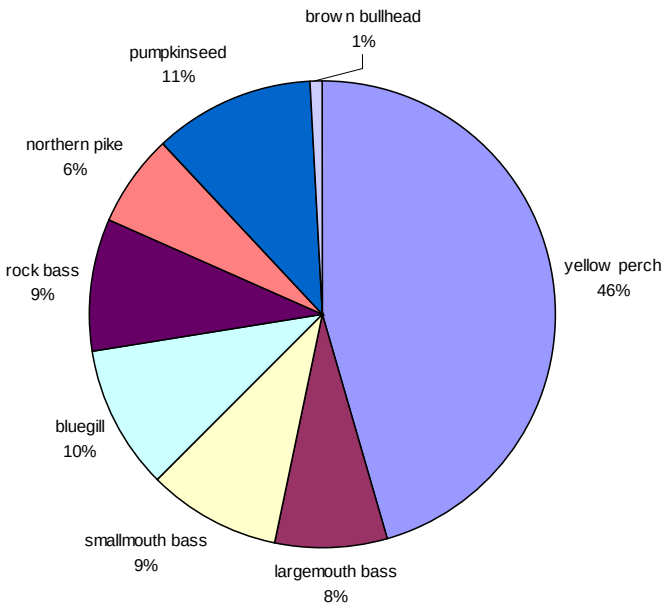


Figures (13 and 14). Pie charts of Wycamp Lake seining and electro-fishing species data.

Table 2. Summary of fish captured using all gear, 2002-2006 in Wycamp Lake, Michigan. Frequency of each species and average length (cm) of each species is shown.

Species	Frequency	% by Frequency	Range of TL (cm)	Average TL (cm)
bluegill	641	31.3%	3-27	16.3
largemouth bass	346	16.9%	4-48	30
smallmouth bass	249	12.2%	3-53	21.3
northern pike	64	3.1%	12-80	49.9
rock bass	220	10.7%	5-24	15.9
yellow perch	160	7.8%	3-21	16.2
pumpkinseed	142	6.9%	3-20	15.6
brown bullhead	211	10.3%	n/a	n/a
common carp	4	0.2%	n/a	n/a
common shiner	4	0.2%	n/a	n/a
bluntnose minnow	4	0.2%	n/a	n/a
sand shiner	1	<0.1%	n/a	n/a
Johnny darter	1	<0.1%	n/a	n/a
Total	**2047**	**100.0%**	**--**	**--**





Figures (15 and 16). Pie charts of Wycamp Lake fish community data.

Representative lengths of all fish species were captured in samples 2002-2006. Fish that were small enough to be young of year (YOY) were captured for all species. Over the course of

sampling, it was found that bluegill growth in Wycamp Lake was at the top end of the "satisfactory" size range for Michigan bluegill, at 16.3 cm (Schneider 1990). No similar empirical scoring system has yet been developed for other fish species in Michigan as of yet (Schneider 2000).

Fyke net and hoop net surveys in 2002, 2005, and 2006 yielded different results but are combined in Figure (15). The November 2002 hoop net survey captured mostly rock bass and brown bullhead, while the August 2005 and June 2006 samples were dominated by bluegill and largemouth bass. The dominance of bluegill in the summer samples is explained by the fact that the best time for bluegill sampling is in late spring and early summer (Schneider et al. 2000). Largemouth bass abundance is probably best explained by the large number of young of the year bass present in the system during the summer; the best time for sampling of juvenile bass is the late spring though early fall, although early fall is best (Schneider et al. 2000). The best time to sample adult bass is during the early spring pre-spawn period (Schneider et al. 2000). The dominance of rock bass and bullhead in the November 2002 sample seemingly cannot be explained through gear or seasonal bias; it is likely due to the relatively small amount of effort used during this sample and is probably not biologically meaningful.

Both 2004 and 2005 electro-fishing samples in Wycamp Lake were dominated by yellow perch (Figure 16). This is not surprising, since it is recommended that sampling of juvenile yellow perch take place in fall with electro-fishing gear (Schneider et al. 2000). Catch per unit effort of all species was much higher in 2005 than in 2004.

Length-frequency histograms revealed no discernable high mortality size groups in the fish populations. The 2005 and 2006 bluegill sample met the 100 fish over "stock" size (bluegill stock size = 8 cm) criteria, so age-frequency data can be further analyzed for this species (Anderson and Neumann 1996; Gablehouse 1984). Most fish are in the "quality" and "preferred" size classes, in between 15 and 20 cm, indicating a good bluegill fishery (Anderson and Neumann 1996; Gablehouse 1984). No elevated mortality levels were observed that would indicate winterkill or high fishing mortality around the study period in a given size class. The samples of other fish species did not pass the 100 individuals at stock size threshold (largemouth bass = 20 cm; smallmouth bass = 18 cm; northern pike = 35 cm; yellow perch = 13 cm) (Anderson and Neumann 1996; Gablehouse 1984). Even though these samples are too small, from the limited data we have it appears that there may be high mortality in

largemouth and smallmouth bass at larger size classes. It may also be that the gear used did not sufficiently sample these species. Further study should be undertaken on these species. Yellow perch and northern pike samples were small due to seasonal considerations; more fish are captured in early spring samples, which were not carried out in this study (Schneider et al. 2000).

Bluegill age-frequency histograms show relatively high survival of bluegill. In 2005 and 2006, the highest proportion of fish were age three, which both had over 50 captures. Age four fish were close second, with nearly 50 individuals captured in 2006 and 22 captured in 2005. This may be due to the fact that in most bluegill populations, age three and four fish are the most easily captured by fyke nets (Schneider 2000). Bluegill age-frequency indicates a good bluegill population with low mortality, with fish over age ten found in the sample (Schneider 2000).

Age-frequency histograms for both bass species and northern pike showed that there was no apparent age-related mortality for younger age classes. In pike, there were fewer fish captured of younger age classes, which is likely related to gear selectivity. Largemouth and smallmouth bass had average mortality rates, which the oldest fish in each of those populations being age eight and nine respectively (Schneider 2000). Northern pike had apparently high mortality rates, with the oldest fish aged at seven (Schneider 2000).

All growth indices indicate good growth for bluegill in Wycamp Lake. Growth may be good for bluegill in Wycamp Lake because of the relatively shallow character of the lake, which allows bluegill to forage across most of the lake throughout the summer, instead of being cut off from areas of the lake by the deep, anoxic profundal zone of the lake. Other researchers in Michigan have found that predictors for bluegill populations that exhibit fast growth are large-sized zooplankton and low angling pressure (Theiling 1990; Scheider 1993). It has also been shown that heavy weed growth often limits bluegill growth (Theiling 1990). Nothing is known about the zooplankton community of Wycamp Lake at this time. However, 55% of Wycamp Lake's surface area has a moderate to light density vegetation community, which may help explain the above average bluegill growth observed (Theiling 1990; Cronk 2007).

Northern pike growth indices were calculated. However, since only enough fish were captured for calculation of indices for age two fish, it is unknown if growth proves to be at or greater than state average for older age classes. If the pattern of smaller than average northern pike was found to persist

across age classes in Wycamp Lake, it may be due to the fact that soft-rayed, cylindrical-bodied fishes (such as white suckers or shiners), which are the preferred food of northern pike, are rare in fish samples from Wycamp Lake (Beyerle and Williams 1968; Wahl and Stein 1988). Largemouth bass growth indices were larger than state average for older year classes, which may indicate better forage for larger largemouth bass or inter-specific competition for invertebrate food items with numerous bluegill as well as pumpkinseed and yellow perch. Samples of northern pike were very small, but may provide good information on the harvestable population of northern pike. It appears that a smaller percentage of harvestable northern pike exists in Wycamp Lake than in other studies. Because of the small sample size and seasonality of the assessments on Wycamp Lake, the conclusion cannot be made that high exploitation is causing low numbers of harvestable size pike (Schneider et al. 2000). Early spring population estimates should be undertaken for northern pike in the future.

Comparisons of lengths of northern pike, largemouth bass, and smallmouth bass could only be made for a few age classes, due to small numbers of captures of each year class during each sample. Pike captured during the August 2005 sample were over 37 mm smaller than state average, while pike from the June 2006 sample were 1.4 mm smaller than state average. Growth index for northern pike was 19.45 mm smaller than state average. Enough largemouth bass were captured for analysis of age one fish in August 2005; enough two, three, and five-age fish were captured for analysis in June 2006 fyke net samples .

3. WILDLIFE COMMUNITY ASSESSMENTS

a. Waterfowl Brood Surveys

Brood Survey Methods

Brood surveys are conducted by two people, a spotter and boat driver, to determine species composition and chick productivity. The driver drives the boat around the lake in a clockwise direction, staying as close to shore as possible without running aground and damaging the boat. Both people have binoculars, and the spotter uses a spotting scope where appropriate. The spotter also records the species of waterfowl, age (adult, juvenile, or chick) and numbers of each age group of each species seen. A total of twenty (five, thirteen, and two) brood surveys were executed in 2005, 2006, and 2007 respectively. Birds seen on brood surveys in 2005, 2006, and 2007 were divided into the number of adults and young seen during each survey. The total numbers of birds of each species spotted during surveys for a particular year are expressed as a percent of the total number of birds seen during that year. Overall composition of birds seen in all three years (2005-2007) was also looked at to identify trends of increasing/decreasing abundance over time.

Brood Survey-Results

In 2005, six brood surveys were conducted on Wycamp Lake from May through August (Figure 17). Adults of 13 species were seen during the surveys. Young for five species were seen, with hooded merganser having the most chicks observed. The most commonly sighted species was common loons, with 32 adults seen, but only four chicks observed. Loons made up 22.9% of the birds observed during the surveys. Green heron and sandhill crane were the least common species at 1.3% each . Wood ducks made up 1.9% of the population. Black terns, great blue heron, and bald eagle each comprised 3.2% of the birds sighted. Mallards made up 3.8% of the birds seen. Common merganser and mute swan comprised 5.1% of the sample . Caspian tern, Canada goose, and hooded merganser comprised 10.2%, 16.6%, and 22.3%, respectively.

Brood Surveys 2005

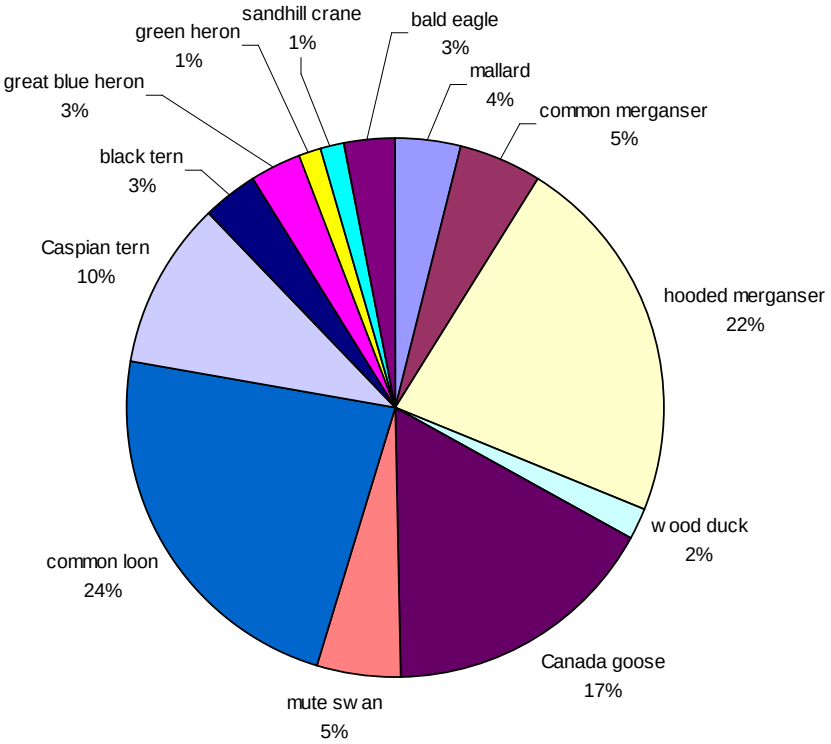


Figure (17). A pie chart of the 2005 brood survey data.

Thirteen brood surveys were conducted on Wycamp Lake in 2006 (Figure 18). As in 2005, common loons were the most numerous species observed, with 103 adults observed and two chicks, making up 23.5% of species sighted. The most chick production was observed from Canada geese, for which there were ten chicks. Eighty-six Canada geese adults were observed; the adults and chicks

together made up 21.5% of the population. In 2006, bald eagles made up 0.9% of the sample. Pied-billed grebes comprised 1.3%. Two to three percent of birds observed were blue-winged teal, common merganser, or wood ducks. Mute swans made up 3.4% of the sample. Hooded merganser and double-crested cormorant comprised about 4% of the birds sighted. Sandhill crane, mallards, and black terns made up 5-6% of birds seen. Great blue heron and Caspian terns made up 6.5% and 9.8% of the samples, respectively.

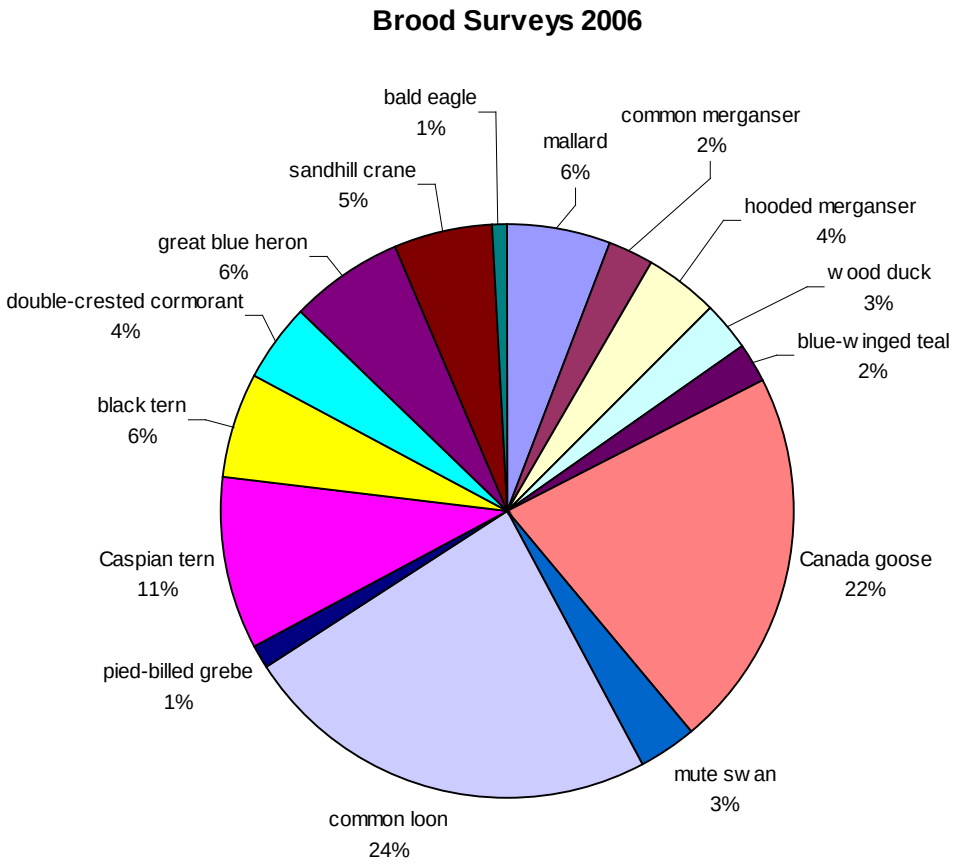


Figure (18). A pie chart of 2006 brood survey data.

A total of ten surveys were completed in 2007 (Figure 19). Canada geese were the dominant species in the 2007 samples at 25%, followed by common loons at 21.3%. Common merganser, wood ducks, double-crested cormorants, and great blue herons each made up 1.3% of birds sighted. Mallards and hooded mergansers made up 3.8% of birds seen during samples. Bald eagles

comprised 5% of the samples. Caspian and Black terns each made up 11.3% of the sample.

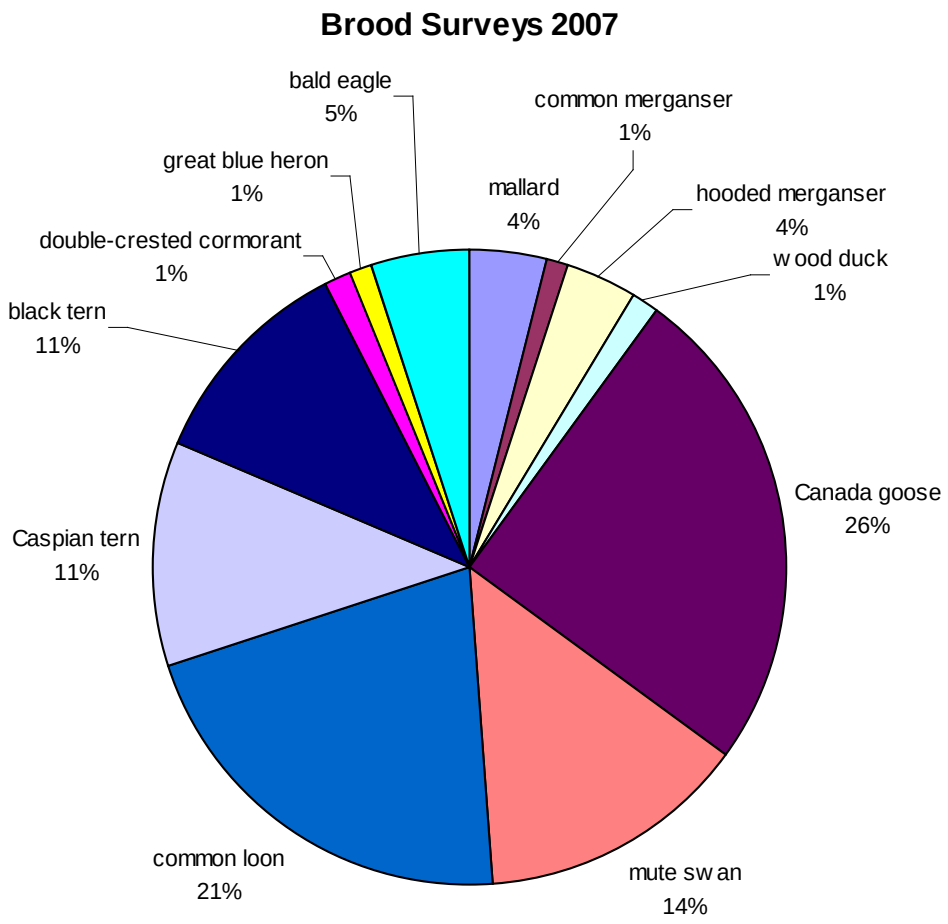


Figure (19). A pie chart of 2007 brood survey data.

Overall, common loons were the most numerous birds observed, followed by Canada geese (Figure 20). The rarest birds observed were the green heron and pied-billed grebe (Figure 10). Other than Canada geese, the most numerous harvestable waterfowl species observed were hooded mergansers followed by mallards and common mergansers (Figure 10). Common loons were the most numerous birds seen on Wycamp Lake in all years, except in 2007, when they were outnumbered by Canada geese. In 2005 and 2006, it appears that there were either one or two nesting pairs of loons, as one would expect on a lake of this size; lakes over 70 hectares may have multiple nesting pairs (McIntyre 1988). The large number of loons often seen on Wycamp Lake are probably due to numbers of unpaired juvenile birds using the lake (often termed “floaters”) as feeding habitat or waiting for a previously occupied territory to become open (McIntyre 1988).

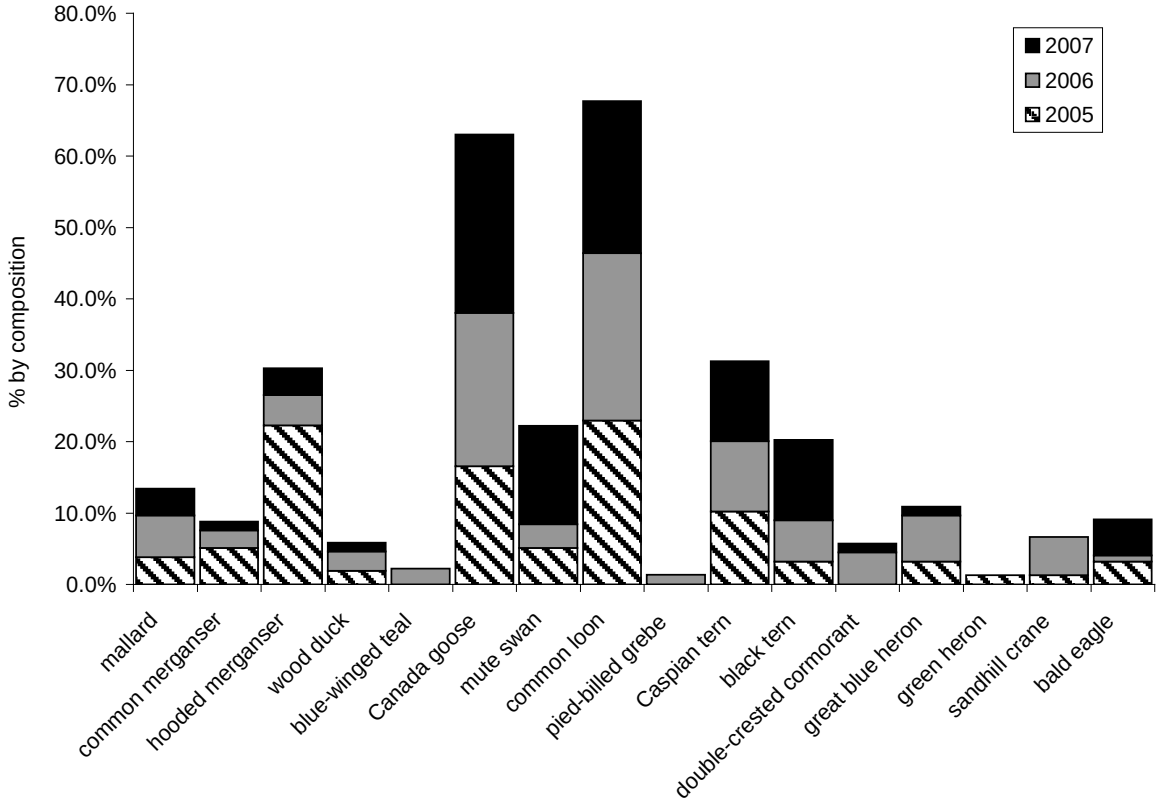
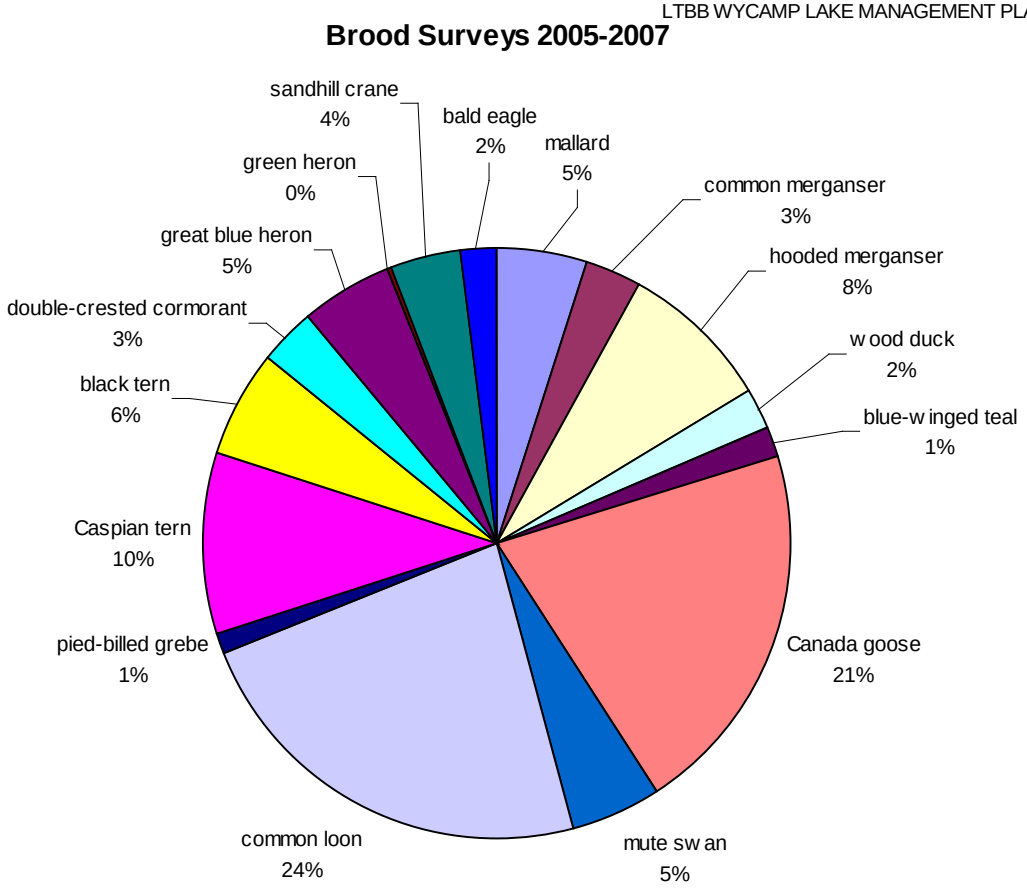


Figure (20). Percent composition of birds seen during brood surveys on Wycamp Lake 2005-2007.

Canada geese adults were the second-most common species in 2005 and 2006. Canada geese also had the most sighted young-of-year in all years except 2007, where no chicks were seen. From this data, it would seem that Wycamp Lake is productive Canada goose habitat. The fact that no goose chicks were seen in 2007 is interesting. Future research should be undertaken to determine the importance of shallow, vegetated backwater areas of Wycamp Lake to all waterfowl species. All three years brood data is combined Figure (21).



(Figure 21). A pie chart of 2005-2007 brood survey data.

b. Mammals

Many mammal species were observed by LTBB NRD staff at Wycamp Lake including: beaver, muskrat, raccoon, mink, otter, white-tailed deer, coyote and bats. Also, tracks and scat of elusive species such as black bear and bobcat have been observed. Beavers, a historically important furbearer, are a key component of the Wycamp Lake ecosystem. Beavers manipulate the water levels at Wycamp Lake by damming the channel and have probably existed at this site for a long time. This furbearer is no longer a species that is sought by many people for economic reasons. Consequently, a local landowner has been successfully trapping beaver during the state trapping season and at other times through a MDNR permit. Beaver dams are often mitigated with a device called a Clemson leveler but the amount of water that fluctuates due to rain events does not appear manageable with this device. Wycamp Lake hydrology is impacted seasonally by beaver activity. A need has been identified to create a partnership to create a range of actions managers will use to protect beaver and

alleviate beaver problems as needed. The LTBB NRD is interested in assisting the future management of beaver at Wycamp Lake.

c. Amphibians and Reptiles

Three species of turtle were captured on Wycamp Lake by the LTBB NRD biologists including: the common painted turtle; common snapping turtle; and the state listed special concern Blanding's turtle. LTBB NRD will continue turtle research on Wycamp Lake in the future. Amphibians have not been studied by LTBB at Wycamp Lake. The biologists plan to create and conduct a Wycamp Lake Frog and Toad Survey for long-term monitoring of amphibians in and around the lake and associated wetlands.

III. WYCAMP LAKE ASSESSMENT

C. BIOLOGICAL COMMUNITIES

4. PLANT COMMUNITY ASSESSMENTS

a. Aquatic Plant Survey

The LTBB NRD contracted the Tip of the Mitt Watershed Council to conduct an aquatic plant survey on Wycamp Lake. The aquatic plant survey was conducted during the months of July through October in 2006. Aquatic plant specimens were collected and documented at 212 sites throughout the lake and major plant communities were mapped with GIS. A total of 35 aquatic plant taxa were documented, all native to Michigan (Table 3). This Tip of the Mitt comprehensive aquatic plant survey of Wycamp Lake is a critical baseline component of the Wycamp Lake Management Plan. The aquatic plant communities were surveyed and mapped from July to October, 2006 to identify plant species, and determine species abundance, density, and the presence or absence of non-native or invasive species (Figure 22). This plant study found that the majority of Wycamp Lake contains aquatic vegetation (>83%). Muskgrass (*Chara spp.*) and common bladderwort (*Utricularia vulgaris*) were the most commonly collected species while muskgrass and swaying bulrush (*Scheonoplectus subterminalis*) most commonly dominated plant communities.

According to the aquatic plant report, the *Potamogetonaceae* family had the greatest representation among plant taxa found in Wycamp Lake (11 taxa found), which is typical as *Potamogetonaceae* is the most speciose family of vascular plants in Michigan waters. Five different taxa in the *Cyperaceae* family were documented, though this number would likely be higher if specimens of the *Carex* genus had been identified to the species level. A total of 575 acres of Wycamp Lake possessed aquatic vegetation; approximately 47% was dominated by submergent vegetation, 34% by emergent vegetation, and the remaining 19% consisted of a mix of emergent and submergent.. A total of 35 aquatic plant taxa were collected or documented during the survey conducted on Wycamp Lake. Of the 212 locations sampled on the lake, aquatic plant specimens were found at all but nine sites. A total of 38 sites had little or no vegetation. The number of aquatic plant taxa encountered at a site ranged from zero to 15, with an average of 4.9 species per sample site. All taxa found were native to Michigan.

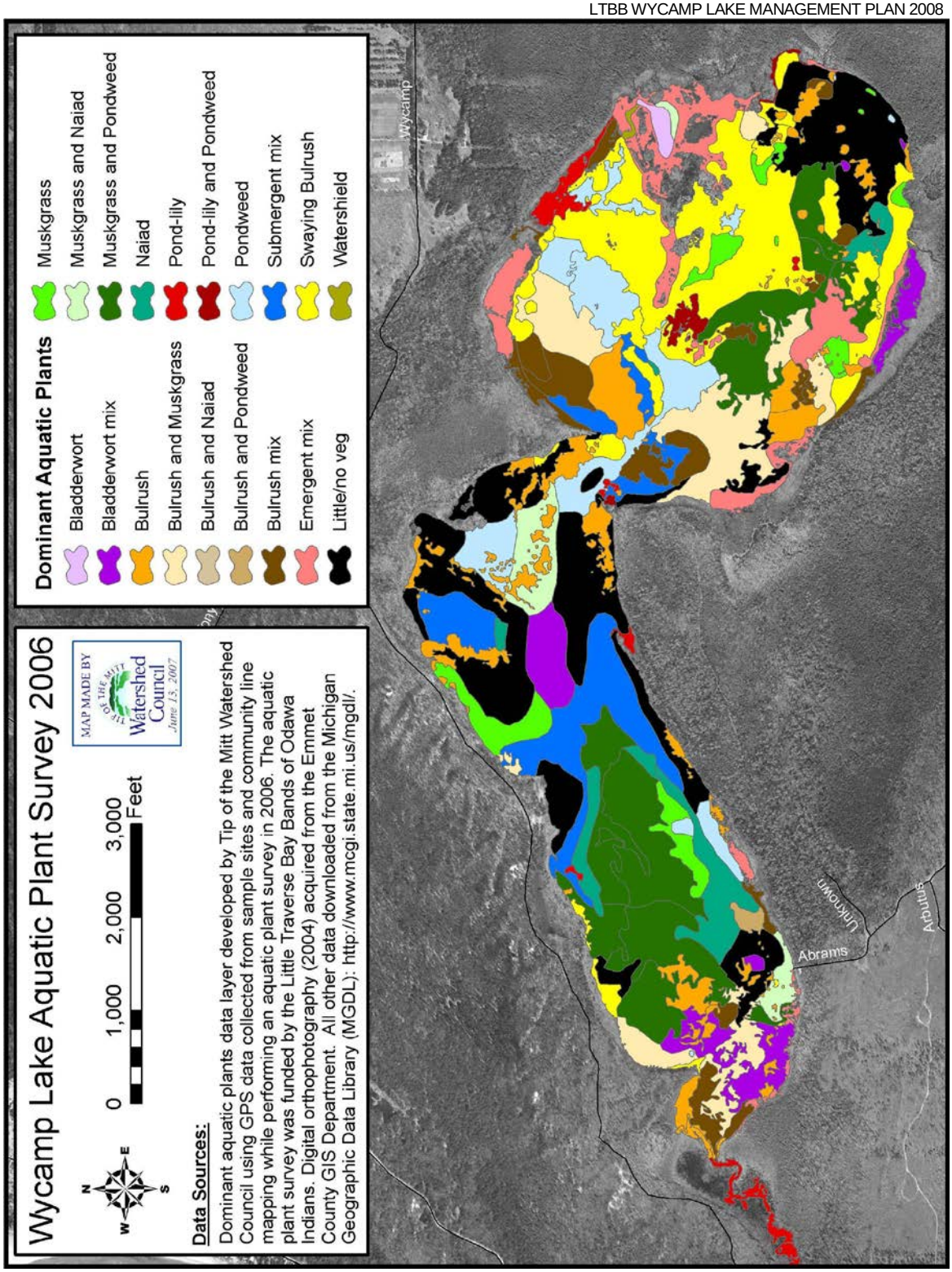


Figure (22). The aquatic plant communities of Wycamp Lake, 2006. Map from Cronk 2007.

(Table 3). Aquatic plant species occurrence at sample sites.

Genus and species	Common Name	# of sites	Occurrence*
Utricularia vulgaris	Common bladderwort	149	common
Chara spp.	Muskgrass	145	common
Najas flexilis	Slender naiad	114	common
Potamogeton illinoensis	Illinois pondweed	95	common
Schoenoplectus subterminalis	Swaying bulrush	77	common
Nuphar variegata	Yellow pond lily	70	common
Schoenoplectus tabernaemontani	Softstem bulrush	64	common
Potamogeton gramineus	Variable-leaf pondweed	62	common
Potamogeton natans	Floating-leaf pondweed	55	common
Schoenoplectus acutus	Hardstem bulrush	51	common
Myriophyllum heterophyllum	Variable-leaf watermilfoil	45	uncommon
Nymphaea odorata	White pond lily	25	uncommon
Sagittaria spp.	Arrowhead	24	uncommon
Potamogeton praelongus	Whitestem pondweed	16	uncommon
Stuckenia pectinata	Sago-pondweed	12	uncommon
Brasenia schreberi	Water-shield	11	uncommon
Utricularia intermedia	Flatleaf bladderwort	7	rare
Potamogeton zosteriformis	Flatstem pondweed	6	rare
Carex spp.	Sedge	3	rare
Ceratophylum demersum	Coontail	3	rare
Hippuris vulgaris	Mare's Tail	2	rare
Megalondonta beckii	Water marigold	2	rare
Myrica gale	Sweetgale	2	rare
Potamogeton richardonii	Richardsons' pondweed	2	rare
Potamogeton xhybrid	Pondweed hybrid	2	rare
Sparganium angustifolium	Narrow leaf Bur-reed	2	rare
Typhus spp.	Cattail	2	rare
Equisetum fluviatile	Water horsetail	1	rare
Juncus spp.	Rush	1	rare
Potamogeton amplifolius	Broad-leaved pondweed	1	rare
Potamogeton robbinsii	Robbins' pondweed	1	rare
Potamogeton strictifolius	Narrow-leaf pondweed	1	rare
Scirpus pungens	Three-square bulrush	1	rare
Sparganium macrocarpum	Giant Bur-reed	1	rare
Vallisneria americana	Eel-grass	1	rare

*Occurrence categories determined by Watershed Council staff based on natural breaks: 1-10 = rare, 11-50 = uncommon, and 51+ = common.

III. WYCAMP LAKE ASSESSMENT

C. BIOLOGICAL COMMUNITIES

4. PLANT COMMUNITIES

b. WILD RICE SEEDING

Wild Rice Plantings

Wild rice plantings were carried out in early to mid September in 2005, 2006, and 2007. Green, wet wild rice was broadcast seeded by hand from either side of the boat during planting events. It was estimated that the rice was broadcast five meters from the boat on average. During the 2006 and 2007 planting events, a Trimble GeoXT GPS unit was employed to capture the movement of the boat while rice was being broadcast (Figure 23). As a result of the estimated five meter broadcast distance, the line generated by the GPS was buffered five meters on either side. The area of this buffer was calculated to obtain an estimate of the potential size of wild rice plots. No spatial data was collected in 2005. Plots were visited in the early summer the following year to verify survival to floating leaf stage. The plots were visited periodically thereafter to check further survival to maturity. In all years, except 2007, rice was planted in the outlet channel on the west end of the lake. Rice was also planted in various areas in the east end of the lake in all years.

In 2005, 680.4 kg of wild rice were planted in Wycamp Lake, primarily in the outlet and in the eastern, marshy end of the lake. The 2006 rice planting consisted of 317.5 kg of rice, again in the lake outlet and in the east side of the lake. 2006 rice planting areas were estimated to be approximately 1.87 ha. Because of relatively good success of wild rice growth in Lake O'Neal elsewhere on the LTBB reservation, the amount of rice planted in Wycamp Lake was reduced, to allow more to be planted in Lake O'Neal. Only 68 kg of rice was planted in Wycamp in 2007, in the east-central part of the lake (Figure 11). Rice plantings in 2007 were estimated to cover 0.31 ha. In all years, rice was observed reaching floating leaf stage, but little or no rice was observed reaching maturity in all years.

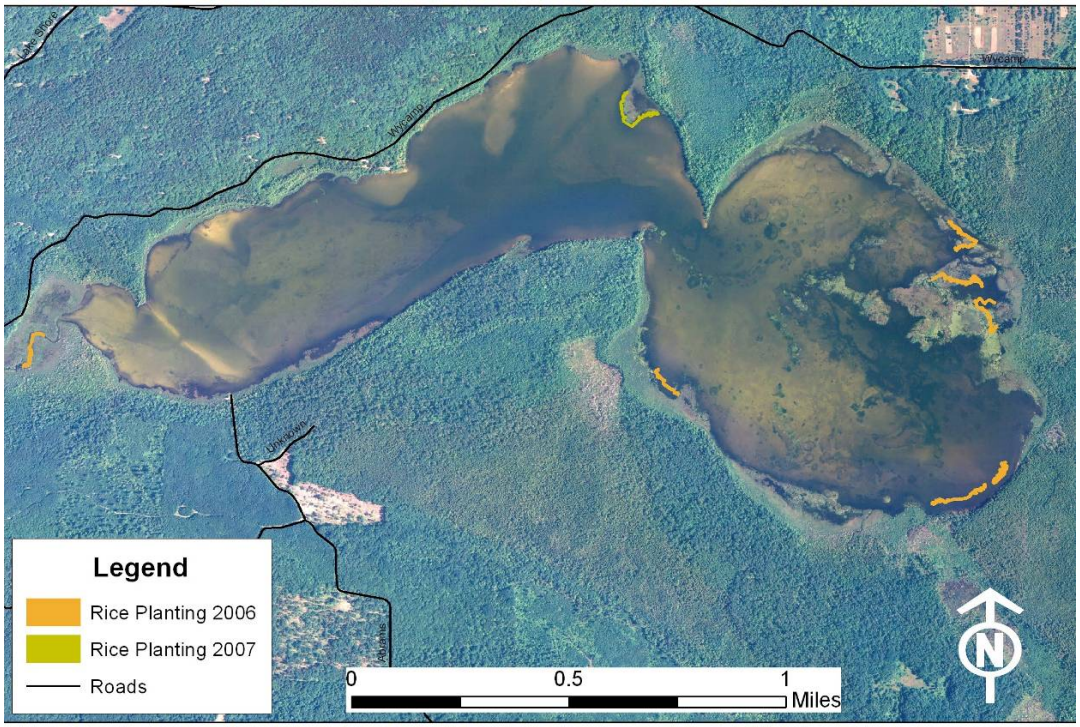


Figure (23). Wild rice was plantings on Wycamp Lake in 2005 and 2006. Wild rice areas from 2006 are shown as orange; 2007 plantings are shown as yellow.

Discussion-Wild Rice Planting

Wild rice at Wycamp Lake has not been successfully established to date. The vegetation survey conducted by Tip of the Mitt Watershed Council did not detect any wild rice in Wycamp Lake during the survey period between July and October 2006. Wild rice has been observed reaching the floating leaf stage in all years, but very little, if any appears to make it to maturity. A small patch that was growing well was grazed as soon as the plants emerged above the water. The water level management at Wycamp Lake may have negatively impacted the success of the rice. Human manipulation of water levels without wild rice in mind has been disastrous to rice stands in the past in other systems (Vennum 1988). With that being said, water level fluctuations caused by beavers was the reason that the dam was built in the first place in the 1960's (Jansma 1960). It is unknown if wild rice was present on Wycamp Lake before the creation of the dam in the 1960's. Future studies involving planting wild rice in exclosures should be used to determine if mortality of developing rice plants is caused by water level fluctuations or grazing waterfowl, such as mute swans.

III. WYCAMP LAKE ASSESSMENT

C. BIOLOGICAL COMMUNITIES

5. INVASIVE SPECIES

a. Invasive Wildlife Species

Mute swans, are a large, aggressive, feral waterfowl species that have been observed nesting at Wycamp Lake. Mute swans impact aquatic vegetation through grazing and are likely be grazing the limited wild rice that emerges. Also, mute swans are a threat to the native wildlife as a result of competition for prime nesting areas, territories and food resources. A primary concern is the common loon, a culturally significant species to the Odawa people and the affects of mute swans on this sensitive species. The non-native mute swans need to be controlled to provide needed habitat for nesting common loons, Canada Geese and/or Trumpeter Swans, which have been observed during the fall migration at Wycamp Lake

b. Invasive Fish Species

The common carp was the only invasive fish species documented in the Wycamp Lake fish community assessments. Although no attempt was made to quantify the numbers of carp present, this omnivorous fish was often observed browsing on aquatic vegetation destroying and consuming food and cover needed by native fish and waterfowl.

c. Plant Species

No invasive plant species were identified by the Tip of the Mitt Watershed Council 2006 Aquatic Plant Study. The LTBB ESD wetland specialist did not identify any invasive species either.

IV. LAKE MANAGEMENT ISSUES and OPTIONS

Wycamp Lake has been and continues to be important to LTBB Tribal Members. In historical times, it was a gathering place for the Odawa and other Anishinaabek people. In the 1980's, Wycamp became again a meeting place for the Odawa people. The gatherings during the 1980's played an important role in the re-affirmation of sovereignty of the Tribe. Throughout the history of the Tribe, the natural resources of Wycamp Lake and the surrounding area have played and continue to play an important role in the life of the Tribe. For Tribal Members, camping has been important at Wycamp Lake for culture, gathering, hunting and fishing for hundreds of years. The over-arching goal of the Natural Resources Department is to keep Wycamp Lake in a natural state; a quiet area where Tribal Members can connect with the natural world through the exercise of treaty rights. Wycamp Lake needs to be protected from development and overuse, if this goal is to be realized.

A. OVERALL LAKE MANAGEMENT GOAL

The goals of the Natural Resources Department are to manage fisheries and wildlife populations for the benefit of Tribal Members for the next seven generations. With this in mind, the tribe will make recommendations on management that will help protect the natural resources of Wycamp Lake. The recommendations are based on field research that was conducted by LTBB personnel and data collected during a public meeting with Tribal Members in October 2007 and a mail survey conducted during November 2007.

The overall goal of this lake plan is to apply an ecosystem management system that recognizes the interrelated nature of air, land, water and all life. This watershed approach is intended to include the whole system and focus on the interrelationships of the lake environment and the biotic communities. The LTBB NRD plans to participate in an adaptive management approach by learning and adapting , through partnerships of biologists, land managers and lake stakeholders that work together to maintain a sustainable ecosystem. The water levels need to be managed and the affects need to be monitored and adapted over time to best manage the resources for the next seven generations.

B. WATER LEVEL MANAGEMENT

The primary lake management issue that affects Wycamp Lake and Creek is the management of water level at the Wycamp Lake outlet dam. The recent lowering of the water level to the legally-established lake level, after several years of being controlled high, has caused worry among Tribal Members and other members of the local community. Wycamp Lake's water level is regulated by a dam that was built in the early 1960's to establish and maintain a court ordered legal lake level of 611.8 feet above mean sea level for summer, with the winter level being 611.0 feet above mean sea level (Jansma 1960). LTBB NRD has approached Emmet County regarding taking over water level management from the county controller's office. LTBB NRD will provide technical advice to Emmet County for the timing of the water levels. LTBB NRD has monitored the water levels with staff gauges (Figures 24-27). Water levels and the impacts of manipulations of the outlet dam and beaver-caused water level changes should continue to be monitored. LTBB NRD and ESD will continue to monitor impacts of the water level fluctuations and manipulations on the habitat, fisheries and wildlife communities.

1. SUMMER LEVEL

The LTBB NRD biologists recommend that the Emmet County manipulate the Wycamp Lake dam to set the legal summer water level (611.8 ft above mean sea level) the last week of April. This summer level is intended to allow time for spring flooding but establish a lake level prior to spring common loon nesting. Typically common loons begin nesting at this time on Wycamp Lake.

2. WINTER LEVEL

The LTBB NRD biologists recommend that Emmet County manipulate the Wycamp Lake dam to set the legal winter water level (611.0 ft above mean sea level) the second week of September. This winter water level manipulation will provide a sufficient flow for the fall Chinook salmon harvest and will be early enough to avoid any air spaces under the winter ice.

Figure (24). Map of staff gauge sites on Wycamp Lake in 2006 and 2007.

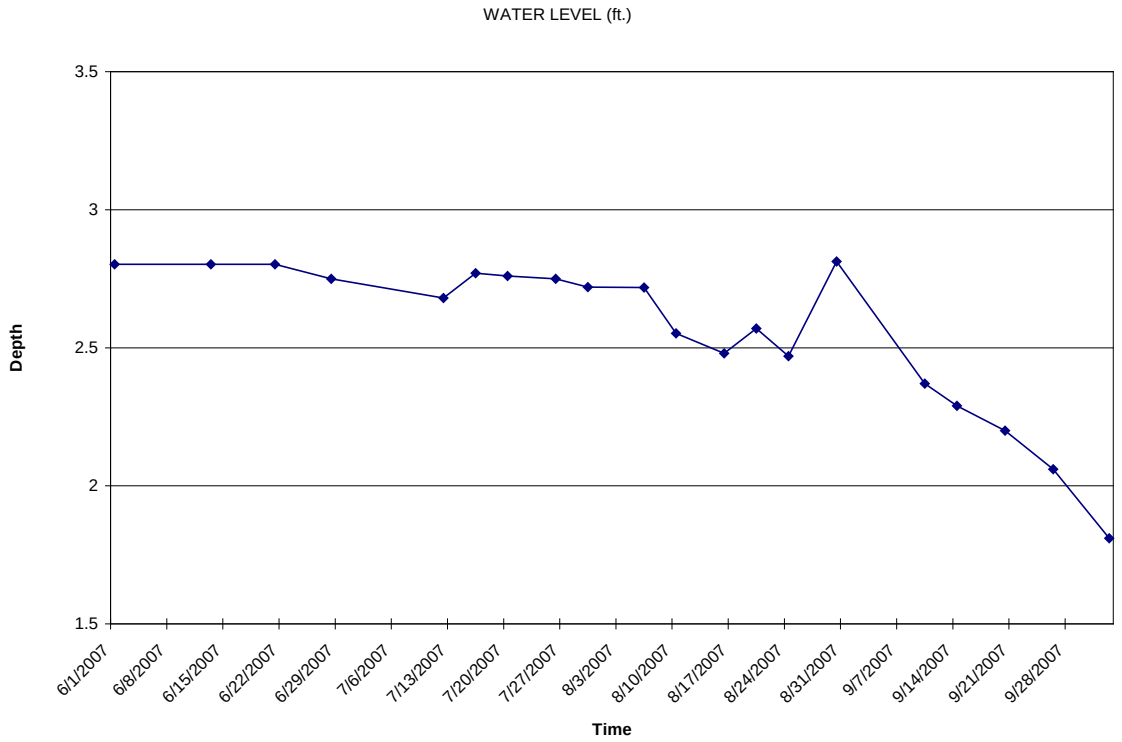


Figure (25). Water level chart of water level fluctuations measured weekly at the Wycamp Lake dam staff gauge in 2007 by LTBB NRD.

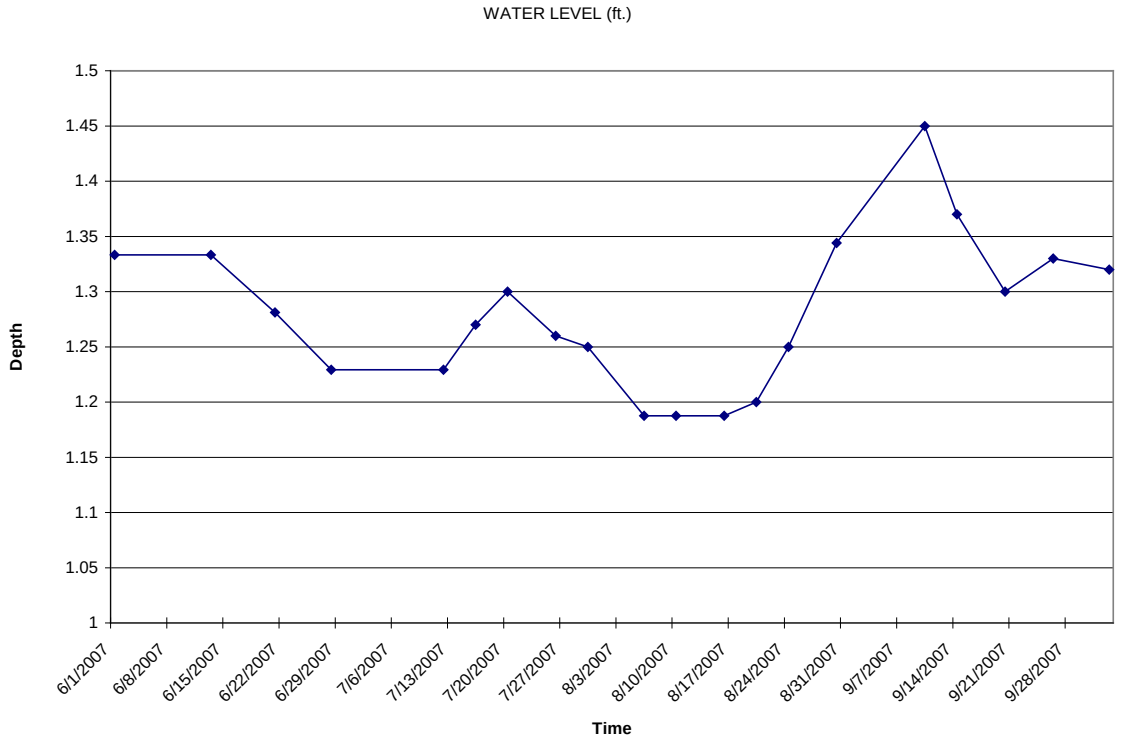


Figure (26. Water level chart of water level fluctuations measured weekly at the boat launch staff gauge in 2007 by LTBB NRD.

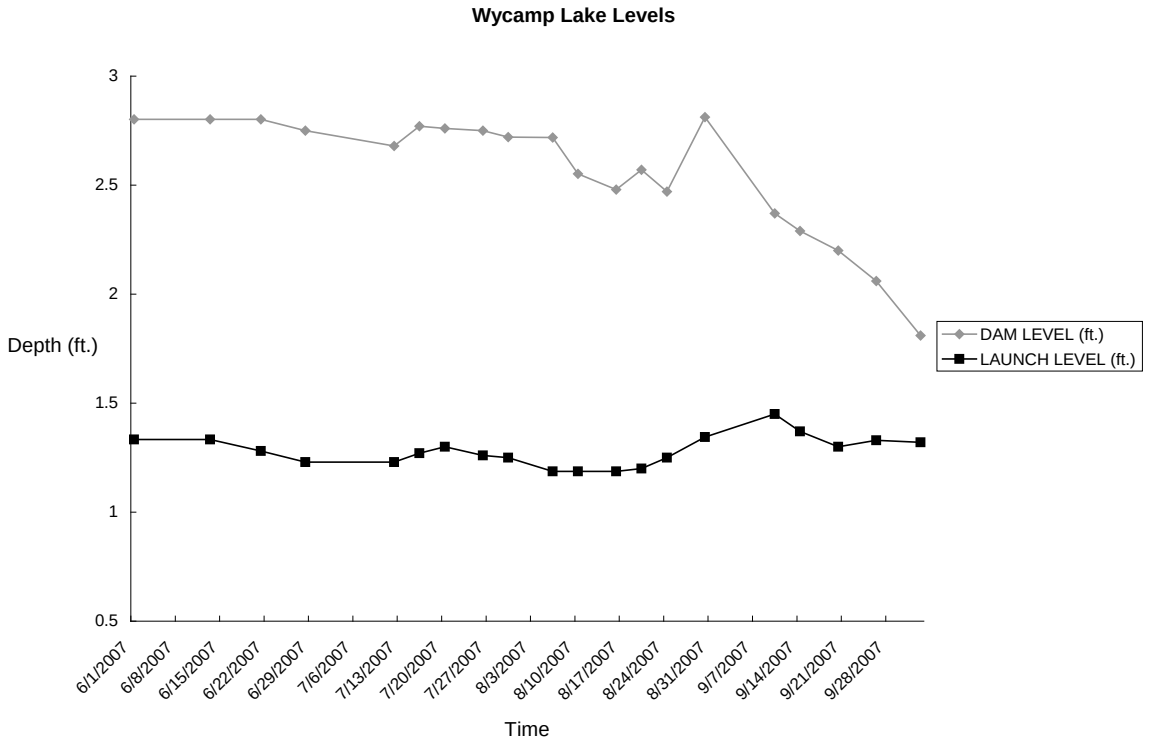


Figure (27). Water level chart of water level fluctuations measured weekly at the dam and boat launch staff gauges in 2007 by LTBB NRD.

The LTBB NRD recommends that Emmet County adopts and maintains a consistent schedule for the Wycamp Lake level manipulations. The tribe understands that this may not be possible from year to year due to seasonal variations. However, a best effort is needed to monitor the long-term effects of the court ordered water levels. The biologists recommend the county set the summer level of 611.8 ft (above mean sea level) the last week of April; and the winter water level of 611.0 ft (above mean sea level) the second week of September. These dates should be considered starting points and any relevant data to suggest other dates should be gathered and discussed with the lake managers and stakeholders at an annual Wycamp Lake community meeting. LTBB NRD will attempt to start a “Friends of Wycamp Lake” Working Group to facilitate future coordination and proposes to use this management plan as a base-line for future work.

IV. LAKE MANAGEMENT ISSUES and OPTIONS

C. ECOSYSTEM MANAGEMENT

The following section of this lake plan describes biological management issues identified at Wycamp Lake: Cultural, Endangered, Threatened, and Special Concern Species Management; Fisheries Management; Wildlife Management; Habitat Management; and Invasive Species Management.

1. Cultural, Endangered, Threatened, and Special Concern Species Management

LTBB NRD biologists are concerned about recreational impacts to sensitive species of cultural importance. Especially concerning are impacts to nesting bald eagles and common loons. Recently camping was prohibited which may have contributed to the return of bald eagles nesting at Wycamp Lake. If camping or recreational use in general increases the LTBB NRD needs to monitor any disturbance to these culturally important species.

2. Fisheries Management Issues

Fisheries assessments revealed that overall the Wycamp Lake fish community is healthy. A quality bluegill fishery exists in Wycamp Lake that is relatively unexploited by fishermen. The bluegill population exhibits good growth, and has relatively low overall mortality. We have learned that largemouth and smallmouth bass exhibited average mortality rates, with largemouth bass showing better growth in Wycamp Lake than smallmouth bass. Lengths of largemouth bass were slightly smaller than state average at age one and two, but much larger than state average at age three and five. Largemouth bass growth index was 27.35 mm larger than state average. Enough smallmouth bass of age one were captured in all 2005 and 2006 samples, but enough age two fish only were captured in August 2005. Smallmouth bass were smaller than state average in Wycamp Lake, although only slightly so for age one fish in June 2006. In Wycamp Lake, smallmouth bass growth index was 19.33 mm smaller than state average.

Smallmouth bass growth indices are consistently smaller than state average, but do not show a consistent pattern based on age. Smallmouth bass growth may be limited in Wycamp Lake by competition with other predators, especially largemouth bass (DeVries and Frie 1998). Other Researchers have found that largemouth bass capture more large food items than smallmouth bass and also capture prey more efficiently in vegetated habitats (Winemiller and Taylor 1987).

It would appear that the LTBB regulations are sufficient to maintain this fishery. Too little information was collected during assessments on northern pike, yellow perch, and pumpkinseed to make reliable management recommendations. The lowering of the water level to the legally-mandated level may increase likelihood of winterkill in Wycamp Lake. To monitor for this happening, fish assessments should be conducted on Wycamp Lake every two to three years. Fisheries assessments in the future should be completed in early to mid-May (water temperatures ≈ 65°C), to better capture largemouth and smallmouth bass, as well as bluegill (Schneider et al. 2000). Fyke nets should continue to be used. If winterkill appears to be a problem in moderate or mild winters, perhaps action could be taken to find a compromise water level that will help prevent winterkill and still protect property (docks and buildings) of private landowners.

3. Wildlife Management Issues

Beaver management is the key wildlife issue at Wycamp Lake. Past beaver management has been handled by a private landowner (Dirk Shorter, Personal communication 2008). Beaver activity, likely was the reason for the construction of the Wycamp Lake dam in the first place. Beavers will continue to play a large role in the water levels of the lake unless dam removal and trapping continues. LTBB NRD personnel have not been involved in beaver dam removal or trapping, but plan to assist if needed in the future. Other methods, such as a Clemson beaver pond leveler (a so-called “beaver cheater”) have also been explored, but the volume of water exceeds the effectiveness of this tool.

Few dabbling ducks, such as mallards, wood ducks, and blue-winged teal, were seen during the surveys. This may be due to the fact that these species are hiding in emergent vegetation close to shore and grasses on the shore. Also, there may be some observer bias caused by the method used. Most brood surveys of this type are carried out on smaller ponds or wetlands, with an observer staying at a fixed, hidden location and with other workers walking the perimeter of the water flushing broods and adults into the air or into the middle of the pond (Rumble and Flake 1982). Other brood survey techniques include using helicopters to survey large, remote lakes and rivers for broods (Gabor et al. 1995). A more effective technique for future waterfowl monitoring may be traditional point counts census or a hybrid approach, which would entail a set route of a known length with known observation points established along the route (Royle and Nichols 2003; Moore et al. 2007).

Bird surveys revealed that Wycamp Lake is important habitat for common loons, Canada geese, black terns, bald eagles and other birds. LTBB NRD will continue to monitor birds at Wycamp Lake every year through brood surveys. Time should be taken in the future to check backwater areas in the east end of the lake for waterfowl production. LTBB Tribal Members have identified wildlife viewing as the single most important value of Wycamp Lake in the mail survey. Currently, viewing of bird species such as bald eagles and common loons is quite easy from the boat launch and other open areas on the north end of the lake. Since levels of waterfowl hunting are low among tribal members, current hunting regulations are likely sufficient to protect waterfowl populations.

4. Habitat Management

Wild rice planting has revealed poor results to this point, but may improve with a stable water level management regime that considers the needs of the wild rice. LTBB NRD biologists recommend that wild rice seeding be continued. The ESD wetlands specialist plans to conduct lake sediment testing for determining areas to be seeded in the future. Also, the LTBB NRD plans to work with a Wycamp Lake private property owner, Dirk Shorter, to create small exclosures at wild rice plots to determine if environmental factors or grazing by water birds or other animals affects growth. The LTBB ESD wetland specialist plans to inventory the wetland plant communities in the future to compliment the aquatic plant survey.

Here in the Midwest, we have two annual species of wild rice - *Zizania aquatica*, the southern species, and *Zizania palustris,* the northern species. Wild rice is a fairly resilient plant with a wide range of environmental tolerances, but there are variables that come into play that determine how well the plants grow. Wild rice is said to grow best in approximately two feet of water, but has been found to survive in water depths ranging from 0-6 feet.

Some sources say that riverine habitats seem to be well suited for wild rice growth, but it also has been known to grow along the margins and in the shallows of lakes. One of the important factors contributing to productive wild rice stands appears to be the regular influx of nutrients that is often associated with riverine habitats, as lake sediments may become depleted of nutrients over time. Additionally, somewhat regular riverine-related disturbances such as flood and scour events may also benefit wild rice by allowing it to compete with perennial plants. Regarding other water chemistry variables, there are not any specific indicator variables that determine whether or not or how well wild

rice grows (Meeker 1999), but this may be a factor related to insufficient data collected under an insufficient range of conditions.

Potential factors affecting wild rice may include:

- Wild rice grows best in soft organic muck, but extremely flocculent sediments may prohibit growth (this is most probable cause of wild rice not doing well at Wycamp Lake, and possibly at O' Neal Lake as well). The deep, flocculent sediment likely can bury the seeds and prohibits the plant from germinating (Meeker p.75-77). In the few cases where plants have germinated, the flocculent muck may be prohibitive for the plant in developing a strong root system. The Aquatic Vegetation Survey done by Tip of the Mitt in 2007 for LTBB on Wycamp Lake indicates that muck levels ranges between 0.25 and 5.00 feet, but over 70% of the sample sites had more than two feet of muck. Studies suggest that seeds covered in just up to 8 cm of sediment may not germinate. Streams flow into the lake bringing sediments naturally into the system, but the lake level control structure (the dam) is probably the biggest cause of "unnatural" accumulations of the flocculent muck.
- Wild rice requires relatively large amount of nutrients. The plants store a variety of nutrients in their tissues and fruits, and in order to store these nutrients they need to be present in the sediments. If there is still interest in trying to grow rice in Wycamp Lake, it may be beneficial to do sediment chemistry analysis to see what kinds of nutrients are present in the sediments (see Meeker p.63 and 64 for information regarding plant nutrient composition). Some nutrients may be necessary only in small amounts but may play a big role in the health of wild rice plants.
- Additionally, it is important to consider the history of the water body itself. Frank C. Gates (1942) published a paper on Bogs of Northern Lower Michigan that described both Wycamp and O'Neal Lakes before they were impounded as being boggy in nature and hosting bog vegetation. Wycamp Lake receives a fair amount of ground water that probably contains some dissolved nutrients, but the boggy characteristics of the lake may be an indicator of poor mineral soils that lack the necessary nutrients for a somewhat nutrient-intensive plant such as wild rice.

- Another potential stress on the rice may be a marly bicarbonate precipitate that is prevalent in Wycamp Lake. While mineral calcium itself does not seem to be an apparent problem for wild rice, if enough bicarbonate material precipitated out of solution along with the decay of vegetation containing bicarbonate (i.e. *Chara spp*.), sediments could become somewhat basic chemically, which may pose a problem (i.e. too high of a pH in the sediment could potentially inhibit germination or growth). It may be beneficial to test the pH of the sediment to determine if this is a factor.
- Something to consider is that not all wild rice is the same. There are two species of wild rice known to the Great Lakes region: *Zizania aquatica*, the southern species, and *Zizania palustris,* the northern species. Although these species are similar, they may have important but subtle differences that may allow them to survive under different conditions. In addition to the two different species of wild rice, there are varieties of those species, and some varieties may be better adapted to certain ecotypes (i.e. inland vs. coastal, river rice vs. lake rice, etc.). When choosing where to get rice to seed from, it may be good to consider where that rice came from, which may influence whether or not it does well where it gets seeded (Herron, personal communication).
- Microorganisms adapted to living in anaerobic conditions in saturated, organic, mucky soils may also play a role in the success of the plant. These microorganisms may perform a range of duties in a somewhat symbiotic relationship. Not all microorganisms are found everywhere, and specific groups of microbes may dictate whether or not plants survive.
- Another potential factor that could contribute to a poor rice crop at Wycamp may involve waterbirds that may eat the rice just after seeding, although this is probably less of a problem than the sediment/muck depth issue.

5. Invasive Species Management

LTBB NRD recommends that educational signs be posted at the Wycamp Creek boat launches to inform users about best management practices to prevent the introduction of invasive species. Also, LTBB NRD adopted policies to prevent the spread of invasive species in 2007.

IV. LAKE MANAGEMENT ISSUES and OPTIONS

D. WATER QUALITY ISSUES

The primary water issue identified at Wycamp Lake is the water quantity not the quality. Wycamp Lake will be monitored in severe winters to detect conditions that may lead to winterkill. LTBB ESD is looking into sampling the lake swimming areas for E. coli in the future. Also, if the water levels are maintained annually at the summer and winter levels the subsequent amount of sedimentation resulting from these manipulations should be less in the future. Water quality will continue to be monitored to assist in future management decisions.

E. LAND USE / RECREATION MANAGEMENT

1. CAMPING

The most contentious land use/recreational issue at Wycamp Lake is public camping on the state land around Wycamp Lake, which is currently prohibited by state regulation. The tribe has a history of camping at Wycamp Lake for a large variety of reasons including: ceremonies, fasting, subsistence fishing, hunting and gathering, and recreation. The LTBB NRD biologists support no camping at Wycamp Lake. However, input at the LTBB tribal member Wycamp Lake meeting in October 2007, indicated a desire to permit regulated camping at limited designated sites that were patrolled by law officers. Most people agreed about not wanting to return to the unregulated camping that existed there in the past.

Future camping at Wycamp Lake requires, at a minimum, the construction of pit toilets to accommodate campers. Additionally, camping would need to be patrolled by law officers to avoid the problems such as trash that were previously encountered with dispersed camping at Wycamp Lake. Further research is needed before the LTBB NRD, MDNR, Emmet County and lake stakeholders discuss if camping could be reinstated in the future at Wycamp Lake.

If camping were allowed at Wycamp Lake, the biologists recommend it be relegated to the north side of Wycamp Road at a limited number of designated sites. This would help minimize lake shore erosion and would reduce disturbance of wildlife on and around the lake. This policy would be similar to the current dispersed camping at French Farm Lake, also in Emmet County. At French Farm Lake, camping is restricted to six designated sites along approximately 1.61 km of road. The sites are situated across the road from the lake and are far apart form each other in order to create a quiet camping experience. Tribal Members and the public at large would likely support a similar option for future camping at Wycamp Lake. At this time NRD biologists support the MDNR "no camping" rule at the lake. However, if camping were permitted, it should be limited camping, with a commitment to maintain enforcement patrols. Also, the LTBB NRD needs to study the long-term affects of human disturbance on the lake ecosystems fish and wildlife populations, especially sensitive species such as nesting bald eagles and common loons.

2. BOAT LAUNCHES

An additional land use issue identified that needs to be addressed is the current condition of the two public boat launches at Wycamp Lake. The LTBB NRD believes the launches need additional crushed stone on the ramps and additional maintenance to provide safe stable launch areas.

V. PUBLIC INVOLVEMENT IN THE LTBB WYCAMP PLAN

A. Tribal Member Input Meeting

The LTBB NRD hosted a Wycamp Lake informational meeting for LTBB tribal members on Wednesday, October 17, 2007 at the LTBB Administrative Building beginning at 6:00pm.

The purpose of the meeting was to provide the LTBB members a general overview of the LTBB NRD Wycamp Lake Management Plan USFWS grant. And most importantly, to solicit tribal member input on the future management of Wycamp Lake. A total of 30 LTBB tribal members interested in exercising their treaty rights at Wycamp Lake attended this meeting. The participants provided excellent comments and concerns about the past and the future uses of Wycamp Lake. A total of 9 Wycamp Lake Uses were identified and listed. Each meeting attendee was given 5 sticker dots to help prioritize tribal member uses of Wycamp Lake. The 9 uses identified are listed in order of priority: Treaty rights (34), cultural uses (22), fisheries (19), wildlife (18), recreation (18), education (12), gathering (10), camping (9) and land use (8) (Figure 28; Table 4).

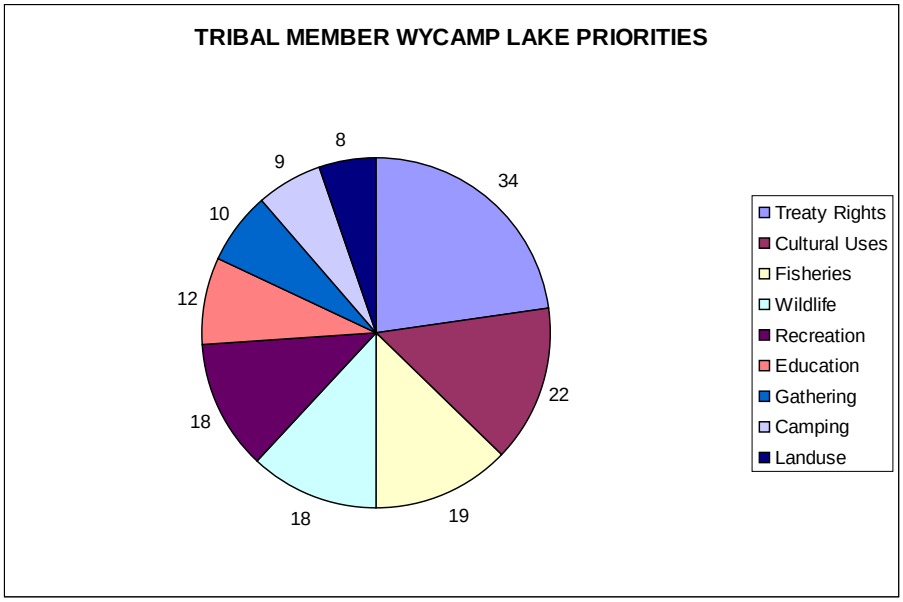


Figure (28). Tribal member Wycamp Lake Use priorities from the LTBB public meeting in October 2007.

Table (4). Tribal member Wycamp Lake Use priorities from the LTBB public meeting in October 2007.

TRIBAL MEMBER PRIORITIES	# OF DOTS	RANKING
TREAT RIGHTS (hunting, fishing and gathering)	34	1
CULTURAL USES (fasting, ceremonies and medicines)	22	2
FISHERIES (subsistence and recreation)	19	3
WILDLIFE (viewing and hunting)	18	4
RECREATION (hunting, fishing, boating, swimming)	18	4
EDUCATION (field trips and research)	12	5
GATHERING (subsistence, crafts and medicines)	10	6
CAMPING (ceremonies and recreation)	9	7
LANDUSE (need for a citizens clean-up group)	8	8
TOTAL OF 9 PRIORITIES IDENTIFIED	**150 DOTS**	**--**

B. LTBB NRD WYCAMP LAKE POST-CARD SURVEY

LTBB NRD staff sent out approximately 1600 post cards to head of households of LTBB tribal members living in Michigan. A total of 450 post cards were filled-out and returned for analysis. The following questions were asked on the post card survey in 2007:

1.) On average, how many times a year do you visit Wycamp Lake?
   a. Zero times
   b. One to ten times
   c. More than ten times

2.) What county and state do you live in? (Write in Below)

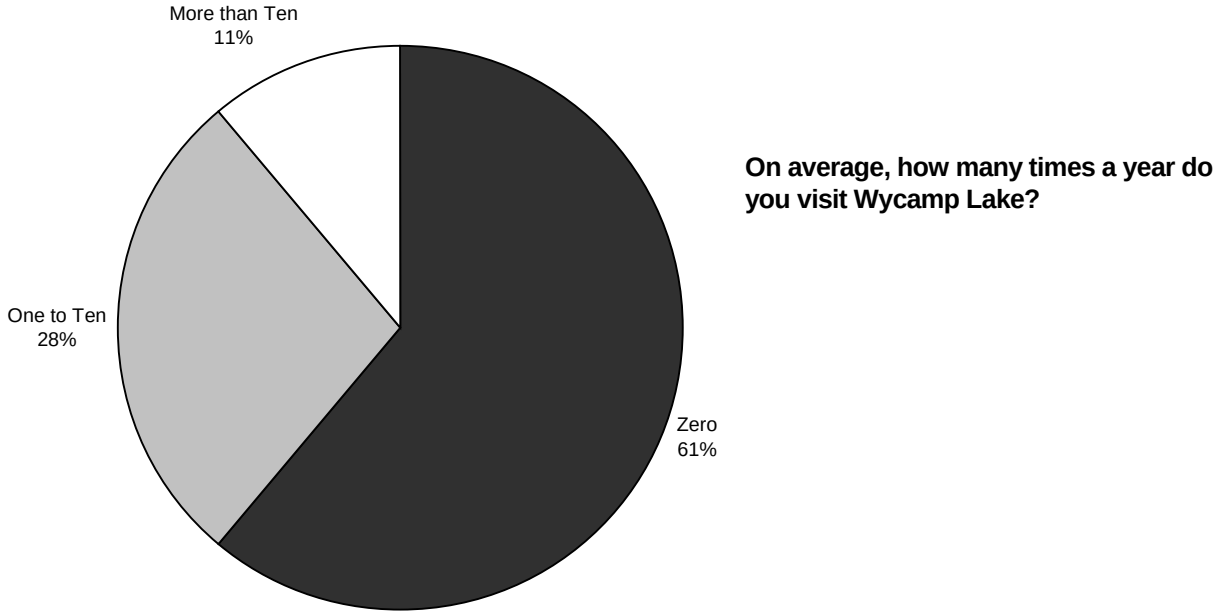
3.) What use of Wycamp Lake do you value most?
   a. Fishing
   b. Hunting
   c. Wildlife Viewing
   d. Traditional cultural uses
   e. Camping
   f. Education
   g. Don't know / no opinion

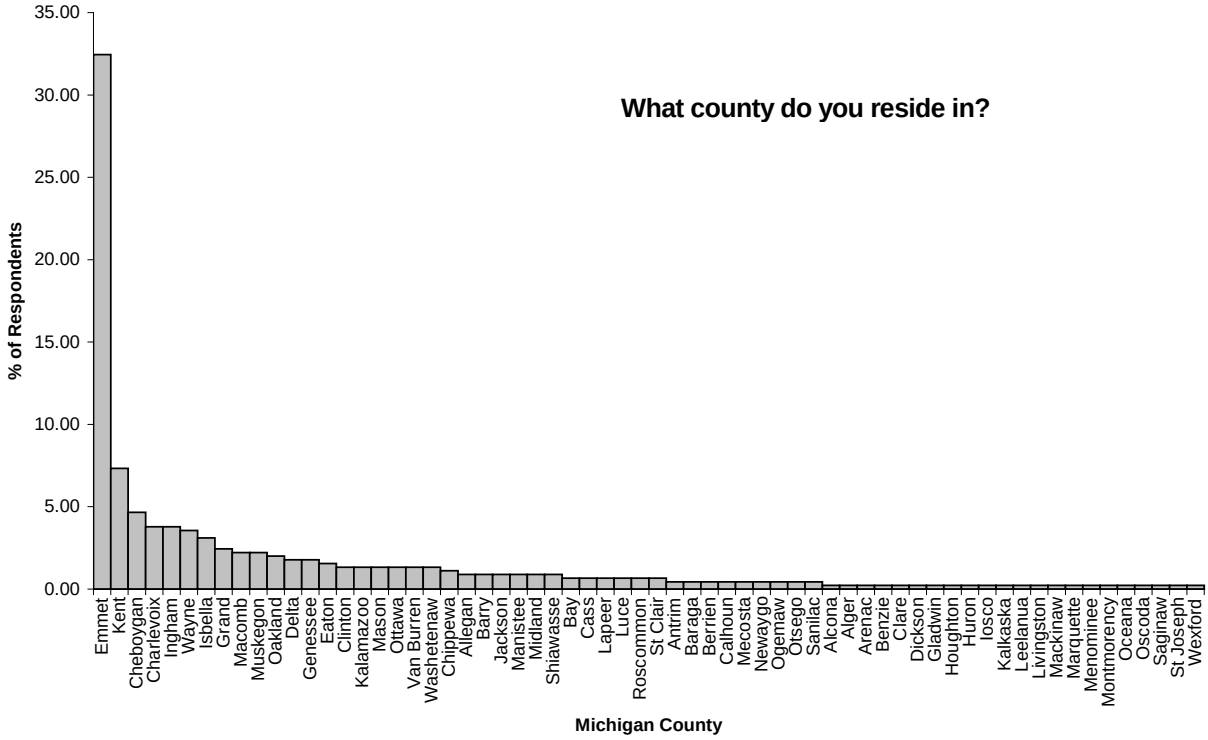
4.) Circle the answer below that best describes your feelings about camping at Wycamp Lake.
   a. No camping should be allowed
   b. Camping should be allowed only for spiritual or traditional cultural purposes
   c. Camping should be allowed, but be restricted to designated areas and regularly patrolled by law officers
   d. Camping should be allowed and should not be restricted in any way
   e. Don't know / no opinion

5.) Would you like to see the Little Traverse Bay Bands of Odawa Indians take over management of Wycamp Lake?
   a. Yes
   b. No
   c. Don't know / no opinion

A total of 61% of the 450 respondents indicated that they had never visited Wycamp Lake. A total of 125 tribal members (28%) indicated they visited lake 1 to 10 times a year. Only 50 members surveyed (11%) said they visited the lake more than 10 times a year. When asked for their county of residence, post card respondents indicated that 146 (32%) lived in Emmet County, followed by Kent at 7%. A total of 64 counties were represented. Wildlife viewing, followed by fishing, then camping, were the most valued Wycamp Lake uses. When asked about camping at Wycamp Lake, 38% wanted future camping but with restrictions to designated sites and officer patrols. Only 3% of those that responded wanted to continue the no camping policy. A total of 292 members (65%) indicated they

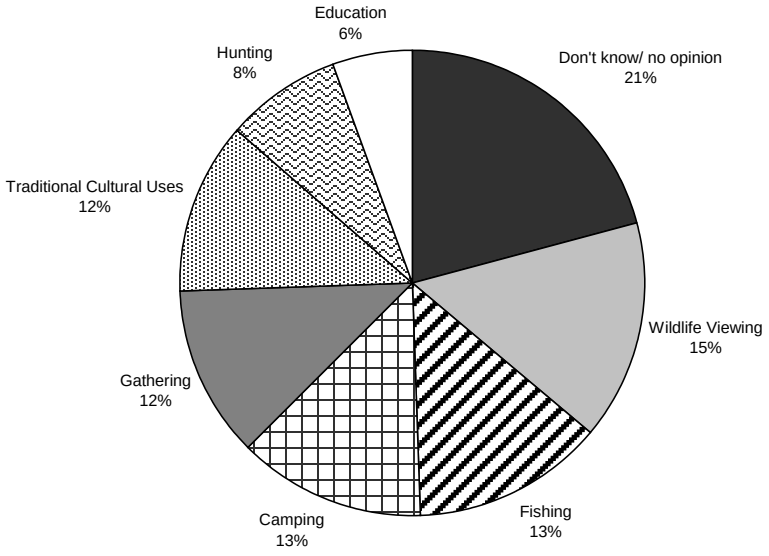
wanted LTBB to take an active role in the future management of Wycamp Lake. The results of the five question post card are in Figures (29-33).

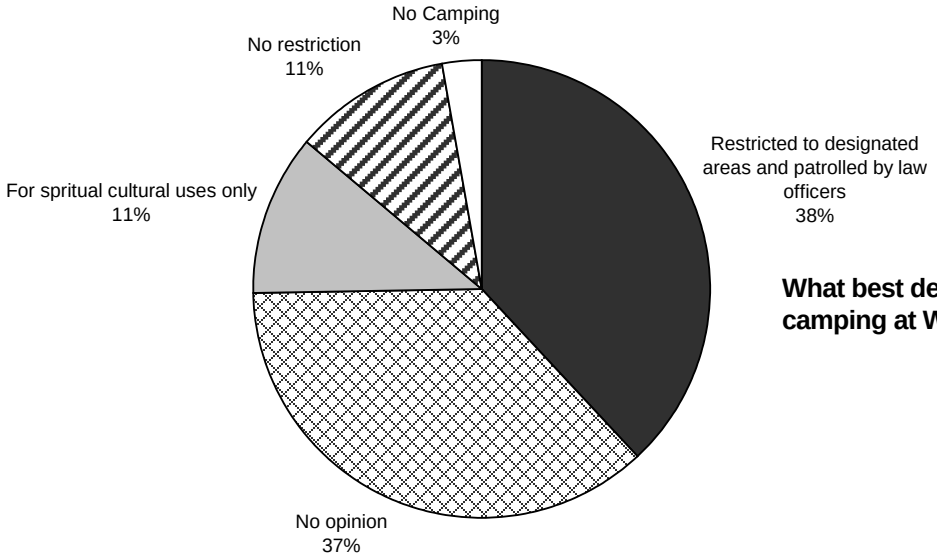




Figures (29 and 30). Tribal Wycamp Lake Use priorities from the LTBB post card survey.

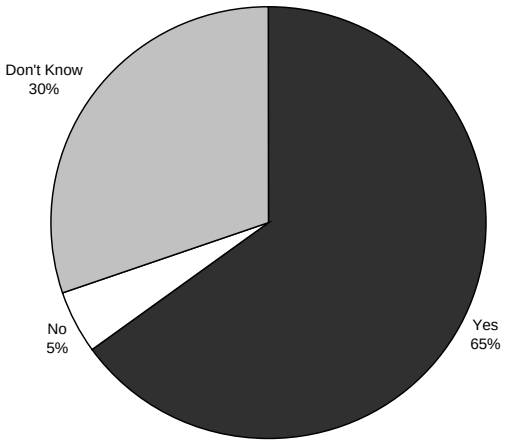
What use of Wycamp Lake do you value most?





What best describes your feeling about camping at Wycamp Lake?

Should LTBB take and active role in the management of Wycamp Lake?



Figures (31-33). Tribal Wycamp Lake Use priorities from the LTBB post card survey.

VI. FUTURE RESEARCH and MONITORING

Future research and monitoring is vital to this lake management plan. This plan is considered a living document and will need to be updated annually. Managers will need current information to make informed decisions to properly manage this culturally unique lake. The following activities are proposed for future work at Wycamp including: cultural research; water level monitoring; biological community monitoring; water quality and wetland monitoring; and Invasive species monitoring.

A. Cultural Research

In concluding his cultural and historic report, Wes Andrews recommended that three of the cultural resources identified during this project are eligible for inclusion to the National Register of Historical Places. These cultural resources includes: the water spirit, the elder gathering at the campgrounds, and the lake's natural resources. According to Wes Andrews report (2006), he recommends "these cultural resources be taken into account in the design of a management plan for Wycamp Lake and Creek, especially when any proposed undertaking would disturb the ground surface or alter the natural character of the landscape and its view shed. Future work with the LTBB Archives and Records department will be undertaken to follow up these recommendations.

B. Water Level Monitoring

Water levels will shape future management. Therefore, water level monitoring should continue weekly at Wycamp Lake, when possible. Year-round monitoring should continue at the dam and seasonally at the boat launch until formation of ice in the lake. The staff gauges should be improved to make for easier interpretation of water levels. LTBB NRD will maintain and monitor weekly staff gauges at the boat launches and dam site. Future manipulations may be necessary to respond to water level fluctuations during the summer. This plan will attempt to initiate those discussions with Emmet County, other lake stakeholders, the private landowners, and MDNR managers.

C. Biological Community Monitoring

The LTBB NRD and ESD will continue biological monitoring of Wycamp Lake. LTBB NRD will continue fish and wildlife surveys for updating this lake management plan in the future. This biological research plans to include: cultural, endangered and threatened species monitoring; fisheries assessments; waterfowl brood surveys; and surveys for invasive species. Future monitoring will also include surveys for mussels, amphibians, and reptiles.

1. Cultural, Endangered and Threatened Species Monitoring

LTBB NRD will continue long-term monitoring of all culturally important species identified at Wycamp Lake and Creek. Bald eagles and common loons will be monitored with help from the BIA Circle of Flight Program. Also, Max Field, a LTBB tribal member, is researching common loons for CMU at Wycamp Lake. This CMU Masters thesis project studying common loons will be useful for future management of this culturally important waterfowl species.

2. Future Fish Community Assessments

Future fisheries work protocols on Wycamp Lake will be similar to those used in status and trends studies of similar lake systems by Michigan DNR (Schneider et al. 2000; Schneider and Merna 2000). Assessments need to be carried out using at least two gear types (Schneider et al. 2000). Because of the shallow nature of Wycamp Lake (≈2 m), fyke nets should be used and are efficient for sampling most species of interest such as bluegill, northern pike, largemouth and smallmouth bass (Schneider et al. 2000; Schneider and Merna 2000). The second gear type that should be used depends on how useable the launch at Wycamp Lake is by the LTBB electro-fishing boat. If the electro-fishing boat can consistently be launched, it should be used as a way to sample smaller fish species and YOY bass, bluegill, and pike (Schneider et al. 2000). In the event that the shock boat cannot be consistently launched, a bag seine should be used to sample the same species in the nearshore areas (Schneider et al. 2000).

Fyke nets with two inch mesh, with 4 x 6 foot frames, and a 150-foot lead (Schneider et al. 2000) should be used. Ideally, fyke nets should be set for at least 15 net nights in a lake the size of Wycamp, over the course of at least two days. If at least 30 individuals of the main species of interest are captured in 15 net nights, sampling can be stopped, if needed (Schneider et al. 2000). Numbers of net nights can go as high as 30, but need not go this high if a representative samples reached in a fewer number of samples. All available habitats should be sampled approximately in proportion to their occurrence in the system.

Using an electro-fishing boat to sample nearshore areas of Wycamp Lake would be ideal, but since the legally-mandated low water level may make the electro-fishing boat difficult to launch consistently, a seine could be used to sample these areas. Since no “standard” seine exists, the 30 foot bag seine that LTBB has been using (or a similar one) should be used in the future to sample the

near-shore fish community of Wycamp Lake (Schneider et al. 2000). The catch of the seine should be standardized as catch per seine haul (Schneider et al. 2000). Enough seine hauls should be undertaken to sample all available habitats approximately in proportion to their occurrence in the system. This will to be determined in the field. At least 30 representatives of the primary species (bluegill, northern pike, largemouth and smallmouth bass) should be captured in these samples (Schneider et al. 2000). The number of all species should be counted and lengths (mm) of fish should be collected. Scales should be collected from at least five fish of each cm-group on each day of sampling from each fish species. The second (or third if the second is lost or damaged) dorsal spine should be collected from large- and smallmouth bass at or over 300 mm.

3. Future Wildlife Assessments

Future waterfowl brood surveys will be a hybrid of the fixed route approach used by LTBB previously and point count surveys used during breeding bird count surveys in Michigan (Anonymous 2002). This is similar to a protocol used on wetland complexes in Alaska (Moore et al. 2007). Set points should be visited around the margin of Wycamp Lake during each survey. After arriving at each point, the observers should wait two minutes to allow birds to resume regular activities before starting the ten minute observation time. Depending on what is seen, the time for all observations could be increased to 15 minutes. During this observation time, all bird species seen will be recorded. The age (adult, chick, or juvenile) should be noted separately for each species. Pre-determined points need to be chosen at the beginning of the first field season that these protocols are used. During travel time to each pre-determined point, bird species seen will be recorded as noted above. Travel should be by canoe or kayak, if possible, to allow stealthy travel through shallow water. If it is thought that the individual bird seen during transit is the same as during the point count, a note should be made so a double count of that individual is not made. Ideally, the survey should take about two hours to complete, but if this seems like not enough time, more time should be added to make the whole survey complete in the least amount of time possible. Time needed to finish the survey will be determined upon the first visit to the lake prior to the beginning of the field season. Time needed to complete the survey may vary if these protocols are used on lakes other than Wycamp. Surveys should be timed to begin one half hour before sunrise and conclude by two hours after sunrise, usually between 5:30 and 9:30 am during the summer; this is the primary activity period of most bird species that we are

concerned with (Anonymous 2002). Surveys should be carried out monthly in May, June, July, and August on Wycamp Lake.

Some preliminary mammal snow track survey work has been carried out around Wycamp Lake in conjunction with LTBB's wolf research grant. However, in late 2007, formalized protocols for rare and elusive mammal tracking (wolf, bobcat, pine marten, and river otter) were developed by other researchers (Stricker and Svoboda 2007). Areas around Wycamp Lake were shown by previous research at CMU to be suitable for pine marten and may provide habitat for bobcats, otters, and transient wolves (McFadden, 2007; Stricker and Svoboda 2007). This tracking is carried out in groups of two people. For tracking around Wycamp Lake, the best tracking technique is on snowmobile or on foot (skis, snowshoes). During track surveys, trails around Wycamp Lake should be surveyed and the shore of the lake should be investigated, provided the ice is safe.

4. Future Habitat Assessments

If funding is available in the future, the aquatic vegetation survey of the lake should be conducted to monitor for any changes in the plant communities. The LTBB NRD is concerned about the status of culturally important native plant species. The LTBB NRD recommends the habitat survey conducted by Tip of the Mitt be replicated approximately every 10 years. Also, the biologists would like to contract a botanist to create a herbarium reference collection of the Wycamp Lake, Creek and associated wetland flora. A project to identify plants or plant communities of medicinal and cultural importance is also needed in the future. LTBB is also very concerned about the introduction of exotic or invasive plant species. The LTBB NRD will work with the LTBB ESD to annually monitor the lake habitat for the presence of invasive plant species.

5. Invasive Species Monitoring

LTBB NRD will continue to monitor Mute Swans as part of the waterfowl brood surveys but the NRD needs to work to obtain the ability to control this species through egg oiling and lethal control. LTBB NRD needs to contact the USFWS sea lamprey control program to obtain past data on sea lamprey and control efforts in Wycamp Creek.

D. Water Quality Monitoring

The LTBB ESD Water Quality Specialist has collected monthly data at fixed sampling locations for Wycamp Lake and Wycamp Creek on even years, beginning in 2000 (2000, 2002, 2004, 2006),

and is scheduled to sample through 2011. The LTBB ESD Wetland Specialist has collected monthly data for Wycamp Lake at (mostly) fixed locations in 2007 and will continue to be collecting data through at least 2009. The LTBB NRD will continue to work with the LTBB ESD on coordination of winter sampling and throughout the seasons on Wycamp Lake. LTBB NRD needs to contact the USFWS sea lamprey control program to obtain past and future biological assessments and treatment statistics.

E. Recreational Impact Monitoring

The LTBB NRD biologists are concerned about the impacts of future recreation on Wycamp Lake and the associated biological communities. The LTBB NRD needs to monitor recreation and land use at Wycamp Lake to protect this valuable area from disturbance and degradation.

Valuable research has been accomplished through this USFWS grant on Wycamp Lake during the past three years. However, research and monitoring should be continued in the future on the fish, wildlife and habitat that depend on Wycamp Lake. We need to understand what we have at present and make sure these natural values are available for the next seven generations

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ACKNOWLEDGMENTS

Acknowledgement must be given to the United States Fish & Wildlife Service (USFWS) for funding this important cultural and biological project including, John Leonard, for his help with the project. Numerous people who helped make this project possible including: Wes Andrews, for the cultural & historic Wycamp Lake report; Kevin Cronk, Tipp of the Mitt Watershed Council, for completing the aquatic plant survey and report; Kira Davis, Jacqueline Pilette, Regina Gasco and Mike Holmes, LTBB ESD, for the water quality/wetland monitoring and report; Alan Proctor and Jim Keiser, LTBB GIS, for the GIS maps and the bathymetric map; Derek De Ruiter, airplane pilot, Northwoods Aviation; Dirk Shorter, Wycamp Lake private landowner for beaver control & good conversation; Lyn Johnson, Emmet County Controller, for meeting with the NRD and planning to work cooperatively in the future for the benefit of the lake; Marty Holtgren, LRB fish biologist, Brett Fessel, GTB biologist , and technician Hank Bailey for assistance on the Wycamp Lake fish assessments; Todd Kalish, MDNR fish biologist for verifying no existing MDNR fish data. Special thanks goes to the NRD staff for a lot of hard work to complete this project; Doug Craven, NRD Director, Archie Kiogima, wildlife biologist, Bill Parsons, Inland Fisheries biologist, Rick Damstra, Non-game Wildlife technician, Kevin Haynes, Fish & Wildlife technician, and Max Field, CMU graduate loon researcher.

LIST OF APPENDICES

1. **Appendix I: WES ANDREWS**
2. **Appendix II: TIP OF THE MITT REPORT**
3. **Appendix III: LTBB ENVIRONMENTAL WATER QUALITY REPORT**
4. **Appendix IV: LTBB NRD Biological Report**

APPENDIX A

Andrews, W. L. 2006. A report on the historical and cultural land use of Wycamp Lake and Wycamp Creek located within Cross Village, and Bliss Townships, Emmet County, Michigan. Andrews Cultural Resources, Fountain, Michigan.

APPENDIX B

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APPENDIX D

Cronk, K. L. 2007. Wycamp Lake aquatic plant survey 2006 survey report. Tip of the Mitt Watershed Council. Petoskey, Michigan.

APPENDIX E

LTBB NRD Wycamp Lake Tribal Wildlife Grant Pictures

APPENDICES (A-F)