Langford Lake

Gogebic County, T45N / R41W / Sec. 19, 20, 29, and 30
Ontonagon River Watershed, 2009

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Environment

Langford Lake is located approximately 20 miles west of the town of Watersmeet in Watersmeet Township, Gogebic County. The lake is 481 surface acres with 4.85 miles of shoreline. Most of the shoreline is in private ownership with seasonal use during the open water months. The United States Forest Service (USFS) maintains an access site and rustic campground with 11 units on the southwest shore providing public access to the lake. A single unnamed inlet from a low lying swamp area enters the lake on the southwest shore and a single outlet exits the lake from the northeast shore forming Langford Creek. The creek then flows approximately two miles before converging with the Cisco Branch of the Ontonagon River and flowing north, eventually emptying into Lake Superior.

Langford Lake has a maximum depth of 15 feet. Over the years, submerged vegetation has been described as abundant, floating and emergent vegetation as common-abundant, and woody debris (either submerged logs or deadheads) as uncommon. In addition to native vegetation, exotic Eurasian Watermilfoil (Myriophyllum spicatum) was identified in the lake in 2002. The lake's shoals are described as composed of mainly sand with some gravel. Spawning substrate includes sand, gravel, vegetation, rubble and a man made walleye spawning reef.

Chemical-physical parameters of Langford Lake include a total pH of 7.9 to 8.4 depending on depth and a secchi disk reading of 6.5 feet (8/27/2003). The most recent measures of total alkalinity ranged from 21 to 24 MG/L on the lake bottom and surface, respectively (8/27/1991). August temperature profiles indicate the lake remains homothermous during the peak summer months and dissolved oxygen levels are satisfactory at all depths to support fish.

History

Langford Lake has a long management history. Smallmouth bass (Micropterus dolomieu) and bluegill (Lepomis macrochirus) were first planted in 1939 and over the next 5 years varying numbers of bluegill, smallmouth bass, and largemouth bass (Micropterus salmoides) continued to be stocked.

The lake was first surveyed in 1956 and although largemouth and smallmouth bass were found to be sparse, the lake was rated a "quite dependable" for bass, bluegill, and walleye (Sander vitreus). Since there are no walleye stocking records for Langford Lake prior to 1990 it is assumed that their presence in the 1956 survey is that of a natural self sustaining population. In addition to bluegill and walleye, yellow perch (Perca flavescens), northern pike (Esox lucius), and pumpkinseed (Lepomis gibbosus) were also described as common or abundant. The 1956 survey also made mention of the USFS access and campground on the southwest shore.

In 1965, USFS rated Langford Lake as having one of the best sustained yield fisheries in the Ottawa National Forest. They did note problems with high numbers of white suckers (Catostomus commersonii), excessive and slow growing yellow perch and pumpkinseed sunfish, as well as prolific aquatic plant growth. A low abundance of Esocids and year class fluctuation in walleye recruitment was also noted. Walleye egg taking operations conducted in 1968 (Unknown Quantity), 1969 (36.8 pts.), 1971 (34.9 pts) and 1972 (8.2 pts) indicated the lake supported a substantial adult population.

Surveys in 1977 and 1978 continued to show a strong numbers of bluegill and pumpkinseed. Walleye was described as the primary predator with smallmouth bass and northern pike available in lower abundance. Brown bullheads (Ameiurus nebulosus) and white suckers were also described as common in these surveys while rock bass (Ambloplites rupestris) were present in low numbers. Several immature walleye were collected during the surveys indicating natural reproduction and juvenile survival was occurring.

Substantial biological changes occurred in Langford Lake in the 1980s. Most devastating of all was the discovery of black crappies (Pomoxis nigromaculatus) during a 1986 survey. Based on the age of the crappies collected in 1986 and a lack of them during previous surveys in the 60s and 70s, biologists hypothesized that black crappie were illegally introduced to the lake in the early 1980s. Between 1986 and a follow up survey in 1989, the black crappie population increased exponentially. During this same period, the abundance of bluegills, pumpkinseed, yellow perch, and suckers declined. Also, no walleye less than 16 inches was collected in either survey. Of the 29 walleye that were sampled, all were nine years of age and older suggesting recruitment over the previous eight years had failed.

Surveys performed in 1990 confirmed the trend established in the 86 and 89 surveys. In the spring, the USFS performed a fyke net survey that continued to show a small population of older walleye and large/increasing population of black crappie. It concludes that walleye reproduction is being inhibited by the crappie and recommends stocking walleye in order to improve the predator-prey balance in the lake. In the fall, the USFS followed up with an electrofishing survey which again confirmed a low number of old walleye and "very abundant" bluegill and crappie. The report further stated the walleye population no longer appeared to be self sustaining.

Public correspondence during the late 1980s and 1990s suggested concern for the lake's fishery and a desire to rehabilitate walleye. Confounding the issue further in the spring of 1990 the Lac Vieux Band of Lake Superior Chippewa Indians began spearing adult walleye from the lake and reported harvesting 90 fish. Filed correspondence revealed this action caused hard feelings with the lakes other users and riparian owners.

Based on changes documented in the 1980s and public desire to rehabilitate the lake, the State responded over the next 15 years with aggressive walleye management.

The first walleye stocking of 9,071 spring fingerlings took place in 1990.

In 1991, the State stocked 13,890 spring fingerlings and 1,100,000 walleye fry. In the fall, the State performed a fyke net survey to analyze the effectiveness of the 1990 and 1991 stockings. The survey did not produce any walleye less than 20 inches indicating that stocking efforts had failed. It also showed continued decreases in the mean length of black crappie, rock bass, and yellow perch.

Management recommendations included stocking walleye and tiger musky to control the sunfish, crappie, and bullhead populations. Unfortunately, the State's tiger musky program was discontinued before any fish were released.

In 1992, the State stocked 26,450 spring fingerling walleye. A manual removal of bluegill, pumpkinseed, rock bass, black crappie and bullhead was performed. In all, 2,590.2 lbs of fish (5.4 pounds / acre) were removed. Management recommendations called for at least one additional pan fish removal and continued walleye stocking.

In 1993, the State stocked 21,100 spring fingerling walleye. A second manual removal occurred collecting 979.25 total pounds of bluegill, pumpkinseed, rock bass, and black crappie (2.05 pounds / acre).

In 1994, the State stocked 10,366 spring fingerling walleye. One last manual removal was performed targeting bluegill and pumpkinseed under 6" and all bullhead and white suckers. The specifics on how much was removed are not clear.

In 1995, the State stocked 25,023 spring fingerling walleye. Spring and fall surveys were performed. The spring fyke net effort looked at the response of the fishery to manual fish removals performed during the previous three years and walleye stocking over the last five. The fall boom shocking survey assessed year class strength of age-0 and age-1 walleye. Both surveys showed a few old walleye (the youngest was aged to 13 years), but no young fish indicating a lack of natural reproduction and failure of all stocking efforts during the previous 6 years. Furthermore, the lake's panfish and black crappie populations continued to grow at rates considerably less than the state average despite manual removals to reduce their numbers. The spring survey did suggest the northern pike population was very robust and doing well with over 200 individuals collected ranging in size from 17 to 32 inches. The spring survey was the first to suggest the new combination of fish in Langford Lake was going to prevent reestablishment of a viable walleye population.

In 1995 and 1996, the Lac Vieux Band of Chippewa's instituted a two year moratorium on tribal walleye spearing from Langford Lake.

A fall boom shock survey was performed in 1996 to again assess the year class strength of age-0 and age-1 walleye. A total of 10 walleye were collected with three age-1 fish. The survey noted few "ideal" spawning grounds. Northern pike were the most abundant gamefish and largemouth bass were plentiful ranging up to 20 inches.

No walleye were stocked from 1996-1999 and no additional surveys performed. Tribal walleye spearing resumed in 1997 and 1998 when 38 and 23 fish were taken, respectively. No spearing took place in 1999.

In 2000, stocking resumed with 9,500 spring fingerling walleye. The USFS performed a fyke net survey which again showed few adult walleye and none less than 19 inches. Bluegill was the most common fish collected, but none were larger than 7 inches. Black crappie continued to be present but in lower concentrations than previous surveys. The lake was described to provide "good fishing

opportunities for bluegill and pumpkinseed" but the predator abundance appears to be "very low". Biennial stocking of walleye (50/acre) was recommended. No walleye were speared in 2000

No walleye were stocked and no tribal spearing occurred in 2001 or 2002.

In 2002, the USFS installed a 100 foot long rock-reef walleye spawning structure. This type of installation had been shown beneficial to walleye reproduction in other waters within the Ottawa National Forest. A Forest Service boom shocking survey was performed to look for walleye of any age to base the reef's future influence on the population. No walleyes were collected during this effort.

In 2003, the state stocked 19,946 spring fingerling walleye. No tribal walleye spearing reported.

No walleye were stocked in 2004. A status and trends survey was performed and utilized boom shocking, gill nets, fyke nets, and seine nets. Results of this effort showed panfish continue to be abundant but most of the fish sampled were less than 6 inches. Black crappie abundance had increased slightly from the 2000 survey with 97% of the fish collected greater than 7 inches. Only four walleye were collected and none were smaller than 20 inches indicating stockings in 2000 and 2003 had failed. Northern pike ranging to 29 inches were collected in fishable numbers as were smallmouth and largemouth bass. All fish, regardless of species, were growing at varying degrees below state average. Bass had the lowest growth rates in the lake (growth index = -3.7 to -3.2) while northern pike had the highest (growth index = -0.4). The survey also mentioned the abundance of bullheads and suckers had increased since the year 2000 triggering biologists to report that these species "have reached nuisance levels" and recommend no further stocking until manual removals targeting all panfish less than 6 inches could occur. After the manual removal, stocking fall fingerling walleye could be considered.

No walleye were stocked from 2005-2006. No walleye were speared in 2005 but the Lac View Band of Chippewa's reported taking 5 fish in 2006.

No walleye were stocked in 2007. The USFS performed a fish survey showing similar results to the 2004 survey. The tribe reported spearing 5 walleye.

No walleye were stocked in 2008. The tribe reported spearing 9 walleye.

The invasive aquatic plant Eurasian watermilfoil was first discovered in July 2002. Over the following eight years, the lake was repeatedly treated with several herbicides in an attempt to control the invasive plant. Beginning in 2007, the treatment was performed as part of an ongoing study by the U.S. Army Corp. of Engineers that continued through the completion of this report. The following is a list of those annual treatments.

Year	Target	Acres Treated	Herbicide	Rate (lbs / acre)
2003	E. Watermilfoil	4.513	Glyphosate	100
2004	E. Watermilfoil	5.8	2,4-D	100
2005	E. Watermilfoil	9.18	2,4-D	100
2006	E. Watermilfoil	16.5	2,4-D	100
2007	E. Watermilfoil	111.0	2,4-D	150 to 200
2008	E. Watermilfoil	111.0	2,4-D	150 to 200

2009	E. Watermilfoil	38.0	2,4-D	150 to 200
2010	E. Watermilfoil	40.6	2,4-D & Triclopyr	150 to 200

Fish samples were collected for mercury analysis by the Michigan Department of Public Health (MDPH) in 1986. Eight of nine walleye, one of two pike, and one of ten bluegill tested above the MDPH action level of 0.5 ppm. The average mercury concentration for walleye was 0.94 ppm and ranged from 0.2 -1.7 ppm with four fish exceeding 1.0 ppm of mercury. Follow up testing in 1994 resulted in five of five walleye and two of three northern pike above 0.5 ppm. The five walleye tested in 1994 ranged from 1.1 to 1.53 ppm and averaged 1.3 ppm. These results account for Langford Lake being listed under a mercury advisory in the 2009 Michigan Family Fish Consumption Guide. It recommends that all segments of the public (men, women, and children) do not eat walleye greater than 22 inches from Langford Lake. No consumption limits are recommended for walleye less than 22 inches or for any other fish species in the lake.

Current Status

Langford Lake was surveyed with fyke nets by the USFS 6/1-6/4/2009. Total survey effort was 32 net-nights (11 sites throughout the lake with three over night single net sets at each site except site #1 which had a net deployed on nights one and three only). The survey identified 11 species of fish and 5 painted turtle observations. A total of 960 fish were handled weighing 488.8 pounds.

Two predator species were collected; northern pike and smallmouth bass. Together they represented 14.2% of the total survey biomass with pike contributing 12.9% and bass 1.3%. Of the 18 pike collected, 11 (61%) were of legal size (?24 in) and ranged from 20 to 28 inches. Of the eight bass collected, none were of legal size (?14 in) and ranged from 9 to 13 inches. Curiously, no largemouth bass were reported during the survey. Previous surveys had shown them to be present in relatively good numbers. One cannot assume they were extirpated from the lake after a single survey but their numbers must be significantly lower than previously documented. No walleye of any size were collected.

Panfish contributed 27.2% of the total survey biomass. Black crappie was the dominant species accounting for 15.9% of the total biomass. They ranged from 6 to 13 inches with 93% considered a desirable angling size (?7 in). Pumpkinseed sunfish was the second most abundant panfish with 5.5% of the total biomass. They ranged from 4 to 8 inches with 50% considered a desirable angling size (?6 in). Bluegill was the third most abundant panfish totaling 4.0% of the total biomass. They ranged from 3 to 7 inches with only 29% considered a desirable angling size (?6 in). Rock bass was the fourth most abundant panfish totaling 1.7% of the total biomass. They ranged from 7-12 inches with 100% considered a desirable angling size (?6 in). Finally, yellow perch rounded out the panfish contributing a mere 0.1% of the total biomass collected. They ranged from 3 to 6 inches in length and none were considered a desirable angling size (?7 in).

Other fish including: black bullhead (Ameiurus melas), brown bullhead, white sucker, and golden shiner (Notemigonus crysoleucas) contributed the remaining 58.6% of the total survey biomass. White suckers were the most abundant species surveyed, accounting for 43.3% of the total biomass and

ranged from 6 to 19 inches. Black and brown bullheads combined for 15% of the biomass and ranged from 6 to 13 inches. Finally, golden shiners were 0.3% of the biomass and ranged from 3 to 6 inches.

The tribe did not report spearing any walleye in 2009.

2009 Survey Results

Species	No.	% by Number	Weight (lb.)	% Biomass	Length Range (in.)	% Legal Size*
Black Crappie	147	15.3	77.6	15.9	6-13	93
Black Bullhead	36	3.7	23.3	4.8	6-13	97
Bluegill	255	26.6	19.7	4.0	3-7	29
Brown Bullhead	161	16.8	49.9	10.2	6-11	65
Golden Shiner	25	2.6	1.5	0.3	3-6	100
Northern Pike	18	1.9	62.9	12.9	20-28	61
Pumpkinseed	173	18	26.9	5.5	4-8	50
Rock Bass	18	1.9	8.5	1.7	7-12	100
Smallmouth Bass	8	0.8	6.1	1.3	9-13	0
White Sucker	110	11.5	211.9	43.3	6-19	92
Yellow Perch	9	0.9	0.5	0.1	3-6	0
Totals	960	100	488.8	100		

*Percent legal or acceptable size for angling.

Analysis and Discussion

Once considered a successful and popular self sustaining walleye fishery, Langford Lake has undergone unfortunate changes in the last 30 years, the most devastating of which was the illegal introduction of black crappie in the 1980s. That introduction produced a classic example of what can occur when an exotic species is introduced into a foreign ecosystem and while the black crappie is native to Michigan, it was not native to Langford Lake. Once established, introduced crappie preyed heavily upon the juvenile walleye to the point where evidence of successful natural reproduction ceased in the mid 1980s. In the years following introduction, remaining adult walleye either died out or were fished out of the lake (zero walleye were surveyed in 2009). In response to the walleye collapse, the DNRE Fisheries Division and USFS from 1990 through 2004 intensively tried to reestablish a fishable walleye population. However after stocking 135,346 spring fingerlings and 1,100,000 walleye fry, performing three separate manual fish removals targeting black crappie, bluegill, bullhead and suckers, and installing rock-reef spawning habitat, the managing agencies were unable to produce any measurable effect on the lake's walleye population. Therefore, after 20 years of futile efforts, the DNRE can make no other conclusion but that Langford Lake is simply no longer suitable to support a meaningful level of juvenile walleye survival. As long as black crappies remain, any management attempts to reestablish or support a recreational walleye fishery will fail. Therefore, continued walleye stocking in pursuit of a recreational walleye fishery by the DNRE is not considered a prudent investment of state time or resources.

Northern pike appear to be reproducing and the 2004 status and trends survey showed them to be growing just under the state average. An abundance of white sucker provides an ample food source

and the potential to grow very large pike. Fishing pressure, which has been described as steady during the open water season and low during the ice fishery, is most likely preventing pike from reaching full potential.

Black crappies are in Langford Lake to stay and no available level of management will meaningfully affect population size or structure. Manual removal efforts have shown to be costly, labor intensive, and ultimately ineffective as a population control. Based on the 2009 survey, the black crappie population provides an acceptable fishery with 93% of the fish surveyed at acceptable angling size however, they have the potential to over populate the lake and stunted growth could prove problematic.

The bluegill and pumpkinseed populations have a disproportionately large number of small individuals. Smallmouth and largemouth bass prey on panfish but in their current numbers there is not enough of them in the lake to effectively keep bluegill and pumpkinseed populations in check. Without management action, stunting will continue to be a problem.

Golden shiners were probably introduced to the lake by a dumped bait bucket. Currently their numbers appear to be low but they have the potential to provide a good food source for juvenile northern pike.

Brown and black bullhead catfish are currently present in high enough numbers to compete with more desirable panfish for food. This is a problem because panfish are growing well below the state average indicating over abundance and lack of food. Therefore competition that further diminishes food resources for panfish should be considered undesirable.

The lake has been treated annually with herbicide for Eurasian watermilfoil from 2003-2010. Future control efforts by either the Langford Lake Association or Federal Government should be expected.

Management Direction

The Langford Lake management direction from 1990-2010 has been shown to be ineffective. Multiple attempts to reestablish a recreational walleye fishery have proven time-and-again to be fruitless in the face of the species assemblage currently established in Langford Lake. A completely new management direction is recommended using one or a combination of the suggestions below.

Proposed Management (to be used alone or in combination)

1) Maximize Northern Pike Fishery - Langford Lake has the potential to produce very large pike. An abundance of soft ray fishes (43.6% of the 2009 survey biomass was composed of suckers and shiners) can provide an incredible food source and the basis for explosive growth. Already, with no focused pike management, 61% of the fish in the lake are longer then 24 inches, however none were found over 28 inches even though surveys in the last 20 years have documented fish to 32 inches. Based on high sucker populations in the lake, pike over 28 inches are either lacking or scarce due to angling harvest and not for lack of food. Therefore, the recommendation is to add Langford Lake to DNRE Fisheries Order 220 and place a protective 30 inch minimum size limit on northern pike. The season would remain open year round and have no gear restrictions. The higher size limit should provide two functions; protect adult females for a longer period from harvest and increase the size

structure of the population. Larger pike would in turn be better equipped to control white suckers. Finally, northern pike in Michigan can grow to 39 pounds and the protection of fish to 30 inches has the potential to provide an attractive year round sport fishery for large fish.

2) Introduce/Stock a Predator to Specifically Control Panfish - An additional predator that is specifically adapt at preying on panfish (bluegill, pumpkinseed, and crappie) and bullheads, would be a welcome addition to the lake to help control the stunted populations. The following options are offered for consideration and can be reviewed for application individually or in combination:

a. Flathead Catfish (Pylodictis olivaris) - Relocate adult flathead catfish from established populations elsewhere in Michigan. While young flathead feed on worms, insects, and crayfish, once reaching 10 inches their diet consists entirely of fish. In Langford Lake, they would likely take advantage of the over abundance of bullheads and stunted bluegill. In other lakes where they have been transferred, they had an immediate effect on controlling the bullhead populations and long term success preying on panfish. While the introduction of yet another non-native species to the lake may seem counterproductive, the State recognizes it is no longer managing a natural system, but instead reacting to a species assemblage that is already driven by black crappie and affected by Eurasian Water Milfoil and golden shiner. Furthermore it is questionable whether flathead catfish would successfully establish a long term population in the Langford Lake. The lake is at the very extreme northern end of their range and may not annually reach the 75° F required for spawning every year. However there is no reason to believe that transferred individuals would not thrive and produce a longer lasting effect than manual removal efforts tried in the past. The main draw back to this approach is finding fish for stocking. They are notoriously difficult to culture, so fish will most likely have to be collected from the wild and relocated. With the size of Langford Lake, it may be difficult to near impossible to collect enough adult fish (>16 inches) to have the desired impact. Flathead catfish in Michigan can grow to 47 pounds and provide popular sport fisheries where they occur in the Lower Peninsula. However, any fishery created must be strictly a catch and release opportunity. Successfully increasing pan fish size through predation will require a complete and permanent moratorium on catfish harvest. For more information see O'Neal 1988.

b. Channel Catfish (Ictalurus nebulosus) - Relocate adult channel catfish from established populations elsewhere in Michigan. Channel catfish are omnivorous scavengers eating everything encountered including: insects, worms, crayfish, snails, fish, and carrion, alive and dead. At large sizes, they eat predominantly fish. As with flathead, channel catfish would be a new species introduction. The lake is at the northern end of their range and may not annually reach the 75° F required for spawning every year preventing permanent establishment. However there is no reason to believe transferred individuals would not thrive. Their effect on bullheads and stunted panfish has not been well studied, but these species are associated with channel catfish diet. On the positive side, unlike flatheads, adult channel catfish (>20 inches) are readily available in Michigan and could be relocated in high numbers. Channel catfish in Michigan can grow to 40 pounds and are viewed throughout the Lower Peninsula as a popular game fish. Any fishery created in Langford Lake must be strictly a catch and release opportunity. Successfully increasing panfish size through predation will require a complete and permanent moratorium on catfish harvest. For more information see O'Neal 1988.

c. Adult Walleye - The previous 20 years have clearly shown the problem with Langford Lake walleye is no juvenile survival. In the absence of adult walleye the size structure of panfish populations has decreased to the point of being unacceptable to the angling community. Adult walleye could be relocated from other sources in Michigan to Langford Lake in an attempt to increase the

panfish size structure through predation. Adult walleye are readily available in Michigan from both inland and Great Lake sources. Relocated walleye would also already be of a large enough size to immediately begin preying on stunted panfish populations. The only way this might work is if relocated adult walleye are not harvested out of the system either through sport angling or tribal spearing. These fish would be relocated to control panfish populations and NOT to create a walleye fishery. Reproduction is not expected and even with the fishing closure, continued relocation of adult fish would be required every 7-10 years. Langford Lake will not have a sustainable walleye fishery again, but it may have an acceptable panfish fishery. Successfully increasing panfish size through predation will require a complete and permanent moratorium on walleye harvest.

d. Fall Fingerling Walleye - As an alternative to stocking adult walleye, fall fingerlings could be stocked in an attempt to increase the panfish size structure through predation. Stocking fall fingerlings might succeed were spring stocking failed because fall fish are released at 6-7 inches instead of 2-3 inches and they are most likely beyond the size preyed upon by black crappie. The main draw back to fall fingerling is that they are extremely expensive to raise ($1.23/fish compared with $0.044/fish for spring fingerlings) and several years of initial stocking would be required. Furthermore, predation of panfish by stocked fall fingerling walleye would require additional years of predator growth compared with the adult walleye stocking option provided above. The only way this might work is if stocked walleye were not harvested out of the system when they reached adult size either by sport angling of tribal spearing. These walleye would be planted to control panfish populations and NOT to create a walleye fishery. Successful reproduction should not be expected and even with the fishing closure continued stocking of fall fingerlings would be required every 7-10 years. Successfully increasing panfish size through predation will require a complete and permanent moratorium on walleye harvest.

NOTE: Options A, B, and C above involve the transfer of adult fish from other established populations in Michigan and would require a clean fish health certification for Viral Hemorrhagic Septicemia and other known pathogens prior to fish being relocated. Certification could be accomplished by either testing a set number of specimens within the species from the source population being relocated (channel catfish and walleye) or testing various cohorts of the other species present in the water body with the source population (flathead catfish). This second testing option is preferable when considering the relocation of flathead catfish since the size of the source population would likely limit the number of catfish available to meet testing protocol.

3) Introduce Watermilfoil Weevil (Euhrychiopsis lecontei): This native self-sustaining herbivorous weevil is considered a potential biocontrol for Eurasian watermilfoil. Adult weevils prefer Eurasian watermilfoil over native aquatic plant species feeding on the leaves and stems resulting in a loss of buoyancy, stem weakening, and removal of leaves. Introduction to the lake might mitigate the rate of application or even the need to continue herbicide treatments.

Goals

1) Increase the number and size structure of northern pike by protecting fish to 30 inches from harvest. Take advantage of the abundant white sucker population in order to maximize the growth potential of northern pike and provide an attractive year round sport fishery for large fish.
2) Increase the average size of bluegill, pumpkinseed, and black crappie while at the same time reducing the prevalence of bullhead through the introduction of flathead catfish, channel catfish, adult walleye or fall fingerling walleye.

3) Lower the prevalence of Eurasian watermilfoil with a native weevil biocontrol, Euhrychiopsis lecontei.

References

O'Neal, R. P. 1988. Report on potential for management of inland waters in Michigan with channel catfish and flathead catfish. (White Paper).

NOTE: This report is a follow up narrative to the 1990 Status of the Fishery Resource Report for Langford Lake that was prepared by then fisheries biologist William Deephouse. The specifics regarding the physical characteristics and management history regarding this lake prior to 1990 were well documented in that report. As such, much of that physical and historical background of the lake was incorporated in this report. The objective of this document is to quantify the post-1990 management and current status of the fishery.