

## **Grass Lake**

Montmorency County, T32N, R3E, various sections  
Thunder Bay River watershed, last surveyed 2012

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### **Environment**

Grass Lake is a 382-acre flooding located approximately 10 miles northwest of the town of Hillman, Michigan in northeastern Montmorency County. There are multiple small inlets to this flooding and one outlet known as Grass Creek. Grass Creek flows to Long Lake outlet which is part of the North Branch Thunder Bay River watershed. A small levee and control structure exists on the east end of the flooding. This dam was established by a private source in 1937, thus creating Grass Lake flooding. Today it is owned by the Grass Lake Association. The flooding has a storage capacity of 1,495 acre-feet (Cwalinski et al. 2006) and an established legal lake level of 837.8 feet. There are nine feet of head at the dam, which has been repaired on various occasions through the decades. The Montmorency County Drain Commission oversees maintenance of lake levels.

Grass Lake is a shallow water body with large amounts of aquatic vegetation. The greatest depth is 10 feet along the island in the north-central region of the lake. This depth was recently recorded and slightly contradicts the deepest point documented in early lake maps (Figure 1). The majority of Grass Lake is less than 4 feet deep with a muck bottom, although some sand and limited gravel is present. Emergent vegetation in the form of cattails and sedge hummocks are common. Shoreline development is minimal as more than half of the shoreline is owned by the State of Michigan state forest system. The lake-shoreline interface is predominantly wetland. Timber beyond this point consists mainly of oak, aspen, and various conifer species.

A public-access boat launch is located on the south shore of Grass Lake. The concrete-surface ramp is maintained by the Michigan Department of Natural Resources (MDNR) Parks and Recreation Division. This access site has parking for approximately eight vehicles with boat trailers.

### **History**

Historical fish community and angler use data is limited at Grass Lake. Fishing pressure fluctuated through time as a result of fish winterkills and angler harvest, although fish mortality from winterkills was usually incomplete and often species-specific. A fish community survey following a partial fish winterkill was completed in 1961 by the Michigan Department of Conservation. Panfish and northern pike were common while largemouth bass and minnow species were nearly absent. Fishing pressure was reported as low at Grass Lake in the early 1960s, but increased steadily through the rest of the decade as a result of rebounding fish populations. Northern pike were regulated with standard fishing regulations through 1972 (20-inch minimum size limit with a daily bag limit of 5 fish). The northern pike minimum size limit was removed in 1973 because the dense population was believed to be slow growing. By 1985 the standard pike regulation was again applied to Grass Lake, only to be changed again to no minimum size limit by 1990. Northern pike were regulated with this liberal regulation until 1995 when the statewide minimum size limit was reinstated and increased to 24 inches (Cwalinski et al. 2006). Thus, regulations for northern pike in Grass Lake were very inconsistent over time. Today,

Grass Lake northern pike are managed with the standard 24-inch minimum size limit and daily bag limit of 2 fish.

Cwalinski et al. (2006) recommended gathering updated information on the Grass Lake fish community with particular emphasis on northern pike size structure. Since recent angler reports have suggested the presence of a large sub-legal northern pike population in Grass Lake, it was the author's intention to document the current status of the fish community and determine if a 24-inch minimum size limit on pike is still effective.

### **Current Status**

The most recent fish community survey in Grass Lake was conducted by the MDNR Fisheries Division from May 21-30, 2012. Sampling effort consisted of 5 large-mesh trap net lifts, 8 large-mesh fyke net lifts, 4 small mesh fyke net lifts, 4 experimental gill net lifts, 4 shoreline seine hauls, and 30 minutes of direct-current nighttime electrofishing. In addition, water quality parameters were collected on August 31, 2012. Results of these indicated low levels of total phosphorus, nitrogen, and chlorophyll-a.

Notes from the survey indicated that many native clams are present in the lake. In addition, both bald eagles and osprey were observed over the lake and in nests, while common loons were abundant. Fishing pressure was high during the survey since panfish were spawning and highly vulnerable to anglers. There were 2-6 boat trailers at the launch site each day of the survey.

Thirteen species of fish totaling 1,378 in number and 646 pounds in weight were collected during the entire netting survey with all gear types (Table 1). Total catch was 1,378 fish weighing 646 pounds. Large predator fish including largemouth bass, smallmouth bass, and northern pike made up 11% of the total catch by number and 35% by weight. Non-game species such as bullheads made up only 4% of the total catch by number and 6% by weight. The panfish community of Grass Lake is dominated by bluegill and pumpkinseed sunfish, followed by black crappie, rock bass, and yellow perch. Panfish comprised 85% of the total catch by number and 59% by weight. Black spot parasites were common on most fish caught during the survey.

Bluegill ranging in size from 1-9 inches were the most commonly collected fish in the survey (Table 2). I used an index to assess the quality of the bluegill population in Grass Lake (Schneider 1990). Based on this rating (Table 3), the population in Grass Lake is in excellent shape. Many quality-size fish are available to anglers (Table 3), and angler reports have indicated the presence of bluegill up to 11 inches in length. A high percentage of 6-inch and larger fish comprise the total bluegill population based on the catch in trap nets. Bluegill growth in Grass Lake is near or slightly below the statewide average for this species. I found bluegill up to age 11 in the survey (Table 4), although some year classes appeared to be missing. Good numbers of age 6 bluegill were found, and high proportions of age 9-11 fish were also caught (Table 4).

Pumpkinseeds, another member of the sunfish family, are also abundant in Grass Lake. This species, which is often targeted simultaneously with bluegill by anglers, was the second-most common fish by number in the survey catch. Like bluegill, they were found up to 9 inches in length and were abundant in the 7 and 8 inch range (Table 2). Also like bluegill, their growth is near state average at approximately 1 inch per year. Thus, an 8-inch pumpkinseed would be roughly 8 years old.

Black crappie, rock bass, and yellow perch were other common panfish encountered in the survey (Table 1). High numbers of large-size black crappie ranging from 10-13 inches in length were collected (Table 2). Despite this, there was a lack of smaller, younger crappie as age 7-10 fish were most abundant. Growth for this species was near or slightly below statewide average (Table 4). Rock bass from 2-8 inches in length were relatively common and were represented by nine year classes (Table 4). Like the other panfish species present, rock bass growth was near the statewide average. Yellow perch were also surveyed, although most were less than 4 inches long. This species is present, but is likely not a significant part of the total angler harvest.

Large predator fish in Grass Lake include largemouth bass and northern pike. Largemouth bass were abundant and distributed across many sizes and ages (tables 2 and 4). A strong young crop of largemouth bass helps to ensure proper balance of the fish community through predation on the abundant panfish, and will also provide anglers a quality fishery for large fish in the future. Largemouth bass up to age 12 were collected, and at this age, average 20 inches in length. Bass grow slightly below (-0.6 inches) the statewide average, although this is in a normal range of variation for this species. The bass collected during the survey appeared very healthy, and large fish were robust. Surprisingly, one 17-inch smallmouth bass was collected during the survey. Grass Lake does not have typical smallmouth bass habitat (sand, rock, cooler water summer refuge) and it is not known how this fish entered the lake. It could not have come upstream from the outlet due to the overflow nature and head associated with this structure.

Twenty northern pike (1% of the total catch by number and 9% of the total catch by weight) were collected in the survey. I hypothesized that pike would be more abundant prior to the survey and that growth would be slow. This was not the case. Although common in the catch, northern pike were not highly abundant (Table 1). More than half of the pike collected were longer than the statewide minimum size limit of 24 inches (Table 2). The growth rate for pike based on our sample was slightly above statewide average, especially for young pike. Pike growth was slower for older fish. Like largemouth bass, this predator is also important to keep the abundant panfish population thinned out through predation.

I also hypothesized that bullhead species and white suckers would be abundant in our survey catches. This was also not the case. Typically, bullheads are abundant at shallow organic bottom lakes, but the numbers did not reflect this in Grass Lake. Bullheads were common but their numbers were rather low. White suckers were not collected in Grass Lake during the 2012 survey.

Golden shiners, a minnow species that provides quality forage, were represented in the 2012 survey. This species may inhabit Grass Lake naturally or have been introduced from anglers as bait.

### **Analysis and Discussion**

The current fish community and environment of Grass Lake can be generally characterized as having the following characteristics: 1) a high-quality, naturally-reproducing panfish community dominated by bluegill and pumpkinseed sunfish, 2) a panfish community which typically displays average growth across species, 3) a healthy, naturally-reproducing predator population consisting of average-growing largemouth bass and northern pike, 4) a non-game fish community low in species diversity and abundance, and 5) a shallow lake with a healthy natural shoreline exhibiting little development.

The Grass Lake panfish community is high-quality with good species diversity. Species available to anglers include bluegill, pumpkinseed, black crappie, rock bass, and yellow perch. Growth of sunfish is average and these species are highly abundant. Fishing pressure appears high at Grass Lake, but the abundance of year classes and good spawning habitat will enable such harvest to be sustained over time. Black crappie appear abundant at times, probably based on high water events coupled with good spawning success. This fish adds to the diversity of catches as do rock bass. Yellow perch are present but typically small in size.

The main predators of Grass Lake are largemouth bass and northern pike. Largemouth bass of a variety of sizes and ages can be found and are vital in helping balance the panfish community through predation. Based on survey results, this species should afford anglers a quality fishery. Northern pike densities are not high in Grass Lake, but they are present and can be caught by anglers, probably mostly in the spring and winter fisheries which are known popular fishing periods. Pike thrive in waters with plenty of forage and aquatic vegetation. Both of these factors are available in Grass Lake and benefit the pike population. However, pike are known to seek coolwater refuge areas in the heat of the summer months. This habitat is severely limited in Grass Lake as no thermocline is present due to the shallow waters. Thus, it is assumed that pike growth is reduced in the hot July and August months at Grass Lake since this would be a stressful period for this species. Despite this, I found a northern pike population that appears to have found an equilibrium in Grass Lake between growth and density.

The non-game fish community of Grass Lake is made up mostly of bullheads and golden shiners. Neither species appears overly abundant, thus competition for food resources from these species is not excessive.

### **Management Direction**

- 1) The Grass Lake aquatic community should be monitored on a consistent basis. Many of the game fish play a vital role not only in the fishery, but also for overall ecosystem balance. A complete fish community survey documenting changes should be accomplished no later than 2030.
- 2) Northern pike regulations have changed many times at Grass Lake over the last few decades, and have teetered between having an established minimum size limit or no minimum size limit at all. The morphological characteristics of this lake would suggest poor growth of pike and high production, yet the survey data showed that pike densities were moderate and growth was good. I do believe that pike exploitation may be higher at Grass Lake, possibly in the winter when deep water is limited and fishing pressure is concentrated. Despite this, the population appears to be sustaining itself and doing well. Public support for the current regulation also exists. Therefore I recommend no change to the current pike regulations at Grass Lake.
- 3) Anglers are urged to report catches of all species to the local MDNR biologist. Sampling gear is not always efficient at capturing some fish, sometimes leaving information gaps for individual species. Such reports are useful for current management of the fishery and for future management as well. The current standard northern pike fishing regulations (24 inch minimum size limit with a daily bag limit of 2 fish) are appropriate for Grass Lake.

### **References**

Cwalinski, T.A., N.A. Godby, Jr., and A.J. Nuhfer. 2006. Thunder Bay River Assessment. Michigan Department of Natural Resources, Fisheries Special Report 37, Ann Arbor.

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Division, Technical Report 90-10, Ann Arbor, Michigan.



Table 1.-Species catch and relative abundance of fishes collected during the Grass Lake fish community survey, May 21-30, 2012. Weight is estimated.

Species	Number	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)
Bluegill	645	47	163.05	25	1 - 9
Pumpkinseed	367	27	156.42	24	1 - 9
Largemouth bass	127	9	160.07	24	2 - 21
Black crappie	68	5	52.61	8	2 - 13
Rock bass	53	4	8.56	1	2 - 8
Brown bullhead	49	4	39.5	6	5 -15
Yellow perch	32	2	0.81	<1	2 - 8
Northern pike	20	1	60.96	9	17 - 28
Golden shiner	13	<1	0.08	<1	2 - 3
Black bullhead	1	<1	0.9	<1	12
Iowa darter	1	<1	0.01	<1	1
Smallmouth bass	1	<1	2.77	<1	17
Yellow bullhead	1	<1	0.71	<1	11
<b>TOTAL</b>	<b>1,378</b>		<b>646.45</b>		

Table 2.-Length-frequency distribution of important game fishes collected during the 2012 netting survey at Grass Lake.

<b>Length (in)</b>	<b>Bluegill</b>	<b>Pumpk. sunfish</b>	<b>Rock bass</b>	<b>Black crappie</b>	<b>Largemouth bass</b>	<b>Yellow perch</b>	<b>Northern pike</b>
1	63	3					
2	59	9	3	10	1	15	
3	72	16	11			12	
4	3	6	2		1	1	
5	1	3	15		3	2	
6	58	29	7	1	1	1	
7	181	99	14		10		
8	190	178	1		11	1	
9	18	24			2		
10				5	5		
11				40	9		
12				10	24		
13				2	34		
14					5		
15					5		
16					5		
17							1
18					2		
19					4		1
20					4		1
21					1		
22							4
23							2
24							5
25							3
26							2
27							
28							1
29							
30							



Table 3.- Grass Lake bluegill size structure rating of 161 fish captured in five large-mesh trap net lifts completed during May 2012. Size structure is rated using scores from the Schneider Index (Schneider 1990). Index scores are as follows: 1=very poor, 2=poor, 3=acceptable, 4=satisfactory, 5=good, 6=excellent, and 7=superior.

<b><u>Measurement</u></b>	<b><u>Index Score</u></b>	<b><u>Value</u></b>
Average Length	6	7.2"
% 6 inches or larger	7	99%
% 7 inches or larger	7	84%
% 8 inches or larger	7	40%
Average Score	6.75	Excellent/Superior

Table 4.-Mean length (inches) at age for various game fishes of Grass Lake for May 2012. Number in parentheses represents number aged. Growth comparison in last column was across all ages.

Species	Age group	2012 May	2012 growth compared to state average across all ages
Bluegill	I	2.0 (5)	-0.4
	II	3.1 (16)	
	III	4.0 (5)	
	IV	-	
	V	-	
	VI	7.2 (16)	
	VII	7.6 (3)	
	VIII	8.1 (2)	
	IX	8.4 (6)	
	X	8.6 (7)	
	XI	9.2 (6)	
Pumpkinseed sunfish	I	1.7 (1)	+0.3
	II	3.2 (11)	
	III	3.5 (6)	
	IV	5.8 (8)	
	V	7.0 (6)	
	VI	7.7 (12)	
	VII	8.1 (9)	
	VIII	8.7 (8)	
	IX	8.8 (4)	
	X	-	
	XI	9.0 (1)	
Black crappie	I	2.5 (10)	-0.4
	II	6.8 (1)	
	III	-	
	IV	-	
	V	-	
	VI	11.1 (3)	
	VII	11.0 (5)	
	VIII	11.7 (8)	
	IX	11.9 (6)	
	X	12.5 (4)	
	XI	13.2 (1)	

Table 4-continued.

Species	Age group	2012 May	2012 growth compared to state average across all ages
Rock bass	I	2.2 (2)	+0.3
	II	3.6 (9)	
	III	5.7 (15)	
	IV	6.7 (10)	
	V	7.2 (4)	
	VI	7.5 (4)	
	VII	8.1 (1)	
	VIII	7.8 (2)	
	IX	8.7 (1)	
Largemouth bass	I	5.6 (4)	-0.6
	II	7.8 (22)	
	III	10.8 (4)	
	IV	11.7 (15)	
	V	12.7 (20)	
	VI	13.5 (9)	
	VII	14.6 (6)	
	VIII	15.9 (4)	
	IX	17.5 (5)	
	X	18.7 (4)	
	XI	19.7 (1)	
	XII	20.4 (3)	
Northern pike	I	-	+0.5
	II	-	
	III	21.1 (6)	
	IV	24.1 (6)	
	V	24.8 (3)	
	VI	24.9 (4)	
	VII	26.8 (1)	