Rush Lake

Montmorency County, T32N, R03E
Thunder Bay River watershed, last surveyed 2015

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Environment

Rush Lake is a 224-acre natural lake located approximately 8 miles northeast of the town of Atlanta, Michigan in northeastern Montmorency County (Figure 1). There are multiple small inlets to this lake and one outlet known as the North Branch Thunder Bay River. This outlet flows to the Thunder Bay River which flows into Lake Huron at the town of Alpena. A control structure exists approximately 1.5 miles north of the natural lake and dams an additional 131 acres known as the Rush Lake Flooding (Figure 2). Thus, the control structure created the flooding and extra lake acreage within the natural lake basin. Rush Lake and its associated flooding total 355 acres. The dam was originally constructed in the 1800s for the purpose of log storage and logging drives during the lumber era. Today it is owned and maintained by Montmorency County and has a legal lake level established through a court order in 1955. The Montmorency County Drain Commissioner is responsible for lake level management at Rush Lake. The natural lake and flooding has a total storage capacity of 2,250 acre-feet (Cwalinski et al. 2006) and an established legal lake level of 863 feet above sea level. There is eight feet of head at the dam.

Rush Lake is relatively shallow in its managed (natural) lake basin with the deepest point around 30 feet (Figure 3). Over half of the lake is less than five feet deep and characterized with sand and marl substrate. These characteristics are due to the extra flooded acreage in the managed lake basin. Shoreline ownership is a combination of private residences and state owned forest land. Most of the flooding is located on state owned land. As of 2015, there were 71 dwellings on the lake, 1 large dock, and 51 small docks. Submersed trees were present in some areas of the littoral zone, and much of the shoreline was armored. Water clarity is clear to slightly tannic, with secchi disk readings of 10 feet (2015 measurement) and an alkalinity value of 134ppm. Rush Lake thermally stratifies each summer and dissolved oxygen levels are limited below the thermocline. Submergent and emergent vegetation is found in moderate amounts in the main lake basin, and is abundant throughout the shallow flooding. Rusty crayfish and zebra mussels inhabit Rush Lake, the latter of which was identified as present in 2013.

A public-access boat launch is located on the south shore of Rush Lake. The gravel-surfaced ramp is maintained by the Michigan Department of Natural Resources (MDNR) Parks and Recreation Division. The access site has parking for approximately five vehicles with boat trailers. Some local watercraft controls exist on Rush Lake.

History

The first examinations of Rush Lake by Michigan Department of Conservation (MDOC) were made in 1925. Observations at that time found a fish population comprised of Pumpkinseed, Yellow Perch, Largemouth and Smallmouth bass, Northern Pike, and various shiners, minnows, and darters. The lake had a good reputation for fishing, particularly for Northern Pike. At that time there was a small dam on

the north side of the flooding that was used for past logging purposes. This small dam connected the flooding to the natural lake basin (Figure 2).

The early years of fish management for the State of Michigan revolved around fish stocking, and in retrospect the need for such practice to occur was often questionable, especially for Rush Lake. Stocking records for Rush Lake date back to 1940. Fry and fingerling Bluegill, Largemouth Bass, and Smallmouth Bass were stocked annually from 1940 through 1945. Yellow Perch fingerlings were stocked in 1941, while Walleye fry were stocked on three occasions from 1940 to 1944. Northern Pike were stocked in 1964. Even cold water species such as Brook Trout fingerlings were stocked by the U.S. Fish and Wildlife Service in 1949, 1,000 adult Rainbow Trout were stocked in fall of 1961 by a private source, which was likely the lake association.

The next examination of the lake was made by MDOC in 1955. At the time there were 64 cottages along its shoreline, 1 hotel, 4 resorts, and 4 boat liveries. Fishing pressure was considered moderate to high, with anglers indicating that fishing was better in the past. The lake stratified thermally and dissolved oxygen levels declined significantly below 15 feet (Table 1). Submergent and emergent aquatic vegetation was considered abundant. The water control structure (dam) was considered to be deteriorating, and later that year it was re-built and administered with a legal lake level. MDOC surveyed the fish community with seines and gill nets and found abundant Bluegill, Rock Bass, Pumpkinseed, Largemouth Bass, and Northern Pike. Yellow Perch were considered common, while Smallmouth Bass were scarce. Also present were bullheads, darters, and minnows. All species present were typical of a warm- to cool-water fish community. Fish growth was considered average for most species. No Walleye were collected during the survey, despite stocking events a decade earlier. Later in the 1950s, notes from agency files suggested that anglers were experiencing good Bluegill fishing. Despite this, some anglers still desired to have more predators stocked, though this was never accomplished.

Information on the Rush Lake fish community and fishery also exists for the 1960s. During this decade, anglers took up petitions to close Rush Lake to Northern Pike spearing, while trying to develop a pike spawning marsh alongside the lake. Neither of these management actions occurred. By the mid 1960s, lake residents again expressed interest to have warm water fish stocked in Rush Lake. As a result, MDOC personnel surveyed the lake in June 1967 with experimental gill nets and alternating-current electrofishing. Results of the netting indicated "the number of fish by species appeared good," and noted normal numbers and species diversity. According to agency files, growth of most panfish, with the exception of slow growing Yellow Perch, was average. Smallmouth and Largemouth bass growth was average, while Northern Pike growth was considered slightly below average. The conclusion from the survey was that "plantings of game fishes would not alter the present situation," and that "all species present are producing normally and certainly capable of replenishing artificial and natural mortalities."

It would be 1976 when the next fish community survey was made at Rush Lake. Michigan Department of Natural Resources (MDNR) personnel surveyed the fish community with 10 experimental gill net lifts and 24 large mesh trap net lifts, which was a considerable amount of sampling effort. Fishing reports from anglers during this period were variable. Results of the survey indicated Rush Lake "has one of the best fish populations," and that there were "good populations of predators and a good population of large Bluegills." Overall, the fish community was deemed stable. Bluegill were abundant

and demonstrated average growth. Yellow Perch were not abundant and grew poorly. Pumpkinseed and Rock Bass were also common and could attain larger sizes. A Black Crappie was collected during the survey, the first known occurrence of this species in Rush Lake. Largemouth and Smallmouth bass were also present, but Largemouth Bass were dominant. Both bass species were able to attain large sizes. Northern Pike were abundant and demonstrated average to slightly below average growth. The coarse fish population was comprised solely of bullheads. No White Suckers were collected, which is a rarity for most northern Michigan lakes. No management actions were undertaken following the fish community survey.

Ryckman and Lockwood (1985) estimated boater angler hours for the summer months at a number of northern Michigan Lakes in 1982. The estimated May through September angler hours for Rush Lake was 13,189. This was a similar amount of pressure when compared to nearby lakes of the same size.

It would be nearly twenty years to the next fish community survey at Rush Lake in 2001. MDNR used 30 large mesh trap net lifts, 2 seine hauls, and 2 large mesh fyke net lifts to examine the fish community in late May. Results indicated a diverse and healthy fish community which offered anglers a wide array of recreational game fish. Panfish were diverse and comprised of Bluegill, Rock Bass, Pumpkinseed, Yellow Perch, and Black Crappie. Bluegill were present in good numbers and many were 8 inches or larger. Rock Bass were abundant and grew to large sizes. Pumpkinseed were captured in lower numbers compared to the 1976 survey, but Black Crappie were captured in larger proportion with many specimens 10 inches or larger. The predator fish population was again dominated by Largemouth Bass and Northern Pike. The bass population was considered abundant enough to control stunting of Bluegill. Northern Pike were present with the largest specimen 27 inches and the population exhibiting average growth. Bullheads were considered abundant. Recommendations from the survey stated a balanced fish community and no actions were necessary. Managers also stated that the lake should be resurveyed in approximately 10 years.

Current Status

The most recent fish community survey in Rush Lake was conducted by the MDNR Fisheries Division from June 22-24, 2015. Sampling effort consisted of 3 large mesh trap net lifts, 9 large mesh fyke net lifts, 6 small mesh fyke net lifts, 4 experimental gill net lifts, and 50 minutes of direct-current nighttime electrofishing. Sampling effort followed the MDNR Status and Trends sampling protocol where the amount of sampling effort is a product of lake size. In addition, a dissolved oxygen and temperature profile was collected on August 24, 2015 (Table 2). Results continued to indicate that Rush Lake possessed a summer thermocline and that dissolved oxygen levels dropped off sharply below the thermocline (19 feet). Dissolved oxygen levels available for fish were nearly zero in Rush Lake's deeper waters.

Fifteen species of fish totaling 861 in number and 153 pounds in weight were collected during the entire netting survey with all gear types (Table 3). Large predator fish including Largemouth Bass, Smallmouth Bass, and Northern Pike made up 7% of the total catch by number and 24% by weight. Non-game species such as bullheads made up less than 1% of the total catch by number and 5% by weight. The panfish community of Rush Lake is dominated by Bluegill and Rock Bass, followed by Yellow Perch and Pumpkinseed. No Black Crappie were collected in the recent survey. Panfish comprised 84% of the total catch by number and 71% by weight. These relative percentages were

similar to results from the 2012 survey at nearby Grass Lake (Cwalinski 2012). Overall, predator numbers appeared low.

Bluegill ranging in size from 1-10 inches were the most commonly collected fish in the survey (Table 3 and 4). An index to assess the quality of the Bluegill population in Rush Lake (Schneider 1990) was applied and based on this rating (Table 5), the population in Rush Lake is in satisfactory condition. Some quality-size fish are available to anglers (Table 4 and 5), although very little is known about the actual Bluegill fishery. A satisfactory percentage of 6-inch and larger Bluegill contribute to the total Bluegill population based on the catch in trap and fyke nets in 2015. However, there was a relatively larger proportion of Bluegill 8 inches and larger caught in the survey. Despite this, the Bluegill index was lower in 2015 when compared to the 2001 survey catch (Table 5), as more larger fish were captured in the older survey (Table 6). Bluegill growth in Rush Lake is near or slightly below the statewide average for this species (Table 7). I found Bluegill up to age 10 in the survey and nearly all year classes were present (Table 7).

Rock Bass were common in the survey catch and fish can attain large sizes in Rush Lake. It appears this fish is more abundant today than in previous survey (Table 6). Yellow Perch were considered common, but nearly the entire catch were fish less than 8 inches in length. Perch numbers have never been high in Rush Lake according to survey catches, and growth today appears slightly below the statewide average (Table 7). Pumpkinseed were captured in the survey in low numbers. Some larger specimens were collected and likely are a valuable addition to the panfish fishery. This species was less abundant in the 2001 and 2015 survey when compared to the 1976 survey results (Table 6). Black Crappie were not collected in the 2015 Rush Lake survey, and it is unknown if they still exist in the lake in low abundance.

Three predatory game fish inhabit Rush Lake and include Largemouth Bass, Smallmouth Bass, and Northern Pike. Largmeouth Bass are the most abundant, although they were caught in relatively lower numbers compared to other regional lakes that have been surveyed under the same sampling protocol. The catch of Largemouth Bass was lower in the recent survey compared to past surveys (Table 6). Despite this, some large bass are still available to anglers. Six year classes of bass were represented in the catch (Table 7) which is generally low, especially when compared to past surveys when many older year classes were collected. Largemouth bass growth is slightly below the statewide average.

Smallmouth Bass were again collected during the recent survey, but they are not abundant. Smallmouth Bass numbers have not changed during the survey periods (Table 6). Northern Pike were collected in very low numbers in Rush Lake, especially when compared to the 1976 and 2001 survey (Table 6). Only eight specimens were collected in 2015 and only one fish was legal size (24 inches or larger). We are able to compare the catch of Northern Pike in gill nets between various surveys. Surveyors used 10 experimental gill net lifts in both the 1967 and 1976 Rush Lake surveys, and we used 4 experimental gill net lifts. The catch rates of pike in gill nets from the surveys were 3.4/lift, 3.5/lift, and 0.5/lift for 1967, 1976, and 2015, respectively. Thus, it appears pike abundance has declined.

The remainder of the Rush Lake fish community was not abundant and comprised of species such as shiners, minnows, bullheads, and darters. White suckers continue to remain absent from the fish community.

Analysis and Discussion

The current fish community and environment of Rush Lake can be generally characterized as having the following: 1) an acceptable, naturally-reproducing panfish community dominated by Bluegill and Rock Bass, 2) a panfish community which displays variable growth rates across species, while some species are absent or in very low numbers 3) a low quality, naturally-reproducing predator population consisting of average-growing Largemouth Bass and low density Northern Pike, 4) a non-game fish community which exhibits fair species diversity but low abundance, and is absent of White Suckers, 5) a changing lake environment with invasive species such as zebra mussels and rusty crayfish present, and 6) a relatively shallow lake which has an established thermocline in the summer and low dissolved oxygen levels below the thermocline. At certain locations and times of the year, Rush Lake may also be susceptible to winter kills.

The Rush Lake panfish community is of acceptable quality, and dominated by Bluegill. Large fish are available to anglers, but it is likely that harvest of large Bluegill is high. Fewer large fish (proportionately) exist today than in past surveys, and growth is near statewide average. This species can attain larger sizes (8 inches or larger), but must do it through longevity as compared to fast growth. Growth of smaller Bluegill today is slower than in the past, which may be linked to the decline in lake productivity following zebra mussel infestation, or the lack of controlling predators. Other species such as Pumpkinseed and Yellow Perch will continue to exist in Rush Lake and add diversity to the panfish catch. Perch older than age 5 were not collected in the survey which may also suggest cropping off of larger fish by anglers. Black Crappie have shown up in the past surveys, although not in high numbers, but were not collected in the 2015 survey. Crappie are highly cyclic in northern Michigan waterbodies, producing strong year classes occasionally. However, it is interesting that multiple year classes (6) were found during the 2001 survey, but no specimens were even collected in 2015. Crappie are likely not native to Rush Lake, and were probably transported to the lake years ago by anglers as this is true for many other local lakes. Rock Bass have become more prolific in Rush Lake over the decades, and are major competitors with other panfish for resources, especially at younger ages. They attain large sizes and are also predators as adults on other species.

The main predator of Rush Lake is Largemouth Bass. A variety of sizes of Largemouth Bass were captured, but there were no specimens older than age 7 which is not typical for most small northern Michigan natural lakes. Smallmouth Bass older than age 4 were also not collected. Smallmouth Bass are on the edge of their habitat requirements in Rush Lake. Cool water zones, particularly in the summer, are reduced in Rush Lake, which limit Smallmouth Bass growth and abundance. Healthy populations of both species of bass will be important in controlling rusty crayfish populations in Rush Lake. Rusty crayfish outcompete native crayfish and shred natural aquatic vegetation.

Northern Pike were much more abundant in past surveys and were caught in very limited numbers in 2015. No specimens older than age 5 were collected, which again is not typical. This species survives better (for growth and longevity) in waterbodies that have some cool water refuge. Spawning habitat (peripheral wetlands, aquatic vegetation) appeared normal at Rush Lake when we completed our survey.

The rest of the Rush Lake fish community appeared normal, but were generally lower in abundance. White Suckers, a typical component of most northern Michigan lakes, were missing in Rush Lake and

has been throughout the survey periods. Their absence is not necessarily a bad index, however, because they also compete with many species for food resources. Other competitors, such as bullheads, were found in relatively lower numbers in Rush Lake.

Management Direction

1) The Rush 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. The lake is currently going through changes with the recent infestation of zebra mussels and rusty crayfish. The invasive mussels are in the early stages of invasion, and according to one angler, are abundant. It is a certainty that the lake production has been altered due to the food filtering ability of the mussels. The plankton that is ingested by mussels becomes unavailable to larval game fish and likely reduces overall numbers. With this overall lake change occurring, we recommend surveying Rush Lake more frequently, and probably no later than 2025/2030. This will provide managers insight into changes and adaptations of a fish community in a small natural lake where zebra mussels have become established. Sampling effort of the next fish survey should mimic the effort expended during the 2015 survey.

2) The littoral zone and wetlands associated with Rush Lake and Rush Lake Flooding are vital to the fish community. Plants are the base of the food chain for larval fish. Plants decompose and start microbial processes that initiate plankton production. Larval fish use the plant cover to enhance early survival. Water levels are maintained by a legal lake level, but it has been suggested that water levels appear to be higher in the spring, which is appropriate for the spawning of some fish (e.g. Northern Pike). We recommend protecting the natural shoreline-water interface and leaving the remaining in its natural state.

3) Anglers are urged to report catches of all species to the local MDNR biologist. We have received reports from some anglers in recent years from Rush Lake. Recent angler catches and trends correlated well with the fish community we sampled during 2015. It was suggested that one group of anglers has stopped Northern Pike fishing at Rush Lake due to their inability to catch them anymore. Bass catches also remain considerably low compared to past years. Survey gear is not always efficient at capturing some fish, sometimes leaving information gaps for individual species. Angler reports are useful for current management of the fishery and for future management as well. The current statewide fishing regulations are appropriate for Rush Lake.

4) The cool water fish community (Northern Pike, Smallmouth Bass) of Rush Lake may be at greater risk at this relatively shallow, warm water lake. This may be especially true in the decades to come if the climate warms. The other warm water fish communities (Largemouth Bass, Bluegill) are capable of producing large year classes as long as environmental conditions are suitable and competition for resources is not burdensome. We recommend no stocking (DNR does not raise such warm water species for statewide stocking), and allowing the wild fish population to adapt to environmental conditions. It is likely that zebra mussels will soon reach their carrying capacity, and level off to lower abundances as has occurred at many larger Michigan inland lakes. We recommend that anglers actively reduce the number of Rock Bass in the lake through harvest. This species has done well in the Rush Lake environment, and as they continue to thrive, they will be a burden on the other game fish populations.

References

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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.

Ryckman, J.R. and R.N. Lockwood 1985. On-site creel surveys in Michigan 1975-82. Fisheries Research Report No. 1922 December 3, 1985.

Schneider, J. C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report No. 90-10, Lansing, MI.

Figure 1. Rush Lake and flooding in northern Michigan, Montmorency County. Arrow indicates the waterbody.

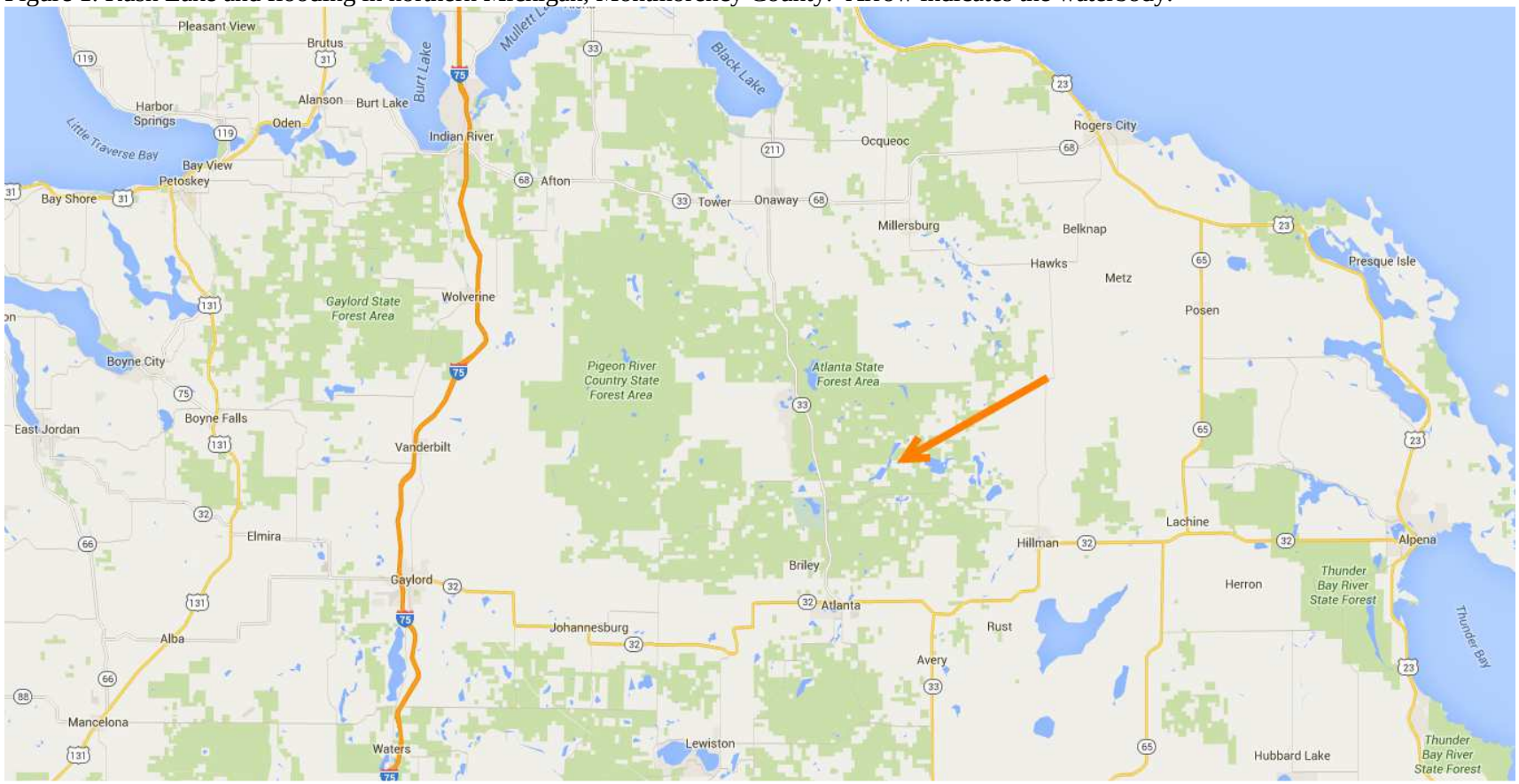

Figure 2. Rush Lake and flooding, Montmorency County. Arrow points to lake control structure location.

Figure 3. Rush Lake bathymetric map.

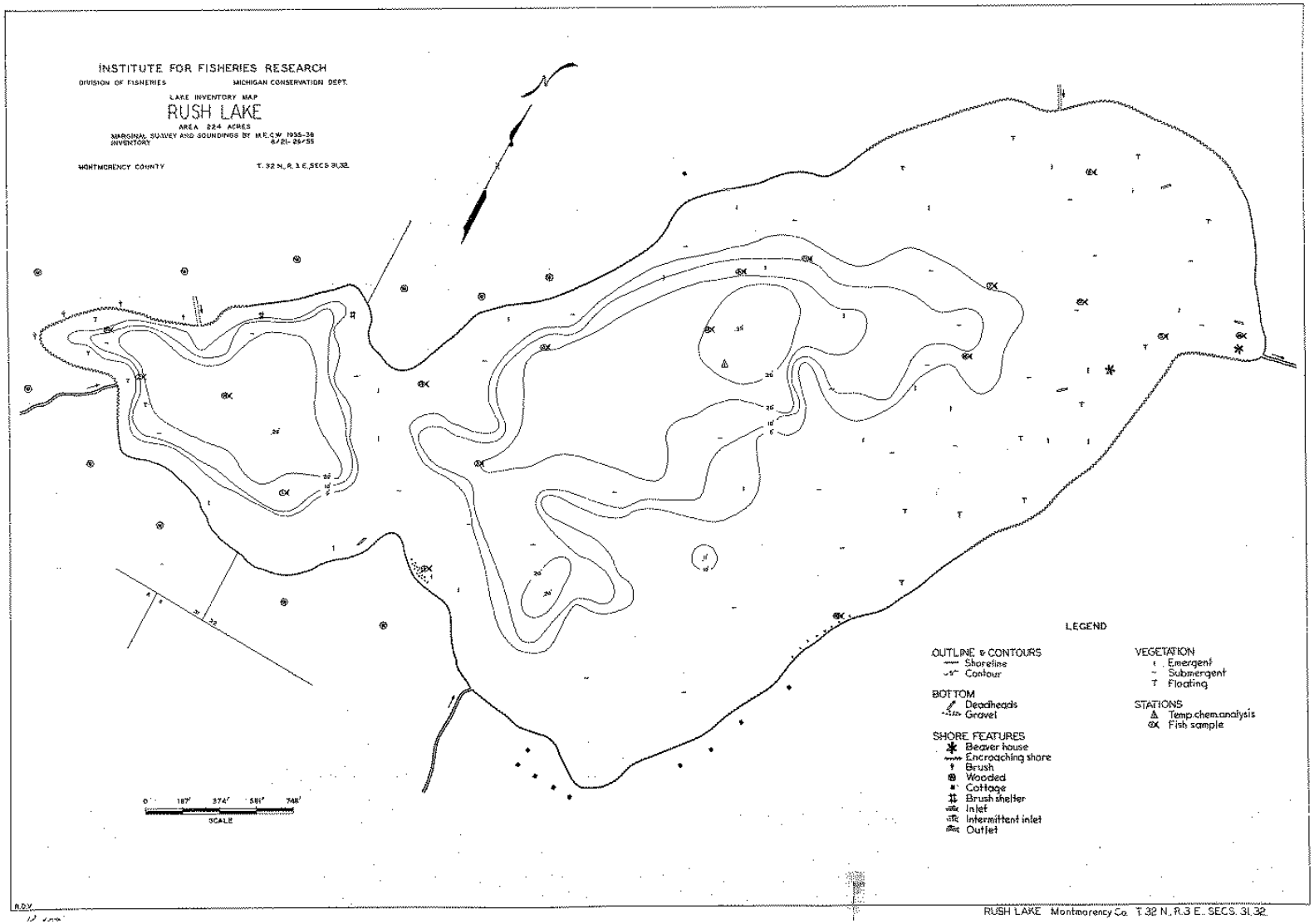

Table 1.-Water temperature and dissolved oxygen profile for Rush Lake, June 27, 1955.

Depth (ft)	Temperature (F)	Dissolved Oxygen (ppm)
Surface	67	--
5	66	8.3
10	68	7.7
15	67	7.2
17	64	3.8
20	64	0.8
25	61	1.1

Table 2.-Water temperature, dissolved oxygen, and pH profile for Rush Lake, August 24, 2015.

Depth (ft)	Temperature (F)	Dissolved Oxygen (ppm)	pH
Surface	71.6	6.1	8.0
2	71.6	6.1	8.0
3	71.6	6.1	8.0
4	71.6	6.1	8.0
5	71.6	6.2	8.0
6	71.6	6.2	8.0
7	71.6	6.2	8.0
8	71.6	6.2	8.0
9	71.6	6.2	8.0
10	71.6	6.2	8.1
11	71.6	6.2	8.1
12	71.6	6.3	8.1
13	71.6	6.3	8.1
14	71.6	6.3	8.1
15	71.6	6.3	8.1
16	71.6	6.3	8.1
17	71.5	6.3	8.0
18	71.2	6.2	8.0
19	70.9	6.1	8.0
20	63.5	0.9	7.7
21	60.9	0.7	7.7
22	57.6	0.3	7.6
23	56.5	0.4	7.6
24	55.1	0.3	7.6
25	54.4	0.1	7.6
26	53.6	0.2	7.6
27	53.4	0.1	7.6
28	53.1	0.1	7.6
29	52.6	0.1	7.6

Table 3.-Species catch and relative abundance of fishes collected during the Rush Lake fish community survey, June 22-24. Weight is calculated.

Species	Number	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)
Bluegill	358	41.6	63.5	41.4	1-10
Rock Bass	271	31.5	33.7	21.9	1-11
Yellow Perch	71	8.2	2.8	1.8	2-8
Largemouth Bass	44	5.1	23.5	15.3	1-17
Common Shiner	38	4.4	0.2	<1	2-3
Pumpkinseed	24	2.8	8.7	5.7	5-9
Smallmouth Bass	14	1.6	4.2	2.7	1-14
Bluntnose Minnow	10	1.2	0.1	<1	2-3
Cent. Mudminnow	9	1.2	0.1	<1	2-3
Northern Pike	8	<1	8.7	5.7	2-24
Black Bullhead	7	<1	7.7	5.0	12-14
Johnny Darter	5	<1	0.0	<1	1-2
Iowa Darter	3	<1	0.0	<1	2
Golden Shiner	1	<1	0.0	<1	2
Yellow Bullhead	1	<1	0.3	<1	8
Total	**861**		**153.4**		

Table 4.-Length-frequency distribution of important game fishes collected during the 2015 netting survey at Rush Lake.

Length (in)	Bluegill	Pumpk. Sunfish	Rock Bass	Yellow Perch	Largemouth Bass	Smallmouth Bass	Northern Pike
1	2		59		21	5	
2	8		34	23			1
3	42		33	23		1	
4	109		50	10			
5	42	2	35	7			
6	52	6	20	3	2	2	
7	52	11	15	2	1	2	
8	34	3	11	3		1	
9	16	2	7		3		
10	1		6		4	1	
11			1		4		
12					1	1	
13					2		
14					2	1	
15					1		1
16					2		
17					1		
18							
19							1
20							1
21							1
22							2
23							
24							1
25							
26							
27							
28							
29							
30							
31							
32							
33							

Table 5.-Rush Lake Bluegill size structure rating using the Schneider Index (Schneider 1990).
Index scores are in parentheses. Sample is from large mesh fyke and trap net nets. More large mesh traps were used in 2001 compared to 2015.

Sample date	**May 2001**	**June 2015**
Sample size	201	225
Gear lifts	32	12
CPUE (#/lift)	6.3	18.8
Avg. length (in.)	7.3 (6)	5.9 (3)
% $\geq$ 6 inches	90 (6)	56 (4)
% $\geq$ 7 inches	80 (7)	38 (5)
% $\geq$ 8 inches	56 (7)	20 (6)
Index score	6.5	4.5
Rank		**Satisfactory**

1 = very poor, 2 = poor, 3 = acceptable, 4 = satisfactory, 5 = good, 6 = excellent, 7 = superior

Table 6.-Length-frequency distribution of certain game fishes at Rush Lake from the 1976, 2001, and 2015 surveys. Sampling effort was variable between years.

Length (in)	Bluegill 1976	Bluegill 2001	Bluegill 2015	P-seed 1976	P-seed 2001	P-seed 2015
1			2			
2			8			
3	6	1	42			
4	5	6	109	2		
5	14	14	42	6	1	2
6	15	20	52	28		6
7	57	52	52	44	6	11
8	146	91	34	19	4	3
9	188	22	16		1	2
10	32		1			
11	2					
12						
13						
14						
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35						
36						
37						

Table 6.-continued.

Length (in)	Y. Perch 1976	Y. Perch 2001	Y. Perch 2015	Rock Bass 1976	Rock Bass 2001	Rock Bass 2015
1					2	59
2			23		5	34
3			23		3	33
4	11		10	2	5	50
5	11	1	7	2	21	35
6	11	3	3	6	79	20
7	1	3	2	12	52	15
8	1	3	3	10	45	11
9	1			2	25	7
10	1	1			3	6
11		3			1	1
12	1	2				
13	1					
14						
15						
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36						
37						

Table 6.-continued.

Length (in)	L. Bass 1976	L. Bass 2001	L. Bass 2015	S. Bass 1976	S. Bass 2001	S. Bass 2015
1			21			5
2		1				
3					1	1
4						
5						
6		1	2			2
7		1	1			2
8	2	3		1		1
9		3	3			
10	11		4			1
11	6	2	4			
12	8	7	1			1
13	13	8	2			
14	9	8	2		1	1
15	4	8	1	1		
16	11	5	2	3		
17	10	5	1	1		
18	3	9		1	1	
19	7	2				
20	1	3		1		
21						
22						
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34						
35						
36						
37						

Table 6.-continued.

Length (in)	N. Pike 1976	N. Pike 2001	N. Pike 2015	B. Crappie 1976	B. Crappie 2001	B. Crappie 2015
1						
2			1			
3						
4						
5						
6						
7						
8				1		
9					2	
10					1	
11					7	
12	1	1			4	
13					4	
14	1					
15	1	3	1			
16	2	2				
17	2	3				
18	9	2				
19	7	2	1			
20	11	4				
21	17	3	1			
22	10	1	2			
23	3	1				
24	4	1	1			
25	3	1				
26						
27	2	1				
28	1					
29						
30						
31						
32						
33						
34	1					
35						
36						
37						

Table 7.-Comparison of mean length (inches) at age for various game fishes of Rush Lake from June 22-24, 2015. Number in parentheses represents number aged. Growth comparison in last column was across all ages.

Species	Age group	June 1976	May 2001	June 2015	2015 growth compared to state average
Bluegill	I	2.8 (7)	--	--	-0.6
	II	3.7 (10)	--	2.7 (13)	
	III	5.0 (23)	4.2 (7)	4.1 (18)	
	IV	6.2 (10)	5.7 (18)	5.2 (11)	
	V	7.2 (15)	6.6 (4)	6.3 (12)	
	VI	8.1 (14)	7.5 (18)	7.5 (19)	
	VII	8.7 (8)	8.7 (13)	8.5 (7)	
	VIII	8.9 (6)	9.4 (4)	9.1 (4)	
	IX	9.4 (7)	9.8 (7)	9.3 (4)	
	X	9.7 (4)	--	10.2 (3)	
Pumpkin-	I	--	--	--	+0.3
seed	II	--	--	--	
	III	5.0 (4)	--	--	
	IV	6.9 (2)	6.1 (3)	6.1 (6)	
	V	6.7 (17)	7.7 (3)	7.1 (2)	
	VI	7.3 (21)	7.7 (3)	7.2 (1)	
	VII	7.9 (10)	8.5 (1)	7.8 (3)	
	VIII	8.1 (2)	8.7 (3)	8.3 (4)	
	IX	--	8.9 (1)	9.5 (1)	
Black	I	--	--	--	
Crappie	II	--	--	--	
	III	--	9.8 (3)	--	
	IV	8.9 (1)	11.5 (2)	--	
	V	--	11.9 (4)	--	
	VI	--	12.2 (6)	--	
	VII	--	13.3 (1)	--	
	VIII	--	13.7 (2)	--	

Table 7.-continued

Species	Age group	June 1976	May 2001	June 2015	2015 growth compared to state average
Yellow	I	--	--	3.0 (19)	-1.1
Perch	II	4.8 (12)	--	4.2 (11)	
	III	5.8 (21)	6.3 (3)	5.8 (6)	
	IV	7.7 (1)	7.6 (5)	7.2 (6)	
	V	8.6 (1)	7.9 (2)	8.2 (2)	
	VI	9.0 (1)	--	--	
	VII	--	10.9 (4)	--	
	VIII	11.6 (2)	12.3 (2)	--	
	IX	13.6 (1)	--	--	
Largemouth	I	--	--	--	+0.3
Bass	II	9.3 (7)	7.4 (3)	6.9 (3)	
	III	10.8 (13)	10.0 (7)	10.9 (15)	
	IV	12.2 (24)	12.8 (12)	14.0 (2)	
	V	15.1 (5)	14.1 (8)	14.9 (1)	
	VI	16.3 (6)	15.2 (12)	15.8 (3)	
	VII	17.1 (9)	16.6 (6)	17.6 (1)	
	VIII	17.8 (5)	17.6 (6)	--	
	IX	19.0 (5)	18.2 (5)	--	
	X	19.5 (3)	19.1 (2)	--	
	XI	--	--	--	
	XII	--	19.9 (2)	--	
	XIII	--	20.4 (2)	--	
Northern	I	15.2 (5)	11.3 (1)	--	--
Pike	II	18.8 (19)	17.4 (12)	15.8 (1)	
	III	21.2 (25)	20.9 (7)	20.1 (2)	
	IV	22.7 (11)	23.6 (3)	22.1 (3)	
	V	26.3 (6)	25.7 (2)	24.4 (1)	
	VI	25.5 (1)	27.4 (1)	--	
	VII	--	--	--	
	VIII	34.2 (1)	--	--	

Photo 1. West shore littoral zone, Rush Lake.

Photo 2. Southeast shore of Rush Lake, 2015.

Photo 3. Rush Lake bluegills captured in the 2015 fish community survey.