Tomahawk Creek Flooding

Presque Isle and Montmorency County
Cheboygan/Black River Watershed, last surveyed 2004

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Environment

Tomahawk Creek Flooding is approximately 574 acres and located in the northeastern Lower Peninsula of Michigan in Montmorency and Presque Isle counties (Figure 1). The flooding was created in 1964 by damming Tomahawk Creek which is in the Black and Cheboygan river watersheds. Funding for this project was through the federal Accelerated Public Works program from the U.S. Department of the Interior. The purpose was to diversify outdoor recreation in the region. The dam has a maximum water head of 12 feet. The flooding drains over 8 square miles of sand and upland pine barren country. Included within the current flooding is what was once known as Mud Oaks Flooding, which was a small natural lake basin that makes up a very small part of the entire flooding today. The deepest spot in the flooding is in this natural basin and reaches over 30 feet. Most of the flooding, however, is less than 10 feet deep. No bathymetric map exists for Tomahawk Creek Flooding.

The dam riser structure and outlet pipe are owned by the State of Michigan, Department of Natural Resources (DNR). The DNR Fisheries Division is responsible for maintenance of the structure and periodic required inspections by a certified engineer. These inspections are made every five years. The inspections of this structure (Dam Identification Number 243) are made by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The most recent inspection of this low hazard dam was made in 2016. The structure was labeled as satisfactory with recommendations to immediately begin planning to secure funding to replace the spillway outlet pipe.

The land surrounding Tomahawk Creek Flooding is characterized by sandy plains and predominant jack pine forest. Substrate of the flooding is sand and muck and aquatic vegetation is prominent. Characteristic of many impoundments, Tomahawk has large areas of flooded timber and stumps, particularly along the south end. This type of habitat is not common to the natural glacial lakes in the nearby region. Due to the shallow nature of the flooding, winter and spring fish kills are common at Tomahawk Creek Flooding.

The entire shoreline of the flooding is owned by the DNR and is managed for a variety of values including camping, fishing, hunting, trapping, nearby horseback riding, and forest management. A relatively large and popular state forest campground is located along the northwest and north shore. A DNR managed public boat launch with a paved surface is also located adjacent to the campground and provides ample parking for boat trailers (Figure 2). Other small unimproved boat/canoe/kayak launches can be found around this waterbody. The flooding also offers shoreline fishing opportunities at a variety of locations.

History

Tomahawk Creek Flooding is a relatively young waterbody, thus very little fish management has occurred in its waters. Three species of fish were stocked in the flooding in 1967 following its creation.

These included over 2,000 Golden Shiner, 110 adult Largemouth Bass, and 50,000 spring fingerling Tiger Muskellunge. Preliminary investigations of the fish population occurred in summer 1968 by the Michigan Department of Conservation (MDOC). The department utilized gill nets and shoreline electrofishing to determine the success of earlier stocking efforts and the status of the remaining fish community. Northern Pike were found to be abundant, but none over 18-inches were collected. Also present were Largemouth Bass, Pumpkinseed, and Golden Shiners. No Tiger Muskellunge were captured.

In 1973, growth of Northern Pike was examined through hook and line surveys and angler catches on one winter day in February. Growth was regarded as extremely poor across all age classes, and most fish were less than 20 inches in length. Anglers were utilizing the flooding.

An intensive fisheries survey by DNR was first made at Tomahawk Creek Flooding in early-June 1983. Sampling effort consisted of fine-mesh fyke nets and both large and small-mesh trap nets. Total effort was 120 net nights. This survey showed excellent populations of warmwater and coolwater fish species (Table 1). Panfish comprised of Bluegill, Pumpkinseed, and Rock Bass were common, while Yellow Perch were less common. Bluegill ranged in length from 3-10 inches, but most were 6 inches or less (Table 2). Pumpkinseed were mostly small, yet abundant. Rock Bass were plentiful and could attain large sizes. Yellow Perch, though less plentiful, could attain large sizes (Table 2) and were represented by multiple age groups, as were other panfish (Table 3). Panfish growth rates were generally average to slightly above average for most species when compared to statewide growth rates for each species.

Largemouth Bass and Northern Pike were equally common. Largemouth Bass up to 19 inches were collected, with good numbers found both above and below the minimum size limit (14 inches) (Table 2). The bass growth rate was slightly below the statewide average and nine year-classes were collected. Northern Pike were dominated by fish in the 17-19 inch size range (Table 2). Twenty-eight percent of pike were 20 inches or larger, while 11% were 24 inches or larger. Eight year-classes of pike were collected (Table 3) while growth rate was considered slow compared to the statewide average. Growth rates for bass and pike were thought to be low due to the shallow and vegetated nature of the impoundment and its negative impacts on predator feeding. Following the 1983 survey, the minimum size limit of 20 inches was restored for Northern Pike statewide, including at Tomahawk Creek Flooding.

Bullheads and White Sucker (primarily bullheads) made up 37% of the survey total catch, and 66% of the total catch by weight (Table 1).

Current Status

A second fish community survey was made at Tomahawk Creek Flooding from June 7-11, 2004 by the DNR. Survey effort was less intensive than the 1983 survey, but included 8 trap-net nights, 6 inland gill-net nights, 3 small-mesh fyke-net nights, 5 large-mesh fyke-net nights, 4 maxi-mini fyke-net nights, and one large seine haul. A total of 837 fish were collected during the survey weighing 404 pounds (Table 4). Panfish made up 73% of the survey catch by number and 23% by weight. Predator game fish made up the near inverse with 25% by number and 76% by weight. The rest of the fish numbers and weight were primarily from bullheads. No White Suckers were captured in the 2004 survey, as compared to the 1983 survey when some suckers were present.

Species of panfish in the 2004 fish community survey included Bluegill, Pumpkinseed, Black Crappie, Rock Bass, and Yellow Perch (Table 4). Growth for most of these species was below the statewide average (Table 3). However, most of these panfish can attain large sizes based on longevity as many of the species have the potential to live to age 10. Bluegill size structure was slightly lower in 2004 compared to the 1983 survey (Table 2). For example, 8% of the Bluegill collected in 1983 were 8 inches or larger compared to only 2% in 2004. Pumpkinseed size structure was not significantly different among the surveys (Table 2) and most Pumpkinseed were 7 inches or smaller. Rock Bass were caught in relatively lower numbers of the total catch in 2004 (2%) compared to 1983 (20%). Yellow Perch remained uncommon in Tomahawk Creek Flooding in 2004 as in the 1980s based on survey catches (Table 1 and 4). Black Crappie were not collected in the 1983 survey but made up 6% of the total catch by number in 2004 (Table 2 and 4). It appears that this species has become a significant part of the fish community, and angler reports also suggest this. This species is likely having some impact on recruitment and growth of other panfish. Crappie up to age 9 were collected and represented by six year-classes (Table 3). As with other panfish, growth rates were slow.

Largemouth Bass and Northern Pike remain the top predator game fish in Tomahawk Creek Flooding (Table 4). Largemouth Bass ages 1-9 were represented in the catch, as was the case in 1983. Growth of this species is currently below the statewide average (Table 3). Percentages of Largemouth Bass 14 inches (minimum size limit today) or larger in the catch were 39% in 1983 compared to 27% in 2004. Thus, there appears to be a slight negative shift in size structure of bass. Large bass though could still be found in the flooding in 2004 (Table 2).

Eight year-classes of Northern Pike were found in both the 1983 and 2004 surveys (Table 3). Fish ranged in size from 10-29 inches in 2004 and growth remained very poor. Pike growth in 2004 was slow as pike were on average 3 inches smaller across ages compared to the statewide average for this species. Eleven percent of the pike captured in 1983 were 24 inches or larger compared to 13% in 2004. The minimum size limit for Northern Pike in 2004 was 24 inches. In 2012 the size limit for pike at the flooding was removed. Anglers could keep 5 fish per day of any size, of which only one pike could be 24 inches or larger. This was done to allow anglers to harvest more of the stunted pike in the flooding, as well as to make pike regulations consistent with nearby waterbodies in the Black River watershed.

In addition to the 2004 fish collections, limnological parameters were measured at Tomahawk Creek Flooding in August 2004 (Table 5). Temperature and dissolved oxygen profiles were taken in 11 feet of water. Water temperature ranged from 74F at the surface to 73F at the bottom, indicating that the flooding does not thermally stratify. Dissolved oxygen was suitable to fish (6ppm or greater) throughout the water column. Secchi disk reading (a measure of water clarity) was 9 feet. Various other parameters such as nitrogen, phosphorus, and alkalinity were also measured in August. The lake had a low alkalinity value (less than 100ppm) and a slightly basic pH throughout the water column (Table 5). Total phosphorus and nitrogen levels were also very low at Tomahawk Creek Flooding.

A different type of survey was made at Tomahawk Creek Flooding in 2017. Two trail cameras were used to quantify boat trailer estimates and time spent on the lake by anglers between the two primary launch sites from May 8 through September 24, 2017. The first boating site was the DNR launch on the west shore near the campground. The secondary access was a small road ending on the east shore.

Camera photos were taken every hour from dawn to dusk. Periodic checks were made through the summer to determine the average number of anglers per boat trailer to enable computation of total angler hours. The following could not be quantified: 1) shore fishing, 2) fishing from kayaks/canoes unless obviously observed as anglers in the parking lots, 3) ice fishing (which is significant), and 4) fishing from boats that were moored on the lake campground sites. Thus, the estimates were considered conservative. The purpose of the survey was to gather quantifiable use data to inform future decisions regarding dam repair or removal. Many dams of similar age have failed across Michigan, so use (effort) data gathered prior to a potential safety-related dewatering can be useful for managers when making these decisions. Swimming and skiing are not significant on this lake due to aquatic vegetation and wood in the water, so the predominant activity on the flooding is fishing.

The total boat trailer angler hours were estimated to be 8,347.3 Boat trailer derived angler hours per lake acre for May 8 through September 24, 2017 was 14.5. The fishing benefit to the economy was calculated in two different manners:

1) Fishing party trips

- 1,076 Boat-Trailer fishing party trips (regardless of number of anglers per trailer)

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- $30.00 spent for average trip expenditure per day (2011 National Survey of Fishing, Hunting, and Wildlife - Associated Recreation in Michigan, U.S. Fish and Wildlife Service and U.S. Census Bureau)
- 1,076 Boat trailers using the launches * $30.00 per day = $32,280 benefit from May 8 - Sept 24

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2) Angler trips

- 2,475 Boat-Trailer fishing anglers (based on the average number of anglers per trailer)
- $30.00 spent for average trip expenditure per day (2011 National Survey of Fishing, Hunting, and Wildlife - Associated Recreation in Michigan, U.S. Fish and Wildlife Service and U.S. Census Bureau)

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- 2,475 boat-trailer anglers * $30.00 per day = $74,250 benefit from May 8 - Sept 24

The actual value of the lake and associated dam was considered much higher when adding recreational camping, the campgrounds, kayaking, hiking, shore fishing, ice fishing, and fishing from means not quantified in this study.

During the same period of counting trailers (May 8 - September 24), DNR Parks and Recreation Division reported that there were 1,649 camping nights at the Tomahawk Creek Flooding campground, with a total camping revenue of $21,307 (Jeremy Spell, MDNR Parks and Recreation Division, personal communication).

Analysis and Discussion

Tomahawk Creek Flooding is a relatively young waterbody among the glaciated natural lakes of northern Michigan. The dam is owned by the DNR, and with the lifespan of the structure nearing its end, it is starting to show signs of stress. Though it is a low hazard dam, a decision will need to be made soon on whether to replace the aging infrastructure or to remove the dam completely. Fish and angler surveys in recent decades showed the significant value of the entire flooding to the region and economy.

Since it is a relatively young impoundment (56 years), the fish community is subject to subtle changes. The relatively shallow and warm nature of the flooding dictates the fish communities that will prosper in it, and those that will not likely thrive.

Fishing is a popular activity for this waterbody throughout the year. Though slow growing, the diverse panfish population is abundant and dominated by Bluegill, Pumpkinseed, and Black Crappie, and to a lesser extent Rock Bass and Yellow Perch. Panfish attain large sizes through the potential to live long rather than having fast growth rates. Predators including Largemouth Bass and Northern Pike are common but both species also demonstrate slow growth. Some large bass are found in the waterbody. The bass fishery has enough quality to attract two registered bass fishing tournaments per year based on DNR records. The few large pike that are found are likely females. The current liberal pike regulation encourages harvest of smaller pike while trying to limit harvest of large females to allow them to propagate and perhaps control stunted panfish and even smaller, stunted pike. The non-game fish community is less diverse than what is found in other regional lakes. Bullheads, once very abundant, appear to be less abundant based on the most recent fish community survey. This is a positive which allows for reduced competition with game fish for food resources. Other non-game fish such as White Sucker and Bowfin are either reduced in numbers or absent.

Management Direction

1. Anglers should report their catches to Fisheries Division to help managers make more informed decisions regarding lake management. Biologists can capture fish community data through periodic surveying, but a more complete picture of the fishery can be achieved by gathering important fishery data from anglers. Angler reports are generally low when compared to the total number of anglers fishing our waterbodies. The next fish community survey should be done at Tomahawk Creek Flooding within the next 10-15 years.

2. Enough data exists demonstrating the quality fishery that Tomahawk Creek Flooding provides. There are also some data showing high usage. The lake is a popular destination for anglers throughout the year. It is often one of the first lakes regionally to have good ice cover, and usage is high in the winter. The flooding also has one good DNR boat launch and a campground along its shores that is widely used. All this points to the flooding as a continued good investment to the State of Michigan. Dam renovation (as compared to removal) is a viable option that needs to be examined soon due to signs of stressed infrastructure.

3. The regulations for Northern Pike at Tomahawk Creek Flooding allow for increased daily harvest and some protection of larger pike. This statewide regulation exception was changed in recent decades to allow anglers to harvest abundant small pike while simultaneously reducing confusion on pike regulations within the Black River watershed. Since we enacted these regulations, we have received no calls or concern with the regulation change. This regulation should stay in place.

References

Figure 1.-Location of Tomahawk Creek Flooding in Montmorency and Presque Isle counties of Michigan's northern Lower Peninsula. The flooding is shaded yellow.

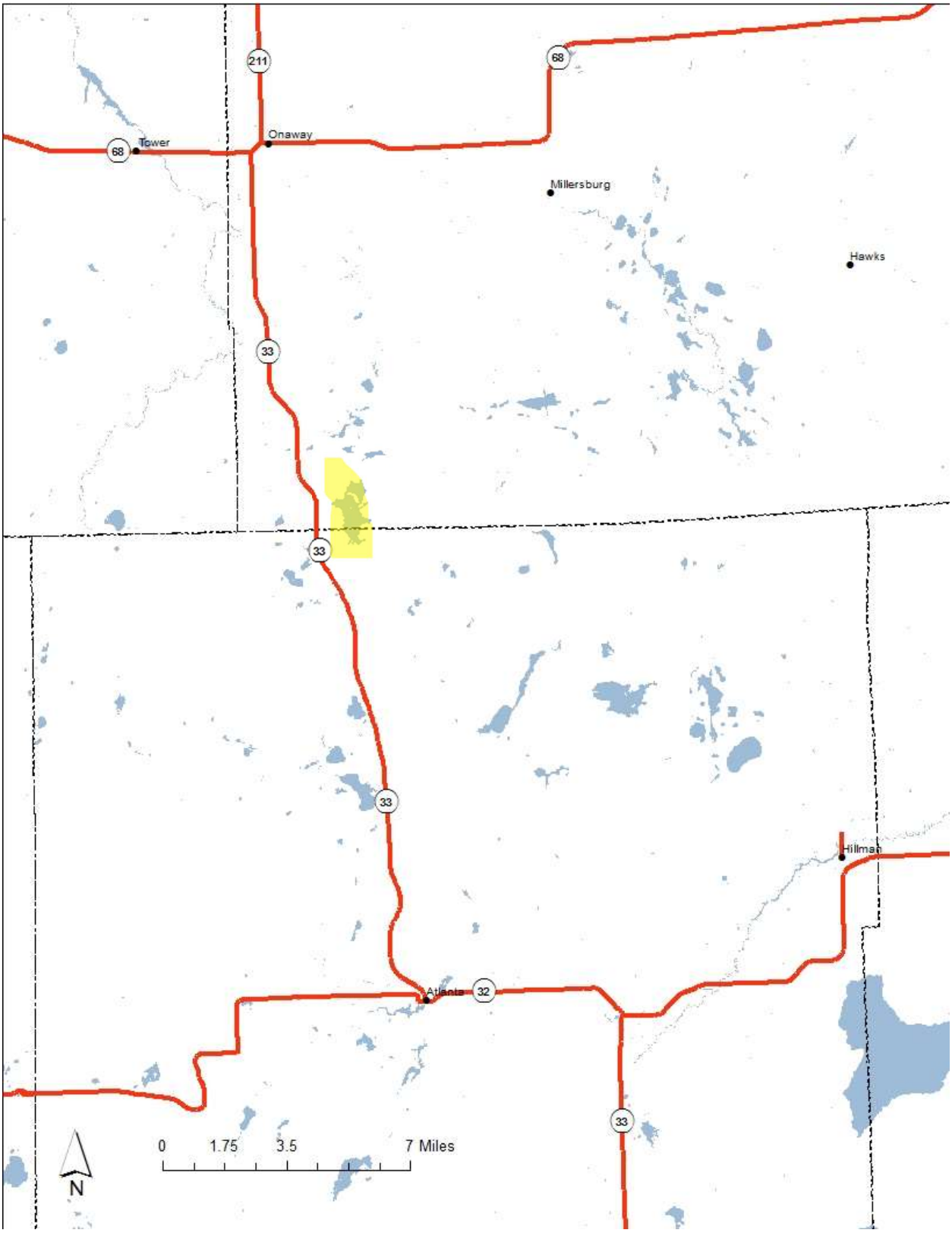

Figure 2.-Site map for Tomahawk Creek Flooding.

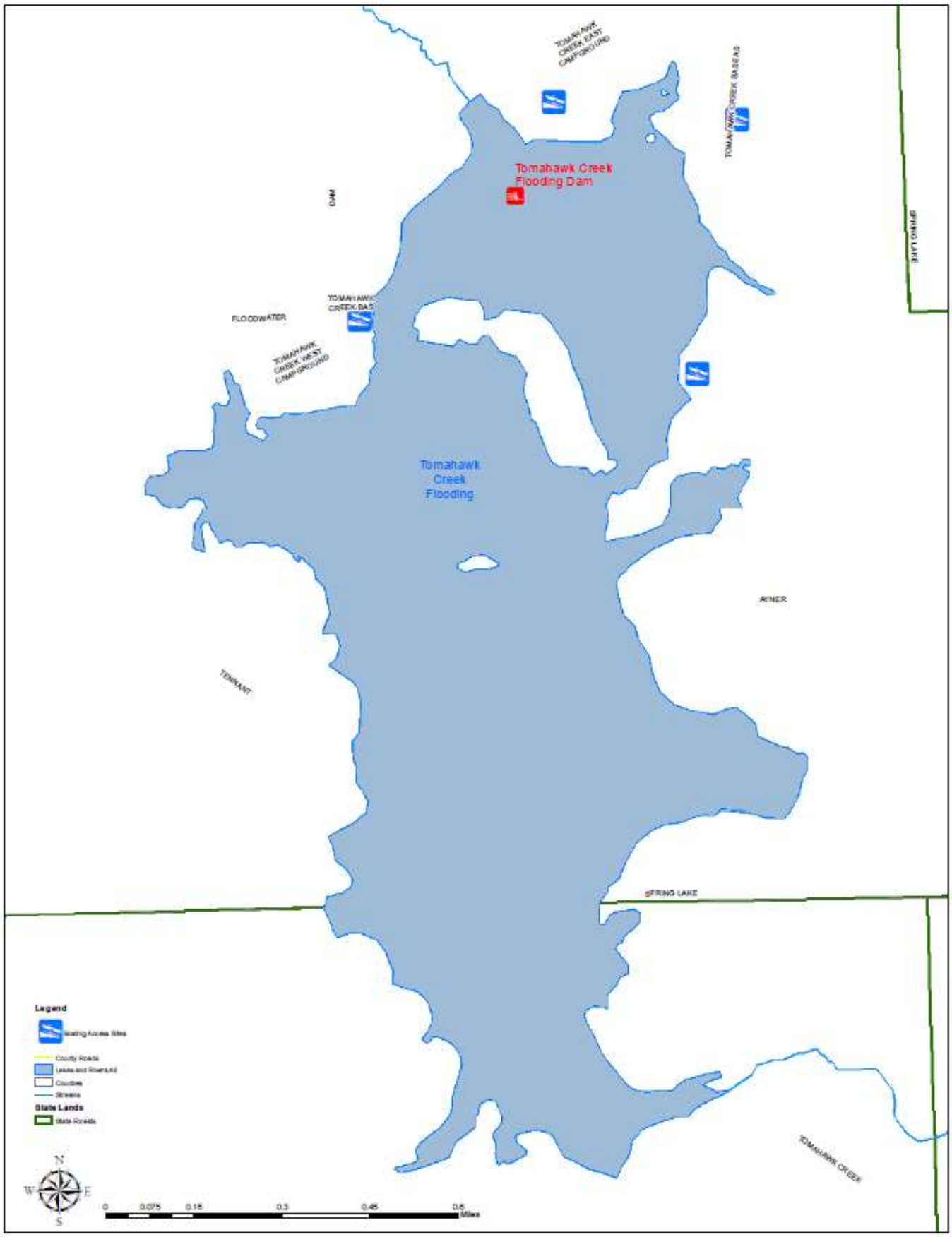

Table 1.-Fish collected from Tomahawk Creek Flooding June 1-6, 1983 by DNR with small-mesh fyke nets, and small- and large-mesh trap nets. Weight was estimated from Michigan length-weight relationships.

Species	Total Catch	Percent by number	Weight (lbs)	Percent by weight	Length range (in)
Bullhead sp.	2,968	37%	2,400.8	65%	7-14
Bluegill	1,975	25%	264.9	7%	3-10
Rock Bass	1,587	20%	469.4	13%	3-10
Pumpkinseed	1,099	14%	127.9	3%	3-8
Largemouth Bass	134	1%	153.9	4%	7-19
Northern Pike	111	1%	209.5	5%	11-35
White Sucker	27	<1%	60.7	1%	11-22
Yellow Perch	27	<1%	16.0	<1%	3-13
Total	**7,928**		**3,703.1**		

Table 2.-Length frequency distributions of fishes collected in 1983 and 2004 surveys at Tomahawk Flooding. The lengths represented in 1983 are a sub-sample of total catches. Sampling effort between surveys was not comparable.

Length (in)	**Black Crappie**		**Bluegill**		**L. Bass**		**N. Pike**		**Pumpkinseed**		**Rock Bass**	
	1983	2004	1983	2004	1983	2004	1983	2004	1983	2004	1983	2004
1				2								1
2				104		1				4		2
3			10	46					9	9	8	1
4		1	16	43					40	6	10	2
5		5	83	133					46	25	46	
6		5	171	71		2			37	36	48	5
7		6	34	23	4	7			7	22	12	2
8		12	23	9	5	2			2	3	13	3
9		14	7	1	24	5				2	11	1
10		6	1		20	13		1			4	
11					11	18	1					
12		2			7	15						
13		1			4	18	2					
14					16	12	1	1				
15					14	5	5	3				
16					10	6	9	6				
17					3	4	19	16				
18					4	2	16	15				
19					1		18	15				
20						1	2	12				
21							2	7				
22							7	7				
23							6	3				
24							1	9				
25							3	2				
26							3					
27							1					
28												
29								2				
30							1					
31												
32												
33												
34												
35							2					

Table 3.-Comparison of mean length (inches) at age for various game fishes of Tomahawk Creek Flooding from 1983 and 2004. Number in parentheses represents number aged. The growth index is the difference between the average growth for each species at the flooding in 2004 and the statewide average for that species across ages.

Species	Age group	June 1983	June 2004	Growth Index (in)
Black Crappie	I	--	--	-1.4
	II	--	--	
	III	--	5.9 (10)	
	IV	--	6.9 (4)	
	V	--	8.2 (10)	
	VI	--	9.0 (15)	
	VII	--	10.1 (7)	
	VIII	--	--	
	IX	--	12.8 (3)	
Bluegill	I	--	2.4 (2)	-0.9
	II	4.0 (16)	3.0 (15)	
	III	5.2 (12)	4.2 (9)	
	IV	6.4 (12)	5.3 (18)	
	V	7.5 (5)	5.8 (12)	
	VI	8.2 (7)	6.8 (12)	
	VII	9.9 (2)	7.8 (4)	
	VIII	--	8.3 (4)	
	IX	--	8.7 (4)	

Table 3.-Continued.

Species	Age group	June 1983	June 2004	Growth Index (in)
Pumpkinseed	I	--	--	-0.8
	II	3.3 (4)	3.3 (3)	
	III	3.6 (4)	3.7 (4)	
	IV	4.1 (15)	5.0 (8)	
	V	6.5 (12)	5.4 (10)	
	VI	6.4 (4)	6.3 (7)	
	VII	7.6 (2)	7.0 (13)	
	VIII	8.0 (2)	7.1 (15)	
	IX	--	8.3 (3)	
	X	--	9.8 (1)	
Rock Bass	I	--	--	-0.5
	II	2.7 (1)	2.0 (1)	
	III	4.0 (14)	4.1 (2)	
	IV	6.0 (15)	--	
	V	7.7 (11)	6.7 (7)	
	VI	9.0 (12)	7.7 (1)	
	VII	9.4 (8)	8.2 (3)	
	VIII	9.9 (5)	--	
	IX	--	9.6 (1)	

Table 3.-Continued.

Species	Age group	June 1983	June 2004	Growth Index (in)
Yellow Perch	I	--	--	--
	II	4.3 (3)	--	
	III	5.1 (2)	6.2 (3)	
	IV	5.6 (1)	6.6 (4)	
	V	--	--	
	VI	10.4 (5)	--	
	VII	11.4 (7)	--	
	VIII	12.3 (5)	--	
	IX	13.2 (4)	--	
Largemouth Bass	I	3.8 (1)	2.9 (1)	-1.3
	II	6.6 (1)	6.9 (2)	
	III	8.1 (9)	8.6 (14)	
	IV	10.3 (20)	10.8 (5)	
	V	11.0 (17)	11.8 (16)	
	VI	14.2 (13)	13.2 (27)	
	VII	15.7 (23)	15.8 (12)	
	VIII	17.8 (8)	16.6 (2)	
	IX	18.9 (2)	18.3 (6)	

Table 3.-Continued.

Species	Age group	June 1983	June 2004	Growth Index (in)
Northern Pike	I	12.5 (3)	10.9 (1)	-3.1
	II	17.3 (38)	16.7 (4)	
	III	19.0 (28)	18.5 (51)	
	IV	22.2 (15)	21.5 (17)	
	V	26.3 (6)	24.1 (2)	
	VI	31.4 (1)	24.5 (7)	
	VII	30.3 (2)	26.0 (4)	
	VIII	--	29.7 (1)	
	IX	35.7 (2)	--	

Table 4.-Fish collected from Tomahawk Creek Flooding June 7-11, 2004 by DNR with small- and large-mesh fyke nets, trap nets, inland gill nets, and seining. Weight was estimated from Michigan length-weight relationships.

Species	Total Catch	Percent by number	Weight (lbs)	Percent by weight	Length range (in)
Bluegill	432	51%	44.4	11%	1-9
Largemouth Bass	111	13%	129.6	32%	2-20
Pumpkinseed	107	13%	23.2	6%	2-9
Northern Pike	99	12%	182.0	45%	10-29
Black Crappie	52	6%	20.7	5%	4-13
Rock Bass	17	2%	3.8	4%	1-9
Bullhead sp.	9	1%	--	--	11-14
Yellow Perch	8	1%	1.1		5-8
Common Shiner	2	<1%	--	--	--
Total	**837**		**404.8**		

Table 5.-Water temperature, dissolved oxygen, and pH profile for Tomahawk Flooding, August 9, 2004.

Depth (ft)	Temperature (°F)	Dissolved Oxygen (ppm)	pH
Surface	74	8.4	8.3
1	73	8.4	8.4
2	73	8.4	8.4
3	73	8.4	8.4
4	73	8.4	8.4
5	73	8.4	8.4
6	73	8.4	8.4
7	73	8.4	8.4
8	73	8.3	8.4
9	73	8.3	8.4
10	73	8.3	8.4
11	73	8.4	8.4