Upper Bushman Lake
Oakland County, T4N R9E Sec 3
Clinton River Watershed, last surveyed 2011

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Environment

Upper Bushman Lake is a 32 acre lake located approximately 9 miles north east of the City of Pontiac in north central Oakland County. Upper Bushman Lake is comprised of three smaller connected lakes (Figure 1). The north lake is 3.7 acres, has relatively steep drop-offs to a depth of 26 feet and shoal areas are very limited (Figure 2). The middle lake is the smallest, being only 2.6 acres. This lake is deeper in the middle, but most of the area is shallow water shoals of five feet or less. The southern lake is the largest, 25.7 acres in size. There are two basins, one on the north side (32 feet deep) and one on the south side (13 feet deep). There are wide shoal areas along the east and southwest shores, with a shallow saddle going across the lake (Figure 2). The shoal areas in the middle and southern lakes were heavily vegetated. Aerial photographs taken during summer show extensive lily pads and other aquatic vegetation in the middle lake. Depending on water levels and amount of plant growth, it may be difficult to access the southern lake during certain times of the year. The water is brownish in color and water transparency is low; less than 4 feet.

This lake is in the headwaters of the Clinton River. The Clinton River is 79 miles long and originates just 2 miles upstream of Upper Bushman Lake. The area surrounding and immediately upstream of the lake is predominantly wetland. There are three inlets and one outlet to Upper Bushman Lake (Figure 1). The first inlet feeds into the north end of the north lake and originates from a 3.5 acres lake immediately upstream. The Clinton River is the second inlet and enters the north end of the southern lake through a wide wetland area. The third inlet flows into the southeast corner of the south lake from Whipple Lake, which is located south of Upper Bushman Lake. The Clinton River outlets Upper Bushman Lake at the south end of the south lake through a wide wetland connection. Because of the extensive wetlands surrounding the lake and the abundant aquatic vegetation on the shoals, the lake bottom is predominantly organic.

The surface geology of the surrounding area is glacial outwash sand and gravel and end moraines of course-textured till. This type of geology is well drained and allows good movement of groundwater. With the exception of some sparse housing, the Upper Bushman Lake watershed has extensive wetlands.

Upper Bushman Lake lies completely within Independence Oaks-North County Park. The property was purchased from a private owner in late 2010. The lake was officially opened to the public on May 28, 2011. There is a 30-space parking lot located east of the northern lake and a 312-foot boardwalk connecting to a 180-foot long fishing dock on the north lake. Given the extensive wetlands that surround the lake, the fishing dock is the only location that provides access for shore anglers. Hand carried canoes, kayaks, and other non-motorized boats can be launched by following a 1,200 foot long gravel trail from the parking lot to the northern lake.

History

Because this lake has been in private ownership, little information is known about the lake or its fishery. As noted earlier, the extensive wetlands around the lake limits shore angler access. The only place where anglers have been able to get onto this lake is to walk in from Oakhill Road, on the north side of the north lake (Figure 1). However, a fence stretched across the lake parallel to Oakhill Road which prevented people from fishing from the road or accessing the lake. The local conservation officer reported encountering a few anglers each year ice fishing on the north lake during winter. The anglers accessed the lake by walking in from Oakhill Road. The anglers caught good-sized bluegill and crappie, but were asked to leave because the lake was not open to the public. Fishing pressure has been extremely low on Upper Bushman Lake until it was opened to the public in spring 2011.

Current Status

A fish community survey was conducted on Upper Bushman Lake by DNR Fisheries Division during May 2011, before the lake was officially opened to the public. A variety of sampling gear was used to survey the entire fish community. Sampling consisted of 6 trap net lifts, 3 small-mesh fyke net lifts, and 2 gill net lifts during May 10-12, 2011 (Figure 1). The goal of this survey was to evaluate the current fish population and determine future management needs of the fishery.

A total of 360 fish were caught during the survey, represented by 12 species (Table 1). Panfish such as bluegill, pumpkinseeds, black crappie, and rock bass comprised 76% of the total catch by number and 28% by weight. Large game fish including largemouth bass and northern pike accounted for 14% by number and 62% by weight.

Bluegills were the most abundant fish caught. They represented 61% of the total catch by number and 21% by weight (Table 1). Bluegills ranged in size from 1 to 8 inches (Table 2) and in the fyke nets averaged an impressive 7.8 inches. Bluegills age-1 to age-3 were growing near the statewide average, but growth rates were well above-average for age-4 and older bluegill (Table 3).

The quality of the bluegill population in Upper Bushman Lake was evaluated using Schneider's Index. This index provides a relative measure of the quality of bluegill size in a lake, based on a scale from 1 to 7, with 7 being the best (Schneider 1990). Based on the fyke net catch, the bluegill in Upper Bushman Lake scored a 6.75 and ranked just below "superior."

Pumpkinseeds and largemouth bass were tied as the second most abundant fish, each making up 11% of the total catch by number (Table 1). Pumpkinseeds caught in the fyke nets averaged 7.6 inches, with 81% being larger than 7 inches. All age-classes of pumpkinseeds were growing above average (length-at-age), with an overall Mean Growth Index of +0.8 (Table 3). That means that pumpkinseeds in Upper Bushman Lake were growing about 0.8 inches longer than the statewide average length-at-age. A good range of age-classes were caught, with age-1 through age-9 pumpkinseeds represented in the catch (Table 4).

Largemouth bass made up 45% of the total catch by weight (Table 1). From all gear combined, the largemouth bass averaged a very impressive 15.8 inches. Age-1 to age-13 bass were represented in the catch, with the exception of the age-2 year-class (Table 4). Although the small sample sizes per age-class makes statistical analysis difficult, largemouth bass up to age-7 were growing close to the statewide average (Table 3). Growth rates were below average for age-8 and older largemouth bass.

Only 12 black crappie were caught. However, black crappie are not as susceptible to netting as bluegills, so this is likely not a true representation of their relative numbers. The crappie averaged 9.0 inches and 40% were 10 inches or larger. Age-1 to age-6 crappie were at or above-average length-at-age, but age-8 and older crappie were below average (Table 3).

The northern pike catch averaged 1.3 fish per fyke net. The pike averaged 23.2 inches and 55% exceeded the minimum size limit of 24 inches. Although there was a good size range of fish (Table 2), growth rates were generally below average. A variety of age-classes were represented in the catch, from age-1 to age-8 (Table 4).

Analysis and Discussion

There were good numbers of large bluegills and pumpkinseeds in Upper Bushman Lake. The average size of the fish in the fyke net catch for both species was well above average relative to other lakes in the Lake Erie Management Unit (LEMU), which covers southeast Michigan. The bluegill catch was evaluated using Schneider's Index, which is a relative measure of the quality of the bluegill size in a lake. The bluegills in Upper Bushman Lake were just shy of a perfect score of 7 and are rated just below "superior." This is the highest score Schneider's Index in LEMU. The catch of large fish is even more impressive considering that catch rates were average for bluegills, and 4 to 7 times higher relative to the mean catch rate in other LEMU lakes (Table 5).

Although the overall size of panfish was large, growth rates varied by species. Bluegills had average growth rates up to ages-3 and above average growth rates for bluegills age-4 and older. Once bluegills reach about 5 inches, they appear to be released from a bottleneck and experience good growth. This shift in growth rate may be related to the abundance of predators. In lakes with high predator abundance, smaller fish are often restricted to less desirable habitat, resulting in slower growth rates. As the bluegills get larger and are less susceptible to predation, they shift to more preferred habitat and growth rates improve. All age-classes of pumpkinseeds had above-average growth rates.

There was a good age-distribution for both bluegills and pumpkinseeds in the catch; bluegills up to age-7 and pumpkinseeds up to age-9. Although there was a range of age classes, roughly one-third of the catch for both bluegills and pumpkinseeds were made up of age-1 fish. The abundance of young fish is encouraging, given the fact that spawning habitat appeared limited for panfish and largemouth bass based on field observations. These species are nest builders and prefer sand and gravel substrate to build their nests (Becker 1983). However, Upper Bushman Lake is heavily vegetated and the bottom is predominantly organic.

Black crappie were not abundant. Growth rates were average for age-1 to age-6 crappie, but slowed and were below average for older fish. Although growth rates were slower for older fish, the catch of larger fish makes them an important component of the fishery. Rock bass is a species that is both common and fairly abundant in southeast Michigan lakes, but had very low catch rates in Upper Bushman Lake. This is not unexpected given the type of habitat available in Upper Bushman Lake. Rock bass have a distinct preference for clear lakes, with gravel or rocky bottom (Becker 1983).

The largemouth bass catch was excellent with catch rates in the fyke nets 2-3 times greater than the catch rate in other LEMU lakes (Table 5). The wide range of age-classes represented consistent production and good survival to older age-classes. There is a stock pile of older fish, with almost one-

quarter of the catch made up of age-10 and older largemouth bass. These older fish are large (18+ inches) and preferred by anglers. The abundance of large bass is attributed to the lack of fishing pressure on this lake.

Northern pike catch rates were also good, averaging 2-4 times the average catch per effort of other LEMU lakes (Table 5). Age-classes 1 to 8 were represented in the catch, with the exception of age-3. Pike typically exhibit greater variability in spawning success than other species, but the presence of 7 age-classes indicates good reproduction in Upper Bushman Lake. This is not surprising as northern pike require marsh habitat and aquatic vegetation to spawn. Although we have seen the loss of this type of habitat in lakes in Oakland County with high levels of residential development and shoreline alterations, pike spawning habitat is abundant in Upper Bushman Lake.

Lakes that are open to fishing generally have a different looking fish community than those that are closed to fishing. Both increased mortality from harvest and selective harvest of larger fish will reduce the number and size of fish in a lake. The above average catch rates for pumpkinseeds, largemouth bass, and northern pike, the abundance of large-sized fish, and the broad age range of game fish, are all indications that fishing pressure has been very light on Upper Bushman Lake.

Upper Bushman Lake has a high level of predators; largemouth bass and northern pike accounted for 62% of the total catch by weight. Schneider found that lakes which had a higher proportion of their fish biomass in piscivores were better fishing lakes (Schneider 1981). The abundance of large predators contributes to a balanced fish community.

Management Direction

Upper Bushman Lake supports a high quality fishery. Both catch rates and the size of panfish are very good. Even more impressive is the population of largemouth bass; abundance and size of largemouth bass is well above average relative to area lakes. The abundance of large fish in Upper Bushman Lake is consistent with a lake that has had no or very limited fishing pressure. The lack of harvest allows these bass to reach large sizes and the abundance of large bass provides predatory control to keep a balanced fish community.

In order to maintain the high quality fishery in this relatively small lake, we recommend that Upper Bushman Lake be nominated for designation as a Quality Non-Trout Fishing Lake.

The goal for managing Upper Bushman Lake through special regulations (catch-and-release) is to provide diverse fishing opportunities. Diverse public fishing opportunities are created by managing select inland waters for quality fishing which includes maximizing the size of fish and the subsequent of large fish. Although restrictive regulations are required to create this diverse opportunity, there is an abundance of public fishing opportunities that allow harvest, both in the immediate area and even within the existing park.

Upper Bushman Lake is a prime candidate for special regulations. Survey results document that this lake has the biological potential to support a high quality fishery (high catch rates and large-sized fish). Extensive wetlands comprise the shoreline of the lake making it relatively inaccessible to anglers. This creates two advantages, 1) limited access facilitates enforcement of special fishing regulations; and 2)

provides an "up-north" aesthetic to the lake, which can be best enhanced by preserving the presence of large fish and diverse fishing opportunities through catch and release regulation.

Managing fishing on Upper Bushman Lake with special regulation provides a unique opportunity. There are only 37 lakes in the state that allow a variance from the "standard" fishing regulations. Only one of these is in southeast Michigan, and that lake does not have public access. Upper Bushman Lake would be the only public access lake in southeast Michigan managed with special regulations. Anglers looking for unique fishing opportunities seek out these types of lakes which serve as a regional recreation draw for anglers.

References

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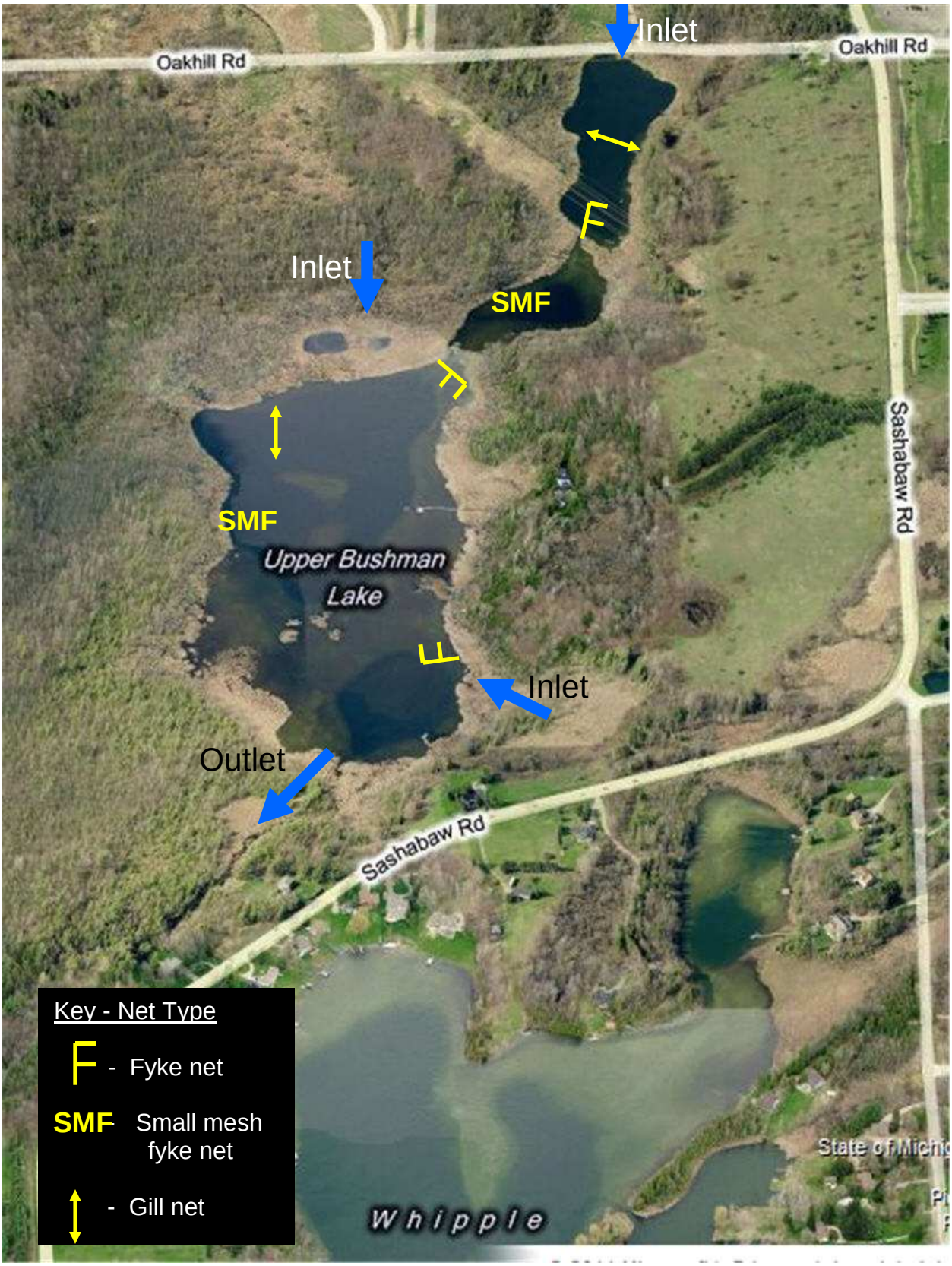

Figure 1.-Map of Upper Bushman Lake, including net set locations.

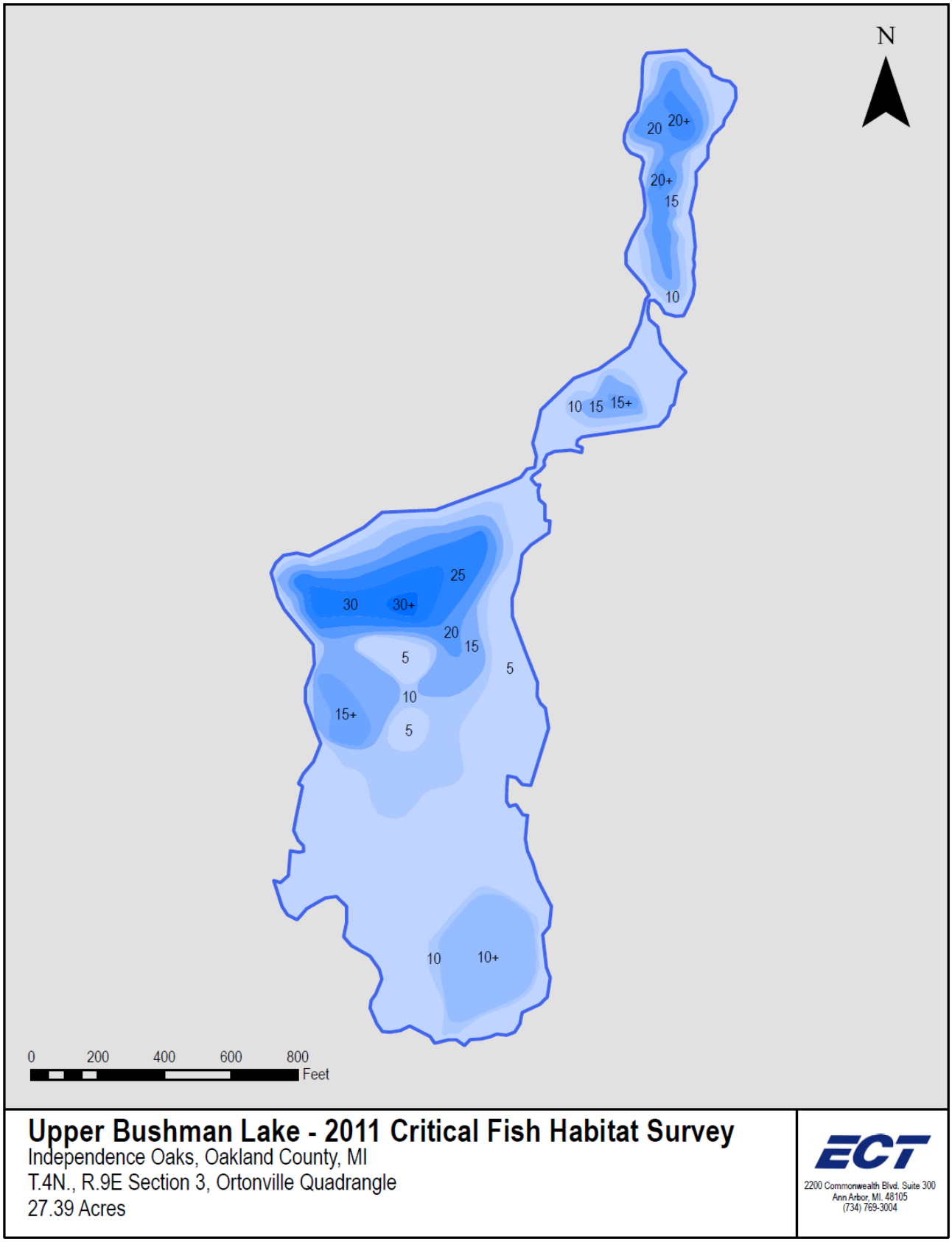

Figure 2.-Bathymetry map of Upper Bushman Lake, Oakland County.

Table 1.-Species catch and relative abundance of fishes collected with all gear types combined during the Upper Bushman Lake fish community survey May 2011.

Species	Number	Percent by number	Weight (lb)	Percent by weight	Length range (in)	Average length (in)	Percent legal size*
Bluegill	221	61.4	43.1	20.6	1-8	5.6	55
Pumpkinseed	41	11.4	10.6	5.1	1-8	6.0	66
Largemouth bass	41	11.4	95.3	45.4	3-20	15.8	76
Brown bullhead	26	7.2	18.4	8.8	7-13	11.4	100
Black crappie	12	3.3	5.5	2.6	4-11	9.0	92
Northern pike	11	3.1	35.0	16.7	9-30	23.2	55
Warmouth	2	0.6	0.3	0.1	5-6	6.0	100
Yellow bullhead	2	0.6	1.1	0.5	10	10.5	100
Rock bass	1	0.3	0.3	0.1	7	7.5	100
Blackchin shiner	1	0.3	<0.1	<0.1	2	2.5	--
Central Mudminnow	1	0.3	<0.1	<0.1	3	3.5	--
Lake chubsucker	1	0.3	<0.1	<0.1	3	3.5	--

*Legal size refers to the minimum legal size limit where applicable or minimum size acceptable to anglers.

Table 2.-Number per inch group of important game fishes collected with all gear types combined, during the 2011 Upper Bushman Lake fish survey.

Length (in)	Black crappie	Bluegill	Largemouth bass	Northern pike	Pumpkinseed
1		8			1
2		67			11
3		9	1		
4	1	8			
5		8			2
6		15			6
7	3	61			13
8	1	45			8
9	2			1	
10	4		1		
11	1		2		
12			4		
13			2		
14			3		
15			3		
16			7		
17			9		
18			5	1	
19			3		
20			1		
21				1	
22				1	
23				1	
24				2	
25				1	
26				1	
27					
28				1	
29					
30				1	

Table 3.-Mean length-at-age (inches) for selected fish species from Upper Bushman Lake 2011. Number in parenthesis represents the number of fish aged.

Species	Age group	State average	Total length (inches)	Mean Growth Index[1]
Black crappie				--
	I	4.2	4.0 (1)	
	III	7.5	7.8 (4)	
	IV	8.6	9.4 (3)	
	V	9.4	10.3 (3)	
	VI	10.2	10.5 (1)	
	VIII	11.4	10.4 (1)	
	IX	11.9	11.7 (1)	
Bluegill				+0.4
	I	1.8	2.2 (19)	
	II	3.8	3.7 (9)	
	III	5.0	4.9 (10)	
	IV	5.9	6.7 (7)	
	V	6.7	7.8 (18)	
	VI	7.3	8.0 (3)	
	VII	7.8	8.1 (1)	
Largemouth bass				-0.7
	I	4.2	3.1 (1)	
	III	9.4	11.1 (3)	
	IV	11.6	12.3 (3)	
	V	13.2	13.5 (3)	
	VI	14.7	15.0 (4)	
	VII	16.3	16.3 (7)	
	VIII	17.4	16.8 (4)	
	IX	18.3	17.6 (7)	
	X	19.3	18.4 (2)	
	XI	--	18.4 (4)	
	XII	--	19.5 (2)	
	XIII	--	19.5 (1)	
Northern pike				--
	I	11.7	9.9 (1)	
	II	17.7	18.8 (1)	
	IV	23.4	22.7 (3)	
	V	25.5	24.3 (2)	
	VI	27.3	26.4 (1)	
	VII	29.3	30.5 (1)	
	VIII	31.2	26.9 (2)	

Table 3.-Continued

Pumpkinseed				+0.8
	I	1.8	2.3 (11)	
	IV	5.6	5.9 (3)	
	V	6.2	7.0 (7)	
	VI	6.6	7.7 (6)	
	VII	7.1	7.8 (5)	
	VIII	7.5	8.2 (4)	
	IX	--	8.4 (3)	

[1]Mean Growth Index is the average deviation from the state average length-at-age.

Table 4.-Weighted age frequency (percent) of selected fish species collected in Upper Bushman Lake, May 10-12, 2011.

Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	Number caught
Black crappie	8		33	17	20	7		7	8					
Bluegill	34	4	4	13	36	7	2							
Largemouth bass	2		7	7	7	10	17	10	17	5	10	5	2	
Northern pike	9	9		27	18	9	9	18						
pumpkinseed	29			9	16	16	13	10	7					

Table 5.-Comparison of catch-per-effort (CPE) for selected species in Upper Bushman Lake. The statewide and LEMU CPE's were obtained from Wehrly et al. draft.

		Statewide CPE			**Upper Bushman**	LEMU CPE
Species	Gear	25th perc.	Median	75th perc.	**2011**	Mean
Bluegill	Fyke	2.5	8.5	25.9	**19.5**	23.6
	Small mesh fyke	1.5	6.3	19.5	**34.7**	39.8
Pumpkinseed	Fyke	0.4	1.7	4.7	**4.3**	0.6
	Small mesh fyke	1.0	2.7	8.0	**5.0**	1.2
Largemouth bass	Fyke	0.4	1.4	2.8	**6.7**	1.9
	Small mesh fyke	0.5	1.0	2.0	**0.3**	0.6
Northern pike	fyke	0.3	0.8	1.6	**1.3**	0.3
	Small mesh fyke	0.3	0.5	0.8	**0.7**	0.3