Osmun Lake

Cheboygan County, T34N, R1W, S23 and 24
Milligan Ck/Upper Black River watershed, surveyed 2007

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Environment

Osmun Lake is a 48 acre natural lake in the southern half of Cheboygan County. The inlet enters on the southwest shore after draining a swampy area. The outlet on the northeast shore is a small stream which flows over a modified control structure on its way to Weed Creek. This is in the Milligan Creek/Upper Black River watershed. Osmun Lake has several shallow basins separated by small islands. Most of the lake is less than 4 feet deep, and is 10 feet at its deepest point. As such, the lake may be susceptible to winter-kill in certain years when conditions are right. Aquatic vegetation of various kinds can be found in the lake, but none are abundant. The bottom substrate consists of muck, sand, and marl. A small unimproved boat access exists on the north end of the lake but is not suitable for launching large boats or wide trailers. However, there currently are no boating restrictions on Osmun Lake. The riparian zone consists of both hardwood and conifer trees. The entire shoreline is undeveloped. The land around the lake is owned by the State of Michigan and governed under the rules of the Pigeon River Country State Forest. Ownership of the land around Osmun Lake was transferred to the State of Michigan from private ownership in the early 1980s. No MDNR records of fish stocking exist for Osmun Lake. The current State of Michigan fishing regulations apply with the minimum size limit for largemouth bass set at 14-inches and a daily bag limit for panfish of 25 fish.

History

No fish community surveys have occurred at Osmun Lake prior to this one. This lake has been open to public fishing since the 1980s. An early report for the lake suggested it was one of the best bluegill and bass lakes in the management district during the early years of state ownership.

Current Status

Osmun Lake is relatively easy to fish because of the limited amount of deep water that is readily available to anglers on the lake. This coupled with easy access to spawning fish in shallower waters at certain times of the year could result in periodically high harvest and mortality rates for important sport fish species or increased selective harvest of larger, older or faster growing fish. A recent fish management survey was completed on Osmun Lake by MDNR Fisheries Division in late-May 2007. That survey was done to evaluate the fish community and determine the possibility of designating Osmun Lake as a new "Quality Fishing Lake" given the potential for an imbalance between recruitment, growth, and mortality of select sport fish species. Sampling effort consisted of two large-mesh trap-net lifts, three large-mesh fyke-net lifts, two small-mesh fyke-net lifts, and two mini-fyke-net lifts. Surface water temperature throughout the survey ranged from 68-70ºF. Panfish were observed spawning during the survey effort. Snapping-, Blandings-, and painted turtles were also captured during the fish community survey.

A total of 611 fish were captured from six species during the survey (Table 1). Bluegill and largemouth bass were the most numerous fish species in our sample and represent the greatest opportunity for

developing a quality sport fishing experience for anglers. The size and age structure of bluegill and largemouth bass were evaluated to assess interactions among additions (recruitment), growth, and losses (natural mortality + fishing mortality) in the population.

Bluegills are abundant in Osmun Lake representing 87% of our total sample in May 2007. A range of sizes and ages of bluegill were collected during the survey. The sample was dominated by 6 and 7 inch bluegill, with several 8 inch fish, and even a few 9+ inch fish collected (Table 2). Aside from young-of-year fish, we were able to establish bluegill ages 2 through 9 in our sample (Table 3). Age 5 fish, ranging in size from 6.6 to 7.8 inches, were most plentiful in the sample with a weighted age frequency of nearly 50%.

One tool used by managers to evaluate growth of fish in a lake is the Growth Index (GI) (Schneider 2000). This index calculates the average deviation (inches) from the seasonal state average lengths at age established through extensive sampling across many lakes and years in Fisheries Division. Positive GI values indicate fish are growing relatively faster than the established state averages and negative values indicate fish are growing relatively slower. Bluegills in Osmun Lake have a GI value of +0.5, meaning that they are growing a half-inch faster than similar aged bluegill across the state. Slow growth commonly indicates that few large fish will be produced, food supply is constrained, and recruitment is not properly balanced by mortality (Schneider et al. 2000). By the same token, a fast growing fish population suggests that recruitment and total production could be improved through management actions that increased the number of larger individuals in the population and balanced growth across a stable distribution of sizes and ages of fish.

Another evaluation tool for Michigan bluegill populations was devised by Schneider (1990). He developed an empirical scoring system based on length-frequency statistics of bluegill sampled with several types of gear. The length-frequency indices incorporated were average length and proportions of the catch larger than 6", 7", and 8". Resulting scores of 3 to 4 indicate average population size structures, scores of 1 to 2 indicate populations lacking large fish (and usually slow-growing, but possibly short-lived), and scores of 5 to 7 indicate unusually high proportions of relatively large bluegill (which are fast-growing or long-lived). Applying the tool to our bluegill sample from Osmun Lake resulted in a score of 5.25, thus categorizing the lake's bluegill population between good and excellent. Two components of the scoring system for Osmun Lake bluegill were very near the excellent rating (i.e., the percentage of fish greater than 6-inches and the percentage of fish greater than 7-inches). If either or both components could be marginally improved through management actions the overall score for Osmun Lake's bluegill population would approach excellent outright.

Information about large and old fish is also very valuable to fish managers. According to Schneider (2000) it reflects the important interaction between growth and mortality, which determines potential angling quality (abundance of large fish) and longevity (maximum age). Schneider was able to calculate the probabilities of finding older fish in a typical low-intensity sampling effort using the relationship between sampling gear efficiencies and an assumed total annual mortality rate (i.e., natural and fishing mortality combined) of 60% for age 3 and older fish. That assumption was based on years of sampling by Fisheries Division staff. Comparing Schneider's predicted age distribution for bluegill in our sample with what we observed produced some interesting results. The predicted percentage of age 4 bluegills in our sample was substantially lower than expected either indicating a poor year class in 2003, higher than average total annual mortality rates for those fish, or that selectivity of our

sampling gear was not comparable to Schneider's findings for this age group. The opposite was true of age 5 fish. Age 5 bluegills were substantially higher than predicted suggesting either a very strong 2002 year class or a lower than average annual mortality rate. Predicted verses observed values for age 7 fish were similar and observed values were slightly higher than predicted for ages 8 and 9 fish in our sample. These results were compatible with an estimated annual mortality rate for bluegill of 54% from catch-curve analysis; slightly lower than was used to generate Schneider's predictions. Clearly it is better to estimate mortality rates from more intensive sampling of population age structure; however, agreement between two relatively easy to calculate indices suggests the interaction between growth and mortality of bluegill in Osmun Lake is sufficiently balanced to provide both an abundance of larger fish and better than expected longevity (ages 8 and 9 fish). Any management actions that would further increase both the abundance of larger fish available to anglers and the maximum age in the population while maintaining a stable age distribution would improve the potential for developing a quality fishing experience.

Sendek (2006) specifically proposed another tool to assess the current status of a lake relative to the goals of "quality" fishing, and to assess the potential of a lake to produce quality fish in the future. Proportional Stock Density or PSD can provide information on the current status of a lake, based on the size distribution of fish in a survey (Anderson 1976). PSD (%) is determined from lengths of fish captured in a sample of the fish population. It is equal to the number of fish in the sample greater than or equal to some desirable or "quality" stock size divided by the number of fish greater than or equal to an established minimum stock size and multiplied by 100. Similar to PSD, Relative Stock Density or RSD can be calculated to characterize the size distribution of the population relative to even larger size categories including preferred, memorable and trophy categories (Wege and Anderson 1978). For bluegill, the established minimum stock size is 3-inches, the quality stock size is 6-inches, preferred stock size is 8-inches, memorable stock size is 10-inches, and trophy stock size is 12-inches.

Sendek proposed that for Michigan, the designation of a "Quality Non-Trout Fishing Lake" requires regulations aimed at producing fish populations that maintain a targeted proportion of preferred and larger fish; however, he also suggested that future validation of the RSD criteria is needed as additional "Quality Fishing Lakes" are established. The current guidelines for establishing a Quality Fishing Lake for bluegill targets a population sample with 60% preferred fish, 5% memorable fish, and 1% in the trophy category. The RSD-8 (relative stock density 8-inches and larger) of bluegill based on our Osmun Lake sample is only 11%. However, the PSD-6 (proportional stock density 6-inches and larger) of bluegill is 84%. So, while Osmun Lake currently provides one 8-inch or larger bluegill for every ten fish larger than 3 inches, a substantial percentage of the remaining fish in that group are 6-inches or larger.

By this definition then, Osmun Lake already provides a quality bluegill fishery, and management actions designed to increase the number of 8-inch fish available could meet the suggested Quality Fishing Lake designation criteria in a relatively short time provided some catastrophic increase in fishing or natural mortality doesn't take place. Such catastrophes could include a significantly increased focus on harvest by local anglers (increased fishing mortality) or a massive winter-kill (increased natural mortality). With ten ages of bluegill present in the population it seems unlikely that winter-kill is occurring on a regular basis.

Largemouth bass were the next most abundant fish species in our survey of Osmun Lake. As with bluegill, a range of sizes and ages of bass were collected during the survey, and other larger fish were observed during our effort. Largemouth bass captured during our survey ranged in size from 4+ to 18+ inches, with most being in the 12-inch size category (Table 2). We were able to establish largemouth bass ages 1 through 10 in our sample (Table 3). Ages 4 and 5 fish, ranging in size from 9.2 to 13.9 inches, were most numerous in our sample with a combined weighted age frequency of 57%. Largemouth bass in Osmun Lake reach the legal minimum size limit for harvest of 14-inches typically by age 6 (Table 3). Successfully developing Osmun Lake into a quality fishing lake for bluegill depends also on maintaining a healthy or quality bass population. That's because bass are an efficient predator on young bluegill and play an essential role in balancing recruitment, growth, and mortality for that species in such fisheries.

Largemouth bass in Osmun Lake have a GI value of -0.5, meaning that they are growing a half-inch slower than similar aged largemouth bass across the state. Despite the possibility that slower growing populations may not produce many large fish, the presence of 17+ and 18+ inch bass in a relatively small sample (i.e., a total of 48 bass were collected during the survey) suggests this is not the case in Osmun Lake. Still, it seems reasonable that there may be management opportunities to increase growth rates and numbers of larger individuals in the population.

We were able to use the observed percentages of age 3+ largemouth bass in our sample to evaluate the interaction between growth and mortality in the Osmun lake population. When comparing Schneider's predicted age distribution for largemouth bass in our sample with what was actually observed we found that Osmun Lake largemouth bass ages 4 and older were consistently higher than would be expected when assuming a total fishing mortality rate of 60%. Again, this result is supported by our estimated total mortality rate of 35% for largemouth bass in Osmun Lake, and the presence of other larger bass in the lake not vulnerable to our sampling gear.

Analysis and Discussion

It's fair to conclude that winter-kill is not a major factor of natural mortality for fish in Osmun Lake at this time given the range of fish sizes and ages observed in our 2007 survey catch. Recruitment, growth, and mortality rates appear relatively good for both bluegill and largemouth bass compared to other populations across the state. Because few other fish species currently reside in this small lake we can safely characterize it as a true bass-bluegill fish community.

Little or no data on fishing effort and harvest rates exist for Osmun Lake. Anecdotal reports from local anglers suggest fishing pressure and harvest is quite low during some years but can become high periodically. Many small northern Michigan lakes with limited primary productivity have bluegill populations targeted by anglers. It is common for such lakes to exhibit "boom and bust" bluegill fisheries governed by high periodic harvest when populations of desirable sized fish are large and angler perception is that fishing is good. These boom bluegill fisheries are often followed by a resting period when exploitation drops off because harvest rate, size of fish, or both fall below angler expectations for the lake. It is during these low exploitation periods that bluegill recruitment can rebuild and fish are again able to grow to desirable sizes and population numbers. Based on our 2007 fish community survey we believe such a bluegill fishery currently exists in Osmun Lake.

Bluegill growth in Osmun Lake is above average and estimated mortality rates lead us to believe the lake should support a greater abundance of larger, older fish than observed in our sample. This could be explained by a boom and bust bluegill fishery whereby larger, older fish were removed from the population through high fishing effort and mortality sometime in the recent past. If the preponderance of this mortality is due to fishing, then such fluctuations may be indicative of a boom and bust bluegill fishery in operation on Osmun Lake. It is also possible that the lower than expected abundance of larger, older bluegill in the population could be explained by limited primary productivity of the lake or periodic high natural mortality through predation by bass or some other cause. However, the stable distribution of age classes for both bass and bluegill seems to argue against these alternative explanations.

Largemouth bass harvest is probably negligible in Osmun Lake. Our evaluation of mortality rates for largemouth bass suggests that mortality has remained fairly stable over the ages present in our sample. That stability is likely indicative of background or natural mortality being the dominate factor contributing to bass removals from the population all other things being equal. The species is quite abundant with growth only slightly below the statewide average. Largemouth bass will be the single most important predator for maintaining healthy, balanced bluegill populations in Osmun Lake if we are able to control bluegill fishing mortality through management actions, and will provide additional quality fishing opportunities for anglers as well.

Management Direction

Osmun Lake provides good potential to be designated a Quality Non-Trout Fishing Lake as established by Fisheries Order 244. Relatively few lakes in Michigan are established as quality lakes. Regionally, the nearest quality lake for panfish to Osmun Lake is South Blue Lake in Montmorency County. South Blue Lake is also located within the Pigeon River Country State Forest, and is very popular for quality largemouth bass and bluegill fishing. The fishing regulations we propose for Osmun Lake are similar to other designated quality lakes and specifically include the following: 1) harvest of all fish species is prohibited; 2) artificial lures and flies are the only fishing tackle allowed; and, 3) that the open season for fishing is limited to the last Saturday in April through September 30th each year.

Fisheries Order 244 proposes several criteria for determining the suitability of a lake for quality non-trout fishing lake designation. These include angler access; contaminant and fish consumption concerns; frequency of winter-kill events; fish population dynamics; level of public support for such designation; evaluation of the outcomes from designation; and any social-political concerns in play at the time of designation. Not all criteria need be met at the same time however.

Angler Access

A lake designee must have public access. That access may be restricted in ways to promote non-motorized use but can include lakes with developed boat ramps too. Watercraft restrictions are encouraged because a pristine, tranquil setting is often associated with a quality fishing experience.

The entire shoreline of Osmun Lake is forested and in state ownership essentially ensuring public access. Anglers are currently able to access a narrow, unimproved ramp on the north end of the lake that will likely limit the size of boat anglers can use for fishing. We further recommend watercraft

restrictions limiting the use of all but electric motors on Osmun Lake. We suggest such limited use of motorized vessels be established for Osmun Lake through the appropriate land use orders.

Contaminant Concerns Resulting in Fish Consumption Ban

In some cases, lake designees may have contaminant concerns and advisories against consuming fish by the Michigan Department of Community Health. There are some who believe such deterrent to eating fish from a designee lake could lead to improved compliance with restrictive harvest regulations. However, there are no known contaminant concerns in Osmun Lake so no such disincentive exists. Consequently, compliance with the proposed harvest restrictions on Osmun Lake will remain largely a law enforcement issue.

Frequent Winter-Kill Events

Lakes with frequent winter-kill events, defined as more than once in a ten year period, are not considered good candidates for designation. This is because both cool and warm water game fish species often have life spans that can exceed ten years, and lakes with frequent winter-kill events do not allow for the longevity normally associated with producing fish of the desired age and size.

Based on our age and growth analysis for bluegill and largemouth bass winter-kill does not seem to be a frequent occurrence at Osmun Lake. We believe the current availability of old, large fish indicates a rarity of winter-kill events in the recent past. Further, that the potential for increasing abundance of older, larger bluegill and largemouth bass in the future is not significantly limited by prospective winter-kill events in the future.

Population Dynamics

Only lakes with potential to produce a quality fishery should be considered for designation. Growth, recruitment, and mortality are three biological factors that must be considered in determining if a specific lake is a good candidate. Key game fish species should have growth rates likely to produce individuals of large size. A reasonable balance between annual recruitment and mortality is also necessary to allow adequate numbers of fish to survive to older age groups.

Our preliminary analysis of growth, age distribution, and mortality, along with additional indices for bluegill, suggests no inherent factors are present in Osmun Lake limiting the abundance of large fish. It is more likely that periodic high harvest rates have determined the presence or absence of larger individuals over time. We believe placing harvest, tackle, and season restrictions on the fishery could sufficiently increase the abundance of large bluegill and largemouth bass in Osmun Lake to meet the recommended population dynamics metrics described in Fisheries Order 244.

Public Support

It is critical anglers understand that successful implementation of Quality Non-Trout Fishing Lake designation requires compliance with restrictive fishing regulations. Without public support or significant law enforcement, compliance is likely to be inadequate and the new regulations will be ineffective in developing or maintaining a quality fishery.

Quality lake designation would restrict all fish harvest, the types of fishing tackle allowed, and length of the open fishing season on Osmun Lake. Consideration should be given to public opinion regarding this proposal.

Evaluation

Evaluation of designated lakes should be conducted within ten years. If fish size structure and abundance is not responding as expected under the designation an assessment documenting the current fish population structure and all prescribed management actions taken should be done to determine if other management options are available to meet the quality fishery goals.

A follow-up evaluation of Osmun Lake will also be mandatory to determine regulation effectiveness. We expect fish size structure and abundance to respond in a significant and positive manner, and that the fishery is being used by anglers. If these positive developments do not occur, then Osmun Lake will no longer be designated as a Quality Non-Trout Fishing Lake. We propose fish community surveys mimicking the 2007 survey effort are accomplished at least twice more over the next ten years after designation.

Social Political Concerns

Angler values have been trending away from harvest towards opportunities to catch memorable or even trophy sized fish for several decades now, at least in some waterbodies. These trends do not seem to be species specific but span a wide range of game fish species of interest, and requests for more quality angling opportunities continue to increase. Fisheries Division continues to look for opportunities to accommodate such angling interests while still providing harvest opportunities for the angling public.

Establishment of quality fishing lake regulations for Osmun Lake is consistent with recommendations of the Pigeon River Country Concept of Management (Michigan Department of Natural Resources 2007). That plan represents more than 30 years of agency and public collaboration in setting the management direction of the Pigeon River Country. Over that time we have worked closely with the Pigeon River Country Advisory Council and the public to be responsive to the needs and wishes of the people recreating in the Pigeon River Country. The plan provides among other things that lakes containing species of fish other than trout be managed to protect and sustain those species of fish, and the habitats upon which they depend, in a way that provides recreational angling opportunities appropriate for each individual lake. The Pigeon River Country Concept of Management specifically says that fishery management actions may include the establishment of restrictive fishing regulations using the guidance documented in Fisheries Order 244. As such we believe our recommendations sufficiently accommodate the current social political concerns existing for Osmun Lake.

References

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Table 1. Species collected during the 2007 Osmun Lake survey.

Species	Number Collected	Percent of Total Catch
Bluegill	529	87%
Largemouth bass	48	8%
Pumpkinseed	16	2%
Black bullhead	9	1%
Brown bullhead	7	1%
Green sunfish	2	<1%

Table 2. Length frequency of game fish collected during the 2007 Osmun Lake survey.

Length (in)	Largemouth bass	Bluegill	Pumpkinseed
1		6	
2			
3			
4	1	10	
5	1	74	
6	6	212	3
7		162	7
8	1	52	
9	4	7	
10	3		
11	8		
12	12		
13	4		
14	6		
15	2		
16			
17	1		
18	3		

Table 3. Age and growth of bluegill and largemouth bass in Osmun Lake 2007.

Species/Age	No. Aged	Length Range (in)	Weighted mean length (in)	State Average Length (in)	Mean growth index*
Bluegill					+0.5 in
Age II	3	4.1 – 4.4	4.2	3.8	
Age III	16	4.5 – 5.9	5.5	5.0	
Age IV	5	5.9 – 6.9	6.5	5.9	
Age V	14	6.6 – 7.8	7.2	6.7	
Age VI	3	7.0 – 7.8	7.8	7.3	
Age VII	4	8.3 – 8.5	8.4	7.8	
Age VIII	6	8.5 – 9.0	8.7	8.2	
Age IX	6	9.0 – 9.4	9.2	8.6	
L. Bass					-0.5 in
Age I	1	4.8	4.8	4.2	
Age II	2	5.2 – 6.0	5.6	7.1	
Age III	3	7.3 – 9.8	9.1	9.4	
Age IV	17	9.2 – 12.8	11.5	11.6	
Age V	10	11.3 – 13.9	12.3	13.2	
Age VI	6	13.5 – 14.7	14.1	14.7	
Age VII	3	14.7 – 15.3	15.0	16.3	
Age VIII	2	15.5 – 17.4	16.5	17.4	
Age IX	1	18.1	18.1	18.3	
Age X	2	18.6 – 18.7	18.7	19.3	

* compared to the statewide average for the species

Table 4. The percentage of fish in netting or electrofishing samples that should be met or exceeded to achieve relative stock density values for quality lake fishing criteria. The 2007 results for Osmun Lake bluegill is also listed.

Species/Location	Preferred (% 8 in and larger)	Memorable (% 10 in and larger)	Trophy (% 11 in and larger)
Bluegill-quality lake goal	60%	5%	1%
Bluegill-Osmun Lk 2007	11%	0%	0%

Table 5. The percentage of fish in netting or electrofishing samples that should be met or exceeded to achieve relative stock density values for quality lake fishing criteria. The 2007 results for Osmun Lake largemouth bass is also listed.

Species/Location	Preferred (% 15 in and larger)	Memorable (% 20 in and larger)	Trophy (% 25 in and larger)
L. bass-quality lake goal	60%	10%	1%
L. bass-Osmun Lk 2007	12%	0%	0%