Duel Lake

Mackinac County, T42N, R11W, Sections 22, 23, 26 & 27
Last Surveyed: 2011

Darren R. Kramer, Fisheries Management Biologist, Escanaba

Environment

Duel Lake is located in southwest Mackinac County near Gould City (Figure 1). It has a surface area of approximately 220 acres, and the maximum depth is approximately 15 feet. One island is located in the center of the lake and consists mainly of jumbled rock and large boulders. There are no inlets or outlets, and the lake bottom substrate varies from sand and gravel to scattered large boulders. Little emergent aquatic vegetation is found along the shoreline while some submerged aquatic vegetation (Elodea and Potamogeton spp.) exists in scattered colonies found mostly in the deeper offshore waters and also around the island. Downed timber is scattered along the shoreline and an area of slab wood (from historical sawmill operations) is found in the southeast area of the lake.

The immediate landscape surrounding Duel Lake consists of lacustrine sand and gravel and thin to discontinuous till over glacial bedrock. Principle soil associations are mostly sands and loamy sands and are well- to excessively drained. Land cover types consist of northern hardwoods and aspen to the south west and north with lowland coniferous forest found to the east. Land uses in the surrounding area are primarily for timber and outdoor recreation.

Boat access is gained through launching from the northern shoreline; there is no improved (i.e. gravel or concrete) launch ramp available. Dispersed camping opportunities are allowed, and most of the camping occurs in the grassy- level area located adjacent to Duel Lake on the northern shore.

History

Duel Lake is located in an area known locally as Simmons Woods. In 1902, the Simmons Company bought holdings of virgin timber in southwestern Mackinac County. This was the beginning of the Simmons Woods village and construction of housing began on Duel Lake's north shore. The first lumber mill was then constructed on the southeast shore of the lake. In early 1907, the Simmons Lumber Company sold the property and a fire destroyed the town store and adjacent buildings. The sawmill burned down along with most of the remaining buildings and houses in 1913. (Anonymous 2005).

In the 1960s, Bethlehem Steel acquired the Simmons Woods property for use as a potential source of limestone/dolomite rock. Quarrying operations never commenced, but Bethlehem Steel maintained a caretaker on the property. The company allowed recreational uses of the property such as fishing, hunting, camping and day use through fees paid at the gate by the caretaker's house. Most of the recreational use was dispersed throughout the area, except there were group camping sites at Duel Lake and the shoreline on nearby Lake Michigan (Anonymous 2005).

The Lake Michigan shoreline of the Simmons Woods property was identified in the early 1980s by the Michigan Natural Features Inventory as an important natural area. Through funding from the Natural Resources Trust Fund, Simmons Woods was acquired by the Michigan Department of Natural Resources (DNR) over a two-year period for just under 4 million dollars with the largest block being acquired in 1995. The balance of the property was acquired by the state the following year totaling about 10,000 acres.

The first documented fisheries survey was completed in the late 1920s by John Nicholas Lowe who was a general biologist who taught at the Northern State Teachers College (now Northern Michigan University) starting in 1919. After arriving at Marquette he started assembling random fish collections and expressed a general interest in determining the fish fauna of the Upper Peninsula. Lowe surveyed (seine only) Duel Lake in 1929 and captured a total of 10 species: blacknose shiner, bluntnose minnow, brown bullhead, central mudminnow, golden shiner, Iowa darter, northern pike, western banded killifish, white sucker and yellow perch.

A fisheries survey was conducted in 1996 by DNR staff to initially inventory the fish community after the state acquired the property. Abundant populations of minnows, white suckers and yellow perch were documented as well as limited numbers of predators (mainly small northern pike). As it was observed that spawning habitat for northern pike was virtually absent, it was assumed that the pike were stocked or transferred fish and that the population would thus eventually decline in abundance without successful natural reproduction leaving the fish community without a predator. Management recommendations were then made to stock black crappie and smallmouth bass to take advantage of the abundant forage base and provide additional angling opportunity. Subsequently, smallmouth bass fingerlings were stocked from rearing ponds in 1997 and 1998 (Table 1); black crappie were never stocked.

A second fisheries survey was conducted in 2000 by DNR staff to determine if the previous smallmouth bass stocking efforts were successful. Natural reproduction was documented from the survey; fish captured represented four years of natural reproduction (ages 1-4). Additionally, one 10-year old bass was captured.

A total of 15 species of fish have been captured during fisheries surveys that were conducted on Duel Lake from 1929-2011 (Table 2). Schneider (2002) indicated that the total number of species present in a lake is related to lake size (larger lakes tend to have more species than smaller lakes) and connectivity. Duel Lake provides relatively diverse aquatic habitats and supports a moderate number of species as compared to many other lakes in the Northern Lake Michigan Management Unit (NLMMU).

Current Status

In May 2011, DNR Fisheries Division conducted a Status and Trends survey on Duel Lake. Assessment gear included fyke nets, gill nets, mini-fyke nets, a seine, and an electrofishing boat. From May 23-26, crews completed six large-mesh fyke net lifts, six trap net lifts, four experimental gill net lifts and four mini-fyke net lifts. During the night of May 26, three 15-minute electrofishing transects

were conducted at three separate locations around the shoreline. Captured fish were identified to species; measured for total length; a scale, fin spine or fin ray sample was collected from common sportfish for age and growth analysis; and fish were then released back into the lake.

A total of 1,752 fish representing 11 species were collected from the combined May netting and electrofishing efforts (Table 3). In terms of the number captured during the survey, rock bass were the most abundant (comprising 45% of the total catch), bluntnose minnow were second at 22% and white sucker were third at 8% (Table 3). In terms of biomass captured during the survey, white sucker comprised 44% of the survey catch, rock bass were second at 31%, and smallmouth bass were third at 18% (Table 3).

Brown bullhead (n=46) averaged 8.8 inches in total length and ranged from 5-12 inches (Table 4). Approximately 89% of the brown bullhead caught during the survey were 7 inches or longer.

Pumpkinseed sunfish (n=32) averaged 6.4 inches in total length with 66% of the fish meeting or exceeding an acceptable harvest length of 6 inches (Table 3). Pumpkinseed sunfish ranged from 3-8 inches (Table 4). Age-growth data indicated that pumpkinseed sunfish were growing at the statewide average with a mean growth index (MGI) of +0.2 inches (Table 5). A MGI of 0.0 indicates that the sampled population is growing at exactly the state average for the species in question. An index of +1.0 or -1.0 indicates that the sampled population is either growing 1.0 inch faster or 1.0 inch slower than average. A general rule is that satisfactory growth indices for panfish (e.g. bluegill, pumpkinseed sunfish) are in the range of +0.5 to -0.5 while the range for gamefish (e.g. bass, northern pike) is +1.0 to -1.0 (Schneider et. al 2000). The age distribution of pumpkinseed sunfish was ages 3 through 8 in the survey catch (Table 5).

Rock bass (n=790) averaged 6.2 inches in total length with 43% of the fish meeting or exceeding an acceptable harvest length of 6 inches (Table 3). Rock bass ranged from 1-9 inches (Table 4). Age-growth data indicated that rock bass were growing at the statewide average with a MGI of +0.1 inches (Table 5). The age distribution of rock bass was ages 2 through 8 in the survey catch (Table 5).

Smallmouth bass (n=124) averaged 9.7 inches in total length with 22% of the fish meeting or exceeding the minimum harvest length of 14 inches (Table 3). Smallmouth bass ranged from 3-19 inches (Table 4). Age-growth data indicated that smallmouth bass were growing at the statewide average with a MGI of -0.2 inches (Table 5). The age distribution of smallmouth bass was ages 1 through 6 in the survey catch (Table 5).

White sucker (n=143) averaged 15.2 inches in total length and ranged from 8-21 inches (Table 4).

Yellow perch (n=86) averaged 5.8 inches in total length with 33% of the fish meeting or exceeding an acceptable harvest length of 7 inches (Table 3). Yellow perch ranged from 1-13 inches (Table 4). Age-growth data indicated that yellow perch were growing under the statewide average with a MGI of -0.9 inches (Table 5). The age distribution of yellow perch was ages 3 through 6 and 9 in the survey catch (Table 5).

Other species captured during the survey included bluegill, bluntnose minnow, fathead minnow, Iowa darter, and western banded killifish (Table 3).

A concurrent shoreline habitat survey documented the absence of buildings, docks and armored shoreline (riprap, seawalls), features commonly found on other lakes in the NLMMU. Submerged trees and wood were also surveyed in the littoral zone, and wood in Duel Lake was found to be abundant with 140 pieces/mile as compared to the NLMMU average of 77 pieces/mile.

Analysis and Discussion

The current fish community in Duel Lake can be generally characterized as having the following: 1) a panfish community dominated by rock bass (in terms of abundance), 2) a predator population consisting of smallmouth bass with average growth, and moderate mortality which allows few fish to attain old ages and grow to relatively large sizes, 3) an abundant white sucker population, and 4) a moderately diverse minnow/shiner/darter community of unknown abundance.

The smallmouth bass population is supported entirely through natural reproduction as no additional stocking efforts have occurred since 1998. The population appears to be of relatively high abundance, and growth was found to be average. Smallmouth bass are reaching sizes at least up to 19 inches, and a total of six year classes were captured during the survey indicating relatively moderate mortality for this population as the oldest bass was found to be age 6. Schneider (2000) proposed that mortality is within the expected range if the maximum aged fish in a good survey sample was age 8. Alternatively, if fish age 10 or older are found, then that suggests mortality is probably low. Overall, the smallmouth bass population is providing an acceptable fishery and is satisfying its role of predator on the forage and panfish populations in Duel Lake.

Panfish populations of rock bass, pumpkinseed sunfish and yellow perch all provide angling opportunity but vary from each other in terms of abundance, longevity and size structure. Rock bass dominated the survey catch and the high population abundance is indicative of the amount of habitat and forage available in Duel Lake to support them. Rock bass are growing at an acceptable rate and longevity in Duel Lake appears to be about average, and some fish live long enough to reach 9 inches. Pumpkinseed sunfish are not very abundant (as also found in previous surveys). Fish are exhibiting acceptable growth rates, mortality appears average and fish live long enough to attain sizes up to 8 inches. The yellow perch population is exhibiting slow growth and relatively small size structure characteristics (majority of population consists of smaller-sized fish) indicating that mortality (natural and/or fishing) is most likely high. Schneider et al. (2007) suggested that healthy, adequately buffered and self-sustaining populations may have some yellow perch over age 7 and 9 inches in length, and the population in Duel Lake essentially fails to meet either benchmark as only 1 large and older (age 9) yellow perch was captured during the survey. Overall, rock bass provide the best angling opportunity for panfish given their high abundance in Duel Lake while pumpkinseed sunfish and yellow perch add some diversity to the creel.

The non-game fish community is moderately diverse and is dominated in abundance by bluntnose minnow with several other species (e.g. fathead minnow, Iowa darter, Western banded killifish) rounding out the community. All of these species probably compete with juveniles of game species for forage resources but are no doubt preyed upon by larger predators. Currently, white sucker abundance appears to be comparable to previous fish surveys in 1996 and 2000.

The current fish community in Duel Lake is similar to that found from the 2000 survey. The initial transfers of smallmouth bass have been successful in that the population is self-supporting though natural reproduction. The northern pike present in Duel Lake (captured during the 1996 and 2000 surveys) have left the system either through angler harvest or natural mortality, and this was expected as Duel Lake does not contain habitat conducive to successful natural reproduction by northern pike. Fishing opportunities for panfish are limited to mainly rock bass with pumpkinseed sunfish and yellow perch also available.

Management Direction

1) Enhance fishing opportunities in Duel Lake by introducing another member to the panfish community. Black crappie fisheries are relatively scarce in the eastern Upper Peninsula, and Duel Lake does appear to provide suitable habitat in terms of water chemistry and physical structure. The NLMMU will transfer adult black crappie from a suitable donor population to Duel Lake. The transfer of fish will follow the protocols and procedures as outlined in Fisheries Division Policy and Procedure 02.02.023 (Wild Fish Transfer Policy) and MDNR fish stocking guidelines (MDNR 2004). A fisheries survey will be scheduled 4-6 years after the transfer of fish to investigate if the black crappie population will be self-sustaining through natural reproduction.

2) Anglers are encouraged to report sport catches of all species to the NLMMU. Reports are useful to track population trends over time and aid further management of the fishery.

References

Anonymous 2005. Simmons Woods Management Plan. Michigan Department of Natural Resources. Lansing, Michigan.

MDNR (Michigan Department of Natural Resources) 2004. Stocking guidelines for various species of fish. Chapter 5 in Dexter, J. L., Jr., and R. P. O'Neal, editors. Michigan fish stocking guidelines II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 32, Ann Arbor.

Schneider, J. C., P. W. Laarman, and H. Gowing. 2000. Age and growth methods and state averages. Chapter 9 in Schneider, James C. (ed.) 2000. Manual of fisheries methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Schneider, J. C. 2000. Interpretation of fish community population indices. Chapter 21 in Schneider, J. C. (ed). 2000. Manual of fisheries methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Schneider, J. C. 2002. Fish as indicators of lake habitat quality and a proposed application. Michigan Department of Natural Resources, Fisheries Research Report 2016, Ann Arbor.

Schneider, J. C., R. P. O'Neal, and R. D. Clark, Jr. 2007. Ecology, management, and status of walleye, sauger, and yellow perch in Michigan. Michigan Department of Natural Resources, Fisheries Special Report 41, Ann Arbor.

Figure 1. –Locator map for Duel Lake, Mackinac County.

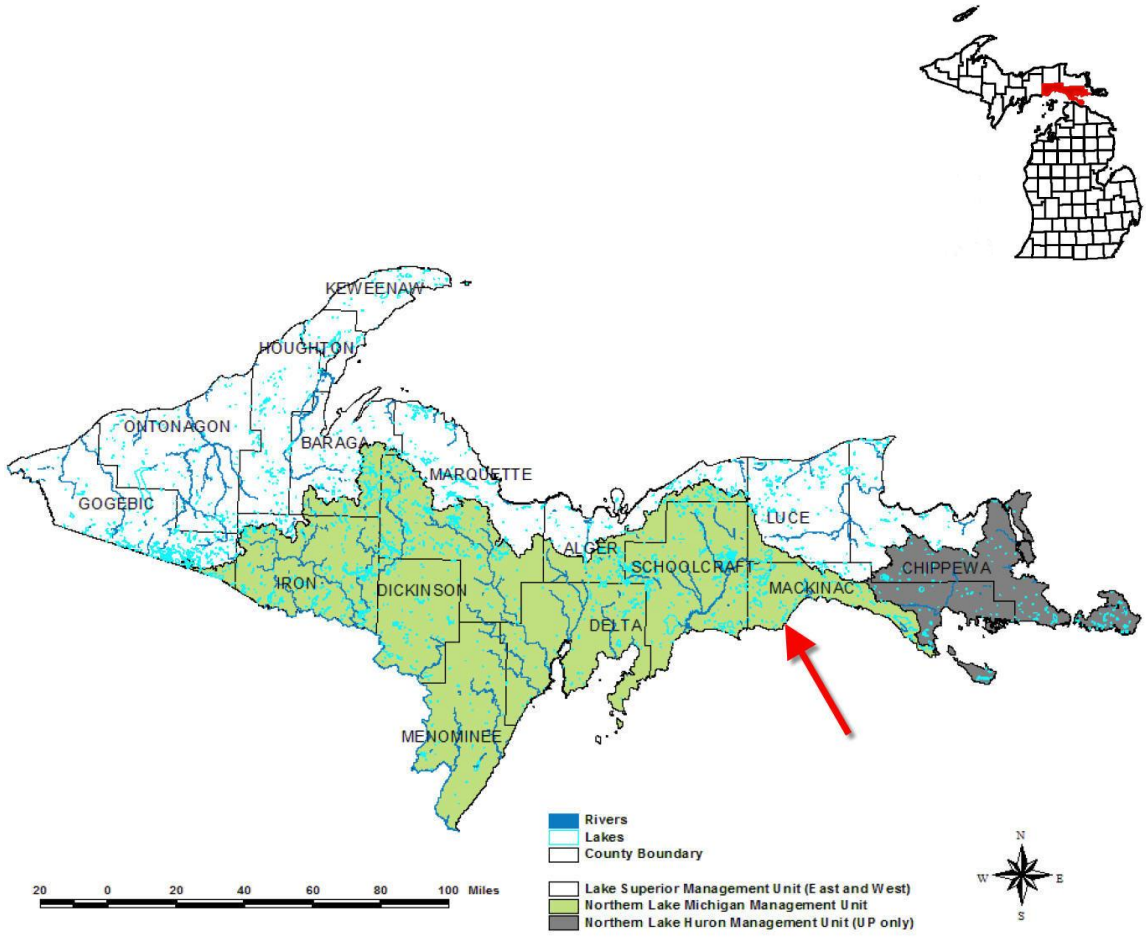

Table 1.-Known fish stocked into Duel Lake, Mackinac County. Data from DNR, Fisheries Division records.

Year	Species	Number	Rate (#/acre)	Size (inches)
1997	Smallmouth bass	5,512	25	3.0 inches
1998	Smallmouth bass	4,981	23	1.7 inches

Table 2.-List of fishes captured during surveys (1929 to 2011) of Duel Lake, Mackinac County. Origin: Native=N, I=Introduced. Status: P (present)=recent observations. Data from DNR, Fisheries Division records.

Common Name	Scientific Name	Origin	Status
Blacknose shiner	*Notropis heterolepis*	N	
Brown bullhead	*Ameiurus nebulosus*	N	P
Bluegill	*Lepomis machrochirus*	I	P
Bluntnose minnow	*Pimephales notatus*	N	P
Central mudminnow	*Umbra limi*	N	
Fathead minnow	*Pimephales promelas*	N	P
Golden shiner	*Notemigonus crysoleucas*	N	
Iowa darter	*Etheostoma exile*	N	P
Northern pike	*Esox lucius*	I	
Pumpkinseed sunfish	*Lepomis machrochirus*	N	P
Rock bass	*Ambloplites rupestris*	N	P
Smallmouth bass	*Micropterus dolomieu*	I	P
Western banded killifish	*Fundulus diaphanous menona*	N	P
White sucker	*Catostomus commersoni*	N	P
Yellow perch	*Perca flavescens*	N	P

Table 3.-Number, weight, length, and percentages of fishes collected from Duel Lake, Mackinac County, in May 2011. Data from DNR, Fisheries Division records.

Common name	Number	Total weight (lbs.)	Average length (in.)	Length range (in.)	Percent of catch by number	Percent of catch by weight	Percent legal or acceptable size
Bluegill	1	-	9.5	-	<1	<1	100 (≥6”)
Bluntnose minnow	382	<1	1.6	1-2	22	<1	-
Brown bullhead	46	17	8.8	5-12	3	3	-
Fathead minnow	2	<1	3.0	-	<1	<1	-
Iowa darter	62	<1	1.6	1-2	4	<1	-
Pumpkinseed sunfish	32	7	6.4	3-8	2	1.5	66 (≥6”)
Rock bass	790	154	6.2	1-9	45	31	43 (≥6”)
Smallmouth bass	124	89	9.7	3-19	7	18	22 (≥14”)
Western banded killifish	84	<1	2.0	1-3	5	<1	-
White sucker	143	222	15.2	8-21	8	44	-
Yellow perch	86	10	5.8	1-13	5	2	33 (≥7”)

Table 4.-Total catch by length range of select fishes collected from Duel Lake, Mackinac County in May 2011. Data from DNR, Fisheries Division records.

Inch group	Brown bullhead	Pumpkinseed	Rock bass	Smallmouth bass	White sucker	Yellow perch
0	-	-	-	-	-	-
1	-	-	1	-	-	3
2	-	-	-	-	-	16
3	-	1	56	4	-	-
4	-	1	22	6	-	4
5	1	9	375	12	-	10
6	4	14	77	22	-	25
7	15	4	198	13	-	25
8	12	3	60	6	3	2
9	2	-	1	7	8	-
10	5	-	-	6	8	-
11	2	-	-	5	1	-
12	5	-	-	9	3	-
13	-	-	-	7	20	1
14	-	-	-	15	34	-
15	-	-	-	6	12	-
16	-	-	-	4	7	-
17	-	-	-	-	19	-
18	-	-	-	1	12	-
19	-	-	-	1	6	-
20	-	-	-	-	7	-
21	-	-	-	-	3	-
22	-	-	-	-	-	-

Table 5.-Weighted mean length (inches) at age and growth relative to the state average for select species of fish sampled from Duel Lake, Mackinac County, in May 2011. Number of fish aged is in parentheses. Data from DNR, Fisheries Division records.

	Age Group											
Species	0	1	2	3	4	5	6	7	8	9	10	Mean growth index[1]
Pumpkinseed	-	-	-	5.1 (2)	5.6 (9)	6.4 (10)	7.8 (3)	8.1 (2)	8.1 (1)	-	-`	+0.2
Rock bass	-	-	4.0 (5)	5.4 (9)	5.8 (14)	7.3 (13)	7.9 (3)	8.4 (5)	8.9 (2)	-	-	+0.1
Smallmouth bass	-	4.4 (5)	6.4 (23)	9.0 (24)	12.8 (32)	13.3 (11)	17.5 (5)	-	-	-	-	-0.2
Yellow perch	-	-	-	5.4 (13)	6.8 (15)	7.6 (7)	8.4 (1)	-	-	13.9 (1)	-	-0.9

[1]Mean growth index is the average deviation from the state average length at age.