

## **PORTAGE LAKE**

*St. Joseph County (T5S, R10W, Sec. 7, 8, 18)*

**Surveyed June, 1998**

**Jay K. Wesley**

### **Environment**

Portage Lake lies in north central St. Joseph County, southwestern Michigan, about 5 miles northwest of the Village of Mendon. The lake is natural, having been formed during the Wisconsinian glacial stage (10,000 to 75,000 years ago). The 199 square-mile watershed contains the Portage River, Portage Creek, Bear Creek, and Portage Lake Drain. The Portage River flows through the lake from north to south and eventually joins the St. Joseph River and Lake Michigan.

The topography of the watershed is that of gently rolling hills made up of moderately well drained ground moraines and sandy outwash plains. The soils are classified as Oshtemo-Spinks associations, which are well-drained loamy and sandy soils. The watershed is primarily used for agriculture, but contains scattered woodlots, wetlands, and residential homes.

Portage Lake is 510 acres in size and maximum depth is reported to be either 37 feet (according to Land and Water Management Division records) or 60 feet deep (according to Humphrys 1962). The lake probably has a relatively high flushing rate due to substantial input from the Portage River. The mean annual flow of the river at Parkville is 80.8 cfs (Holtschlag and Eagle 1985). The mean depth of Portage Lake is unknown (there is no hydrographic map of the lake) but if it is 20 feet, then the lake flushes in only 0.2 years. The substrate is mostly made up of sand, gravel, and organic material.

Water quality conditions are unknown, but there have been no water quality complaints to my knowledge. No limnological surveys have been conducted on the lake by the Fisheries Division, but the Land and Water Management Division (data provided by Ralph Bednarz) recorded the following information from summer sampling: Secchi disk 6 feet, alkalinity 182 ppm, surface pH 8.0, and surface total phosphorus 23 ppb. The lake stratifies in summer, with dissolved oxygen becoming totally depleted at the bottom waters.

Portage Lake is a popular recreation lake. Only about 46% of the shoreline is lined with cottages and homes, while wetlands and wooded areas make up the rest. There is a State of Michigan owned public boat launch on the southwest side of the lake that can accommodate 30 vehicles with trailers.

### **Fishery Resource**

There is no historical fishery survey data available for Portage Lake. However, creel survey data collected by Conservation Officers from 1956 to 1962 indicate that the lake supported good bluegill, black crappie, pumpkinseed, rock bass, and yellow perch fisheries. Fish stocking occurred as early as 1934 according to Michigan Fish Commission reports, but Portage Lake may have been stocked in the late 1800's along with many other Michigan lakes. Between 1934 and 1945, various combinations of bluegill, largemouth bass, and yellow perch were stocked ([Appendix 1](#)).

The first survey of fish populations was conducted June 9-11, 1998. We used four 6'x3'x1.5" mesh standard trap nets (12 net lifts), four 125' experimental gill nets (10 net lifts), and 1.0 hours of night-time 250-V DC boomshocking. Netting was conducted for 3 nights.

The fish community found in 1998 contained 24 species ([Table 1](#)). Black crappie, bluegill, pumpkinseed, largemouth bass, yellow perch, and northern pike were the predominate sport fish, as they were in the 1956-1962 creel surveys. Overall, sport fish populations were in great shape.

The bluegill was the most abundant species collected by number. Only 14% of those collected were of acceptable size (>6 inches). Growth rates were at the state average ([Table 2](#)). Six-year classes were present in the survey, and most (42%) of the bluegill collected were age 3 ([Table 3](#)). The 1995 year class was large. Using Schneider's index of bluegill populations (1990), this population ranked average (3.3) to poor (2.0) on a scale of 1-7, using trap net and boomshocker length-frequency data, respectively. The trap net index of 3.3 is considered to be the more reliable because catches by electrofishing tend to be less consistent.

The yellow perch was the second most abundant species collected by number and 23% were of acceptable size (>7 inches). Five-year classes of yellow perch were present, and growth was near the state average. Year class strength was consistent between 1998 and 1995, but survival apparently dropped between age 4 and 5, when perch reached acceptable size.

The black crappie population appeared to be good with fish up to 12 inches. Thirty five percent of those collected were of acceptable size. Six year classes were present with ages ranging from 2 to 10 ([Table 2](#)). The 1988, 1995, and 1996 year classes were strong, while 1989, 1990, 1992, and 1993 were weak. Black crappie were growing at the state average rate.

A total of 98 largemouth bass ranging from 1-18 inches was collected ([Table 1](#)). Thirty-seven percent were of legal size (>14 inches). Seven-year classes were collected, and growth rates were good. Recruitment appeared to be consistent, but survival was low for the 1992 (age 7) year class. Largemouth bass reproduction may have been poor that year due to cold weather caused by the eruption of Mount Pinatubo, Philippines.

Thirty-four northern pike were collected ranging from 19 to 29 inches, which comprised 18.2% of the total catch by weight. Growth rates were at or slightly below the state average, but 62% of the catch was over legal size. Recruitment appeared to be low with only 9% of the catch represented by age 1-2 fish, but this could also result from the selectivity of our sampling gear for larger and older pike. Five-year classes were present. Northern pike can spawn in wetland areas in the northern part of the lake and in wetlands along the Portage River and Bear Creek.

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One 10-inch walleye was collected. It probably migrated into Portage Lake from the Portage River. Indian Lake, which also connects to the Portage River upstream of Portage Lake, has been stocked regularly by the lake association. Also, there may have also been some illegal (without a permit) stocking in Portage Lake that was not reported to the Fisheries Division.

Hybrid sunfish were unusually plentiful in Portage Lake. Seventy-eight hybrids were collected ranging in size from 3 to 8 inches. Forty-six percent of the hybrid sunfish were over acceptable size. The hybrids were probably of natural origin, but illegal stocking may have occurred.

The forage base is good and diverse. We collected golden, common, and spottail shiners; bluntnose minnow; common carp; brook silverside; white, spotted, and redhorse suckers; and logperch ([Table 1](#)). The abundance of top predators such as northern pike, largemouth bass, smallmouth bass, bowfin, and longnose gar apparently has not depressed forage fishes.

Six species of turtles and one mudpuppy salamander were collected incidentally in the trap and gill nets ([Table 4](#)). Map and painted turtles were most abundant. These turtle species are commonly taken in lake surveys, but the mudpuppy was a rare find.

The overall fish population of this lake is good, and there have been no complaints about the fishery. Anglers report good catches of northern pike and black crappie. The bass fishing has been good and attracts several tournaments a year.

### Management Direction

Portage Lake will continue to be managed as a warmwater fishery. Our goal into the next century will be to maintain the good fish community. Full surveys with standard trap nets, experimental gill nets, and night time boomshocking are recommended every 10 to 20 years to monitor the overall fish community. Limnological surveys should be conducted at the same times. It should be a high priority to produce a topographic map of the lake.

Report completed: May 8, 2000.

### References

Holtschlag, D.J., and D.V. Eagle. 1985. Stream Discharge in Michigan- Miscellaneous Measurements. United States Geological Survey Report 350, Lansing.

Humphrys, C.R. 1962. Michigan lake Inventory. Michigan State University, Department of Resource Development Bulletin 78, East Lansing.

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10, Ann Arbor.

**Table 1.**-Number, weight, and length (inches) of fish collected from Portage Lake with trap nets, gill nets, and DC boomshocker, June 9-11, 1998.

| Species          | Number | Percent by number | Weight (pounds) | Percent by weight | Length range (inches) <sup>1</sup> | Average length | Percent legal size <sup>2</sup> |
|------------------|--------|-------------------|-----------------|-------------------|------------------------------------|----------------|---------------------------------|
| Bluegill         | 522    | 29.4              | 55.4            | 10.5              | 1-8                                | 5.0            | 14 (6")                         |
| Pumpkinseed      | 137    | 7.7               | 15.1            | 2.9               | 2-7                                | 5.0            | 9 (6")                          |
| Black crappie    | 325    | 18.3              | 69.0            | 13.1              | 4-12                               | 6.8            | 35 (7")                         |
| Hybrid sunfish   | 78     | 4.4               | 13.0            | 2.5               | 3-8                                | 5.9            | 46 (6")                         |
| Green sunfish    | 3      | 0.2               | 0.3             | 0.1               | 4-5                                | 5.2            | 0 (6")                          |
| Rock bass        | 39     | 2.2               | 9.1             | 1.7               | 4-9                                | 6.6            | 58 (6")                         |
| Warmouth         | 9      | 0.5               | 1.4             | 0.3               | 4-7                                | 5.7            | 56 (6")                         |
| Largemouth bass  | 98     | 5.5               | 51.4            | 9.8               | 1-18                               | 6.8            | 37 (14")                        |
| Smallmouth bass  | 12     | 0.7               | 14.3            | 2.7               | 8-15                               | 12.9           | 23 (14")                        |
| Walleye          | 1      | 0.1               | 0.4             | 0.1               | 10                                 | 10             | 0 (15")                         |
| Yellow perch     | 334    | 18.8              | 6.1             | 1.2               | 1-9                                | 2.9            | 23 (7")                         |
| Northern pike    | 34     | 1.9               | 96.2            | 18.2              | 19-29                              | 23.1           | 62 (24")                        |
| Bullhead species | 22     | 1.2               | 0.0             | 0.0               | 3-13                               | 10.7           | ...                             |
| Bowfin           | 23     | 1.3               | 81.6            | 15.5              | 18-24                              | 21.4           | ...                             |

|                     |       |       |       |       |       |      |     |
|---------------------|-------|-------|-------|-------|-------|------|-----|
| Longnose gar        | 11    | 0.6   | 32.9  | 6.2   | 26-38 | 31.3 | ... |
| White sucker        | 16    | 0.9   | 42.1  | 8.0   | 12-21 | 18.7 | ... |
| Redhorse            | 6     | 0.3   | 11.4  | 2.2   | 13-19 | 17.3 | ... |
| Spotted sucker      | 2     | 0.1   | 5.4   | 1.0   | 18-19 | 19.0 | ... |
| Northern hog sucker | 1     | 0.1   | 1.3   | 0.2   | 14-14 | 14.5 | ... |
| Logperch            | 35    | 2.0   | 0.7   | 0.1   | 3-4   | 3.8  | ... |
| Brook silverside    | 1     | 0.1   | 0.0   | 0.0   | 3-3   | 3.5  | ... |
| Common carp         | 2     | 0.1   | 18.0  | 3.4   | 25-28 | 27.0 | ... |
| Bluntnose minnow    | 4     | 0.2   | 0.0   | 0.0   | 2-3   | 2.8  | ... |
| Spottail shiner     | 27    | 1.5   | 0.2   | 0.0   | 1-3   | 2.6  | ... |
| Common shiner       | 27    | 1.5   | 1.5   | 0.3   | 2-6   | 4.9  | ... |
| Golden shiner       | 5     | 0.3   | 0.4   | 0.1   | 4-7   | 6.1  | ... |
| Total               | 1,774 | 100.0 | 527.0 | 100.0 |       |      |     |

*1* Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch "12"=12.0 to 12.9 inches; etc.

*2* Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

**Table 2.**-Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Portage Lake with trap nets, gill nets, and DC boomshocker, June 9-11, 1998. Number of fish aged is given in parentheses.

| Species         | Age         |             |             |              |              |              |             |             |     |     |              | Mean Growth index <sup>1</sup> |
|-----------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-----|-----|--------------|--------------------------------|
|                 | 0           | 1           | 2           | 3            | 4            | 5            | 6           | 7           | 8   | 9   | 10           |                                |
| Black crappie   | ...         | ...         | 5.2<br>(24) | 7.8<br>(26)  | 9.6<br>(10)  | ...          | 11.3<br>(2) | 12.2<br>(8) | ... | ... | 12.4<br>(20) | +0.1                           |
| Bluegill        | 1.2<br>(1)  | 2.4<br>(9)  | 3.7<br>(10) | 5.4<br>(27)  | 7.0<br>(12)  | 7.9<br>(5)   | ...         | ...         | ... | ... | ...          | +0.2                           |
| Largemouth bass | 2.0<br>(19) | 5.1<br>(10) | 8.5<br>(11) | 11.9<br>(10) | 13.8<br>(6)  | 14.5<br>(11) | ...         | 18.1<br>(1) | ... | ... | ...          | +0.6                           |
| Northern pike   | ...         | ...         | 21.1<br>(3) | 22.0<br>(6)  | 23.1<br>(15) | 24.3<br>(10) | 29.2<br>(1) | ...         | ... | ... | ...          | -0.9                           |
| Smallmouth bass | 1.7<br>(1)  | ...         | 10.2<br>(2) | 13.0<br>(5)  | 15.0<br>(4)  | ...          | ...         | ...         | ... | ... | ...          | +1.9                           |
| Yellow perch    | 2.0<br>(19) | 3.5<br>(11) | 4.9<br>(15) | 6.6<br>(12)  | 7.5<br>(3)   | ...          | ...         | ...         | ... | ... | ...          | -0.4                           |

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

**Table 3.**-Estimated age frequency (percent) of fish caught from Portage Lake with trap nets, gill nets, and DC boomshocker, June 9-11, 1998.

| Species         | Age |     |    |    |    |     |     |     |     |     |     | Number aged |
|-----------------|-----|-----|----|----|----|-----|-----|-----|-----|-----|-----|-------------|
|                 | 0   | 1   | 2  | 3  | 4  | 5   | 6   | 7   | 8   | 9   | 10  |             |
| Black crappie   | ... | ... | 33 | 36 | 14 | 3   | 11  | ... | ... | ... | 3   | 72          |
| Bluegill        | 2   | 14  | 16 | 42 | 19 | 8   | ... | ... | ... | ... | ... | 64          |
| Largemouth bass | 28  | 15  | 16 | 15 | 9  | 16  | ... | 1   | ... | ... | ... | 68          |
| Northern pike   | ... | ... | 9  | 17 | 43 | 29  | 3   | ... | ... | ... | ... | 35          |
| Smallmouth bass | 8   | ... | 17 | 42 | 33 | ... | ... | ... | ... | ... | ... | 12          |
| Yellow perch    | 32  | 18  | 25 | 20 | 5  | ... | ... | ... | ... | ... | ... | 60          |

**Table 4.**-Number and size range (inches) of turtles and salamanders caught in trap nets and gill nets from Portage Lake, June 9-11, 1998.

| Species            | Number | Size range (inches) |
|--------------------|--------|---------------------|
| <i>Turtles</i>     |        |                     |
| Snapper            | 4      | 9-11                |
| Softshell          | 6      | 6-7                 |
| Map                | 23     | 4-9                 |
| Painted            | 23     | 3-6                 |
| Musk               | 3      | 3                   |
| <i>Salamanders</i> |        |                     |
| Mudpuppy           | 1      | 14                  |

**Appendix 1.**-History of fish stocking in Portage Lake, St. Joseph County.

| Year | Species         | Number  | Size               |
|------|-----------------|---------|--------------------|
| 1934 | Bluegill        | 15,000  | Fall fingerlings   |
| 1935 | Bluegill        | 25,000  | Spring fingerlings |
|      | Yellow perch    | 10,000  | Fall fingerlings   |
| 1936 | Bluegill        | 35,000  | Fall fingerlings   |
|      | Largemouth bass | 1,000   | Fall fingerlings   |
| 1937 | Bluegill        | 40,000  | Fall fingerlings   |
|      | Largemouth bass | 1,000   | Fall fingerlings   |
| 1938 | Bluegill        | 100,000 | Fall fingerlings   |
|      | Largemouth bass | 1,500   | Fall fingerlings   |

|      |                 |         |                    |
|------|-----------------|---------|--------------------|
|      | Yellow perch    | 15,000  | Fall fingerlings   |
| 1939 | Bluegill        | 130,000 | Fall fingerlings   |
|      | Largemouth bass | 2,500   | Fall fingerlings   |
|      | Yellow perch    | 10,000  | Fall fingerlings   |
|      | Black crappie   | 20,000  | Spring fingerlings |
| 1940 | Largemouth bass | 2,000   | Fall fingerlings   |
|      | Largemouth bass | 2,000   | Yearlings          |
|      | Bluegill        | 12,000  | Fall fingerlings   |
|      | Bluegill        | 2,000   | Yearlings          |
| 1941 | Largemouth bass | 1,000   | Fall fingerlings   |
|      | Bluegill        | 90,000  | Fall fingerlings   |
| 1942 | Largemouth bass | 1,000   | Fall fingerlings   |
|      | Bluegill        | 30,000  | Fall fingerlings   |
| 1943 | Largemouth bass | 2,000   | Fall fingerlings   |
|      | Bluegill        | 10,000  | Fall fingerlings   |
| 1944 | Largemouth bass | 2,000   | Fall fingerlings   |
| 1945 | Largemouth bass | 2,500   | Fall fingerlings   |
|      | Bluegill        | 15,000  | Fall fingerlings   |

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