**Heron Lake**
Oakland County, T05N, R08E, Section 08
Flint River watershed, last surveyed 2018

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## Environment

Heron Lake is a 132-acre impoundment in the Holly State Recreation Area (HSRA) located in the northwest corner of Oakland County approximately five miles east of Holly, Michigan (Figure 1, Figure 2). The lake is part of the headwaters of Thread Creek within the Flint River Watershed. The HSRA is managed by the Michigan Department of Natural Resources (DNR) - Parks and Recreation Division and about 80% of the shoreline is public land.

Originally, Heron Lake was a 5-acre natural lake but in 1970 the Fisheries and Parks and Recreation Divisions of DNR created the current impoundment with modifications to the discharge of Thread Creek Dam. This work was completed to provide a larger area for recreation and is heavily utilized today by anglers and other water recreation enthusiasts. Currently the water elevation is maintained at a fixed level where surface water is discharged to Thread Creek. The maximum water depth is approximately 40 feet and less than 10% of the lake (by surface area) is deeper than 15 feet. The only major inlet to Heron Lake comes from the dyke control structure on the east side separating Heron Lake from Wildwood and Valley lakes. The outlet dyke control structure is located along the west shore.

The surrounding landscape consists of rolling hills covered by mixed hardwoods and occasional conifers. According to Michigan's Aquatic Habitat Viewer, major land uses within the watershed (land area that drains to the lake) include forest (54%), urban (15%), agriculture (11%), and wetland (9%). The soil types in the region are primarily sand and sand-loam mixes overlaying coarse-textured glacial moraines. These materials are highly permeable, and Darcy groundwater maps show strong groundwater inputs to the lake. Limited shoreline development has maintained good water quality and natural nearshore habitat in Heron Lake. Water chemistry variables were measured in August 2018 and included alkalinity (132 mg/L), pH (7.7-8.5), total phosphorus (29 µg/L), and chlorophyll-a (2.39 µg/L). Secchi disk readings range from 8-10 feet during summer. These values were all consistent with past surveys and indicate that Heron Lake is a hardwater system with moderate productivity (i.e., mesotrophic). A thermocline generally forms during summer in Heron Lake between 14-25 feet and dissolved oxygen is limited (< 3 ppm) below 15 feet. There is a diverse aquatic vegetation community and vegetation is the primary type of nearshore fish habitat. Coontail and Eurasian watermilfoil are common while Thin-leaf Pondweed, Curly-leaf Pondweed, Elodea spp., and water lilies are also present. Chara spp., a macro-algae, occurs along the lake bottom and is also an abundant habitat type in Heron Lake. In addition to aquatic vegetation, submerged logs are present along the shoreline.

Although Heron Lake receives a lot of activity in the summer months, the setting is quite rural for southeast Michigan and there are only four homes along the lakeshore. Recreational opportunities at Heron Lake are plentiful for people from the Metro-Detroit area. Heron Lake has an 800-foot sand beach, as well as a public boat launch with parking for 25-30 trailers and a fishing pier. Boat rental is also available at Heron Lake from Memorial Day through Labor Day for various forms of watercraft

including boats, stand-up paddle boards, kayaks, and canoes, however no gas motors are allowed. In addition to water recreation activities the park also has cross-country skiing, hiking, and mountain biking trails, a disc-golf course, picnic area, and numerous campsites.

## History

Heron Lake has been actively managed since it was impounded in 1970. Initial stockings included Largemouth Bass, Muskellunge, Walleye, and hybrid sunfish to establish a warm- and cool-water fish community for anglers. Subsequent annual surveys from 1971-1975 continued to document the warm- and cool-water fish community as well as an abundant, slow growing panfish population. Therefore, a partial rotenone treatment occurred in 1978 to remove a portion of the panfish population with the goal of improving growth rates through density-dependent release by reducing abundance and thereby competition. Unfortunately, panfish growth did not significantly increase after the chemical treatment and fish were still growing below the state average.

Over the last 40 years, Heron Lake has been surveyed eight times to assess the fish community (1988, 1996, 2004, and 2018) and evaluate stocking efforts (1989, 1991, 1996, and 1997). A common theme across the general community surveys is an abundant panfish population with individual slow growth likely due to competition (Table 1). Numerous attempts were made to improve panfish growth by stocking Tiger Muskellunge and Walleye (Table 2). Ultimately, Tiger Muskellunge production by the State was stopped in 1991 and poor survival led to cancellation of Walleye stocking efforts in 2004 (Table 3). Northern Pike fingerlings were stocked in June 2017 however it is too early to determine their contribution to the adult population.

## Current Status

The most recent fish community survey for Heron Lake was completed from 21 May - 24 May 2018. This survey used various types of gear including small-mesh and large-mesh fyke nets, trap nets, experimental gill nets, seines, and nighttime boat electrofishing. Large-mesh fyke nets and trap nets were set and lifted on three occasions, while small-mesh fyke nets and experimental gill nets were set and retrieved twice. Seine hauls were completed in four locations and there were three 10-minute electrofishing transects. These various gears were used to capture a wide range of species and sizes and better understand the entire fish community as outlined by DNR - Fisheries Division's Status and Trends Program protocols (Wehrly et al. 2015). Total length (inch group) was recorded for all fish captured. Fish weights were calculated from length data using the length-weight regression coefficients compiled by Schneider et al. (2000b). For game species, ages for up to 10 fish per inch group were determined from scale and spine samples. Mean growth indices were calculated as described by Schneider et al. (2000a). Growth indices only were calculated for year classes represented by at least five individuals.

A total of 2,299 fish were collected during this effort representing 19 species (Table 4). Bluegill and Pumpkinseed were the most abundant species in the survey comprising 50% and 25% of the total catch by number, respectively. Largemouth Bass and Northern Pike were the only top predators collected in the survey, and Sand Shiner was the primary forage species collected.

A total of 1,142 Bluegill (mean total length [TL] = 4.3 inches) were collected in the survey. Only 13% of the fish were larger than 6 inches, which is the estimated minimum length at which anglers will

harvest Bluegill (Table 4). The mean length for age-1 Bluegill in Heron Lake was 0.6 inches higher than the state average (Figure 3). However, by age 3 the mean length of Heron Lake Bluegill was more than an inch below the statewide average, and mean lengths at age for subsequent year classes of adult Bluegill were 1.3 inches to 1.4 inches below average. The Bluegill population in Heron Lake scored 2.5 for an "acceptable/poor" rating using the Schneider Index for classifying Bluegill populations (Schneider 1990, Table 5).

A total of 574 Pumpkinseed (mean TL = 5.9 inches) were collected in the survey. Almost half of the Pumpkinseed collected were above six inches and acceptable for harvest. The mean growth index for Pumpkinseed was -0.4 which is considered average growth (Figure 3).

There were 24 Black Crappie (mean TL = 6.5 inches) in this survey and 96% of the individuals were above seven inches and acceptable for harvest. However, Black Crappie also appear to be growing below the state average and had a mean growth index of -1.3.

A total of 69 Largemouth Bass (mean TL = 9.8 inches) were collected during the survey. Electrofishing gear accounted for 58% of the Largemouth Bass captured. A wide size-range of Largemouth Bass (2-19 inches) are available to anglers and 26% exceeded the minimum length limit of 14 inches. The mean growth index for Largemouth Bass in Heron Lake was -1.4 suggesting they are growing slower than the state average (Figure 3).

Only ten Northern Pike (mean TL = 24.6 inches) were collected in 2018. The average size was slightly above the minimum length for harvest but too few individuals were captured to make an adequate interpretation of growth rates for this species.

Other large species collected in the survey included Brown Bullhead (n = 221) and White Sucker (n = 2). Various small-bodied species were also present in the sampling gear including several minnow species (e.g., Blackchin Shiner, Bluntnose Minnow, Common Shiner, Sand Shiner) and other panfish like Green Sunfish (n = 12), Redear Sunfish (n = 22), Warmouth (n = 23), and Yellow Perch (n = 4).

## Analysis and Discussion

Heron Lake continues to support a warm-and cool-water fish community. The Bluegill population remains in high abundance and struggling with slow growth like past surveys, and a limited predator community may be playing a role. Schneider (2000) observed that predators generally made up 20-50% of the biomass in lakes with desirable fish communities. Predators composed 22% of the biomass during the 2018 survey, so it appears that predator abundance is near the low end of the acceptable range. There are various panfish available to anglers. However most panfish seem to be growing slower than the state average. The abundant panfish community is beneficial for a popular lake which draws families from the Metro-Detroit area and allows children and adults to experience success while fishing if they are focused on numbers, but harvest-oriented anglers may look elsewhere depending on the species they are pursuing.

The predator community in Heron Lake has abundant forage but the Largemouth Bass are growing slowly. In addition, no small (< 20 inches) or large (> 30 inches) Northern Pike were captured in the survey. The absence of small Northern Pike may be due to sampling bias since these fish would primarily be in heavily vegetated areas which are difficult to effectively sample with our equipment.

Furthermore, Northern Pike size potential may be limited due to restricted amounts of deeper habitat (Figure 4). Furthermore, the popularity of Heron Lake may be contributing to high levels of fishing pressure and subsequent mortality leading to few large Northern Pike and Largemouth Bass. However, effort and mortality have not been estimated for Heron Lake. Trailer counts or angler diaries would help better understand the fishing pressure on Heron Lake and provide anglers a means of communicating what type of fishery they desire for this system.

## Management Direction

Heron Lake should continue to be managed as a warm-and cool-water fishery with emphasis on the panfish community. The accessibility and other recreation activities at Heron Lake make it a great destination for families. It does appear Heron Lake has a stunted Bluegill population and there are management options to remedy this problem. One option would be to stock fall fingerling Walleye, which has resulted in improved Bluegill size-structure in some lakes, but habitat conditions are not suitable for Walleye in Heron Lake. Additionally, there are some vegetation management strategies which could be explored further. In some cases cutting lanes through weed beds has improved Bluegill growth however these efforts are expensive and labor intensive. Furthermore, manually removing Bluegill or low dose rotenone treatments to reduce panfish abundance are also expensive and have not shown significant long-term improvements. Although the Bluegill in the lake are growing slowly, they are abundant and provide a great angling opportunity for children or anglers new to the sport looking for action. The slow growth rates of Bluegill and other popular panfish should be monitored going forward but this is a common issue across many lakes in southeast Michigan. In addition, increasing the popularity of Heron Lake has the potential to increase fishing mortality. This may drive the abundance down and improve growth rates, however, current levels of effort and mortality are not known at this time. A creel survey would be useful at Heron Lake but requires hiring an employee. Another tool for estimating effort and mortality is an angler diary. The Parks Department already manages the beach and boat rental on Heron Lake so utilizing the existing employees would accomplish this goal without increasing expenses.

The shoreline of Heron Lake has remained undeveloped since 1970 due to a majority of land ownership falling within the Holly Recreation Area. This undeveloped shoreline should stay as such, while maintaining the boat launch and beach areas. The gas motor ban should continue and adds to the uniqueness of Heron Lake while also limiting any excessive erosion that could occur along the beach if the rule were changed.

## References

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report No. 90-10, Ann Arbor.

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

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Wehrly, K. E., D. B. Hayes, and T. C. Wills. 2015. Status and trends of Michigan inland lake resources 2002-2007. Michigan Department of Natural Resources Fisheries Report 08. Institute for Fisheries Research, Ann Arbor.

**Table 1.** Bluegill mean growth indices from select surveys in Heron Lake. The mean growth index is the average deviation from the statewide length at age (Schneider et al. 2000a). Mean growth indices < -1 indicate poor growth and values between -1 and +1 are considered average.

| Year | Mean growth index |
|---|---|
| 1976 | -0.9 |
| 1978 | -0.1 |
| 1979 | -0.8 |
| 1984 | -0.8 |
| 1988 | -1.6 |
| 1997 | -1.3 |
| 2004 | -0.8 |
| 2018 | -0.8 |

**Table 2.** Heron Lake stocking history.

| Species | Year | Number | Life Stage |
|---|---|---|---|
| Largemouth Bass | 1970 | 10,140 | Fingerling |
| Northern Muskellunge | 1970 | 23,000 | Fry |
| Walleye | 1970 | 20,000 | Fingerling |
| Fathead Minnow | 1970 | 7,000 | Fingerling |
| Largemouth Bass | 1971 | 4,080 | Fingerling |
| Walleye | 1971 | 45 | Fingerling |
| Northern Muskellunge | 1972 | 300 | Fingerling |
| Walleye | 1974 | 340 | Fingerling |
| Northern Muskellunge | 1975 | 200 | Spring fingerling |
| Northern Muskellunge | 1976 | 200 | Spring fingerling |
| Tiger Muskellunge | 1977 | 600 | Yearling |
| Walleye | 1977 | 600 | Yearling |
| Tiger Muskellunge | 1978 | 600 | Fall fingerling |
| Tiger Muskellunge | 1979 | 600 | Fall fingerling |
| Tiger Muskellunge | 1980 | 600 | Fall fingerling |
| Tiger Muskellunge | 1981 | 500 | Spring fingerling |
| Walleye | 1981 | 3,360 | Fall fingerling |
| Tiger Muskellunge | 1982 | 580 | Fall fingerling |
| Walleye | 1982 | 2,814 | Spring fingerling |
| Tiger Muskellunge | 1984 | 380 | Fall fingerling |
| Walleye | 1984 | 3,000 | Spring fingerling |
| Tiger Muskellunge | 1986 | 300 | Fall fingerling |
| Tiger Muskellunge | 1988 | 300 | Fall fingerling |
| Walleye | 1989 | 1,881 | Spring fingerling |
| Tiger Muskellunge | 1990 | 500 | Fall fingerling |
| Walleye | 1991 | 7,281 | Spring fingerling |
| Walleye | 1996 | 20,986 | Spring fingerling |
| Walleye | 1997 | 14,137 | Spring fingerling |
| Walleye | 1998 | 18,130 | Spring fingerling |
| Walleye | 2000 | 4,924 | Spring fingerling |
| Walleye | 2002 | 13,224 | Spring fingerling |
| Northern Pike | 2004 | 1,000 | Spring fingerling |
| Walleye | 2004 | 8,172 | Spring fingerling |

**Table 3.** Walleye age-0 catch-per-effort (CPE; fish/mile) during fall electrofishing surveys in select years after spring stocking events.

| Year | Stocking Rate | Age-0 Walleye CPE |
|---|---|---|
| 1989 | 14/acre | 2.7 |
| 1991 | 55/acre | 5.5 |
| 1996 | 159/acre | 0 |
| 1997 | 107/acre | 0 |

**Table 4.** Species, number, length range (inches), and average length (inches) for all species caught during 2018 survey. Percent of individuals above legal size or acceptable size for harvest for select species collected. Harvestable size is 6 inches for Bluegill, Green Sunfish, Pumpkinseed, Redear Sunfish, and Warmouth and 7 inches for Black Crappie and Yellow Perch. Legal size is 14 inches for Largemouth Bass and 24 inches for Northern Pike.

| Species | Number | Length range (in.) | Avg. length (in.) | % harvestable size |
|---|---|---|---|---|
| Blackchin Shiner | 6 | 1-2 | 2.3 | - |
| Black Crappie | 24 | 6-11 | 8.5 | 96 |
| Bluegill | 1142 | 1-7 | 4.3 | 13 |
| Bluntnose Minnow | 13 | 2-2 | 2.5 | - |
| Brown Bullhead | 221 | 6-13 | 10.6 | - |
| Common Shiner | 1 | 2-2 | - | - |
| Grass Pickerel | 1 | 9-9 | - | - |
| Greenside Darter | 1 | 4-4 | - | - |
| Green Sunfish | 12 | 2-3 | 2.7 | 0 |
| Iowa Darter | 2 | 1-2 | 2.0 | - |
| Largemouth Bass | 69 | 2-19 | 9.8 | 26 |
| Northern Pike | 10 | 20-29 | 24.6 | 60 |
| Pumpkinseed | 574 | 1-8 | 5.9 | 49 |
| Redear Sunfish | 22 | 3-7 | 5.2 | 14 |
| Sand Shiner | 171 | 1-3 | 1.5 | - |
| Tadpole Madtom | 1 | 2-2 | - | - |
| Warmouth | 23 | 2-8 | 4.9 | 26 |
| White Sucker | 2 | 16-20 | 18.5 | - |
| Yellow Perch | 4 | 3-5 | 4.8 | 0 |
| Total | 2299 | | | |

**Table 5.** Schneider Index scores for Bluegill from Heron Lake 1979-2018. Analysis was completed using only trap net data.

| Year | Sample size | Avg. length (in.) | % ≥ 6 in. | % ≥ 7 in. | % ≥ 8 in. | Schneider Index | Rank |
|---|---|---|---|---|---|---|---|
| 1979 | 854 | 5.8 | 95 | <1 | <1 | 2.75 | Poor/Acceptable |
| 1984 | 1,127 | 5.1 | 13 | 1 | <1 | 1.75 | Very Poor/Poor |
| 1988 | 351 | 5.1 | 8.1 | <1 | 0 | 1.75 | Very Poor/Poor |
| 1996 | 516 | 6.0 | 48 | 6 | 0 | 3.00 | Acceptable |
| 2004 | 218 | 6.4 | 76 | 22 | 0 | 3.25 | Acceptable/Satisfactory |
| 2018 | 434 | 5.6 | 33 | 2 | 0 | 2.50 | Poor/Acceptable |

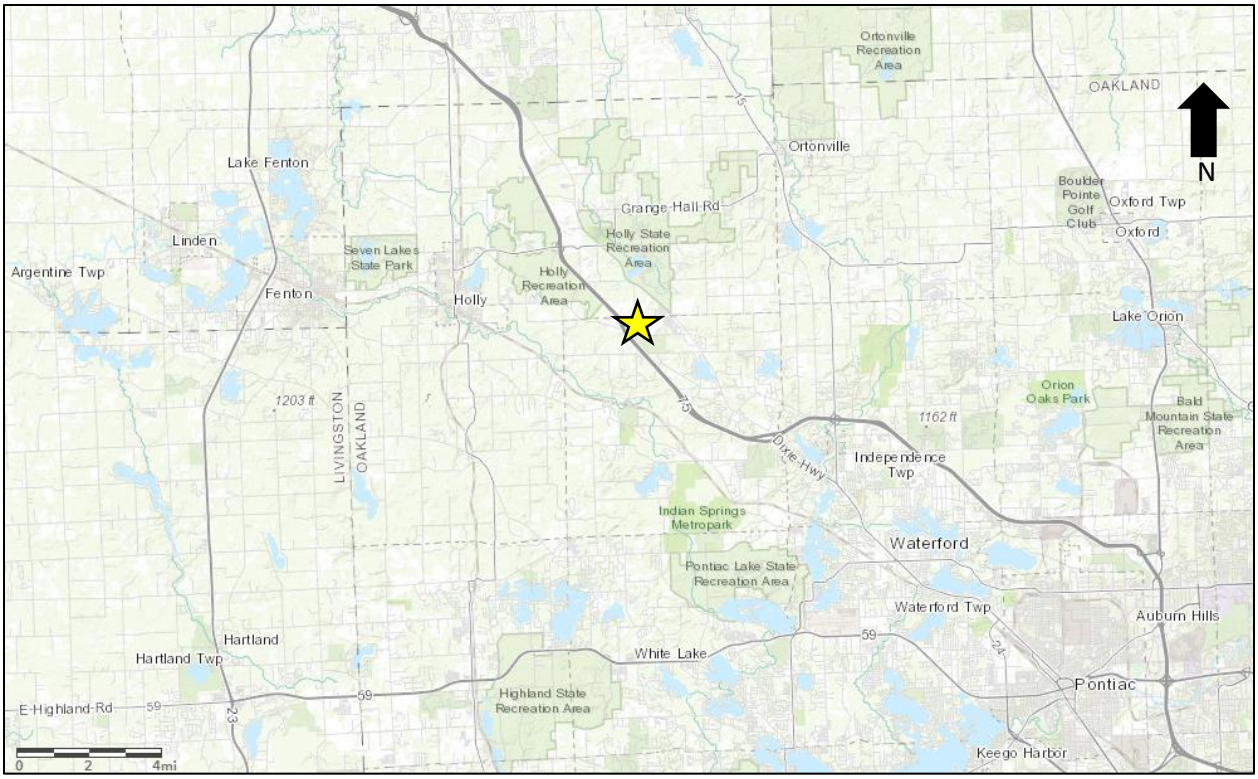


**Figure 1.** Yellow star denotes location of Heron Lake in Oakland County, Michigan.

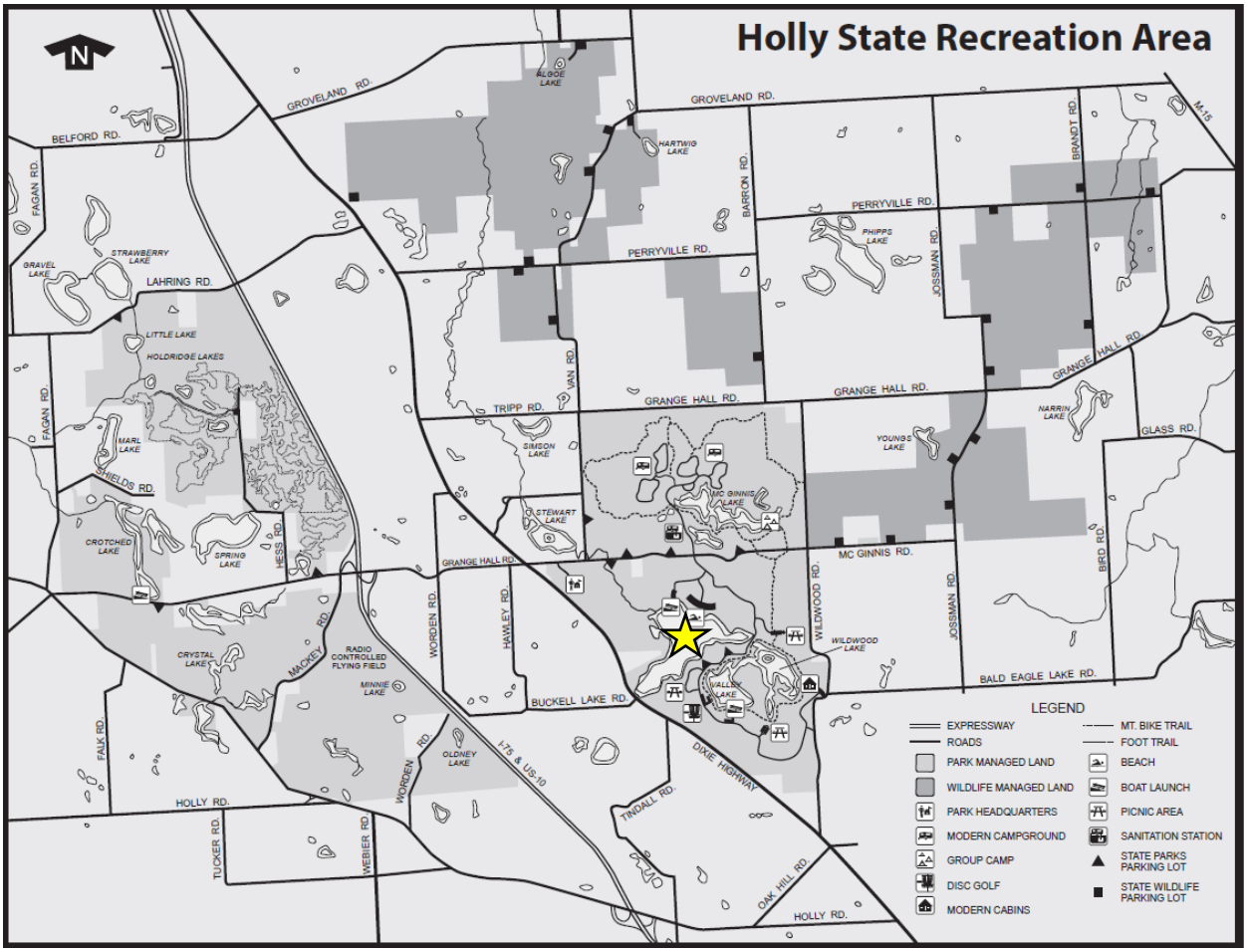


**Figure 2.** Holly State Recreation Area in Oakland County, Michigan.

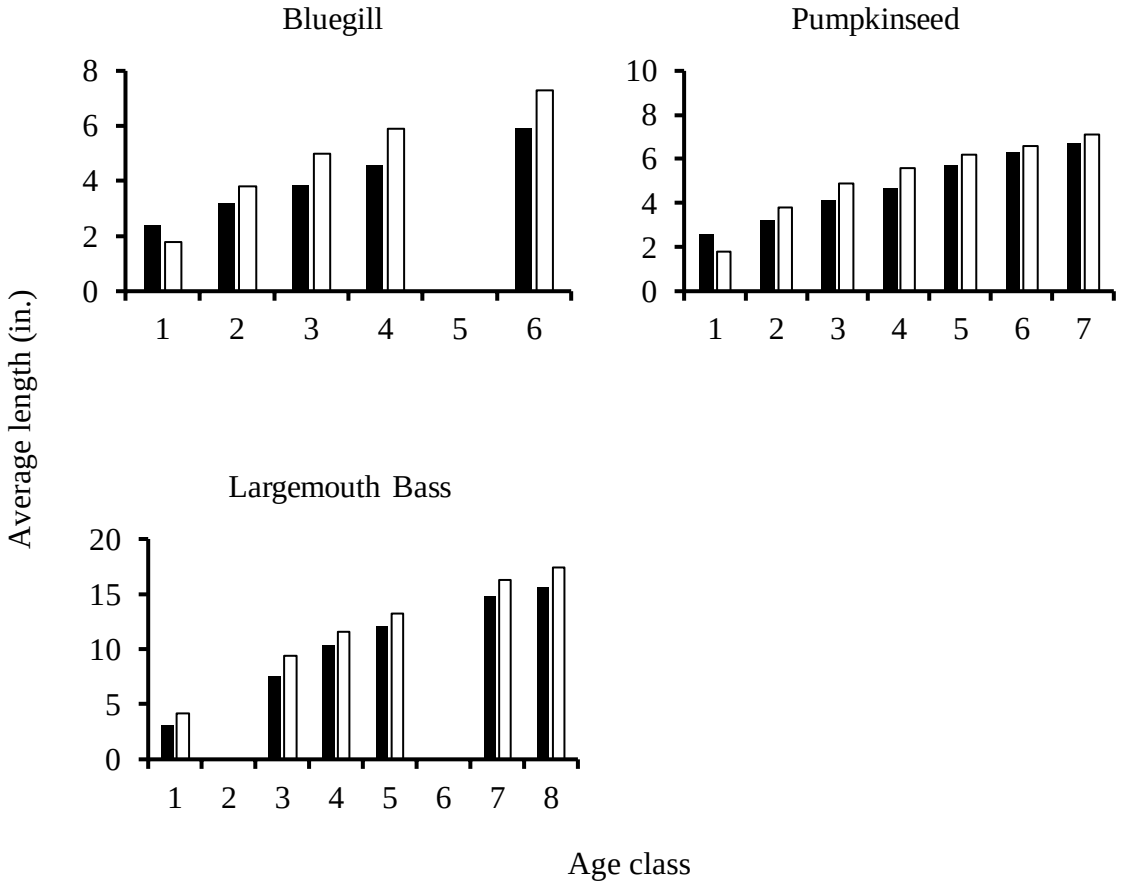


**Figure 3.** Weighted mean length-at-age (black bars) and state average length-at-age (white bars) for select species collected in Heron Lake 2018 survey. State average lengths are from Schneider et al. (2000a).

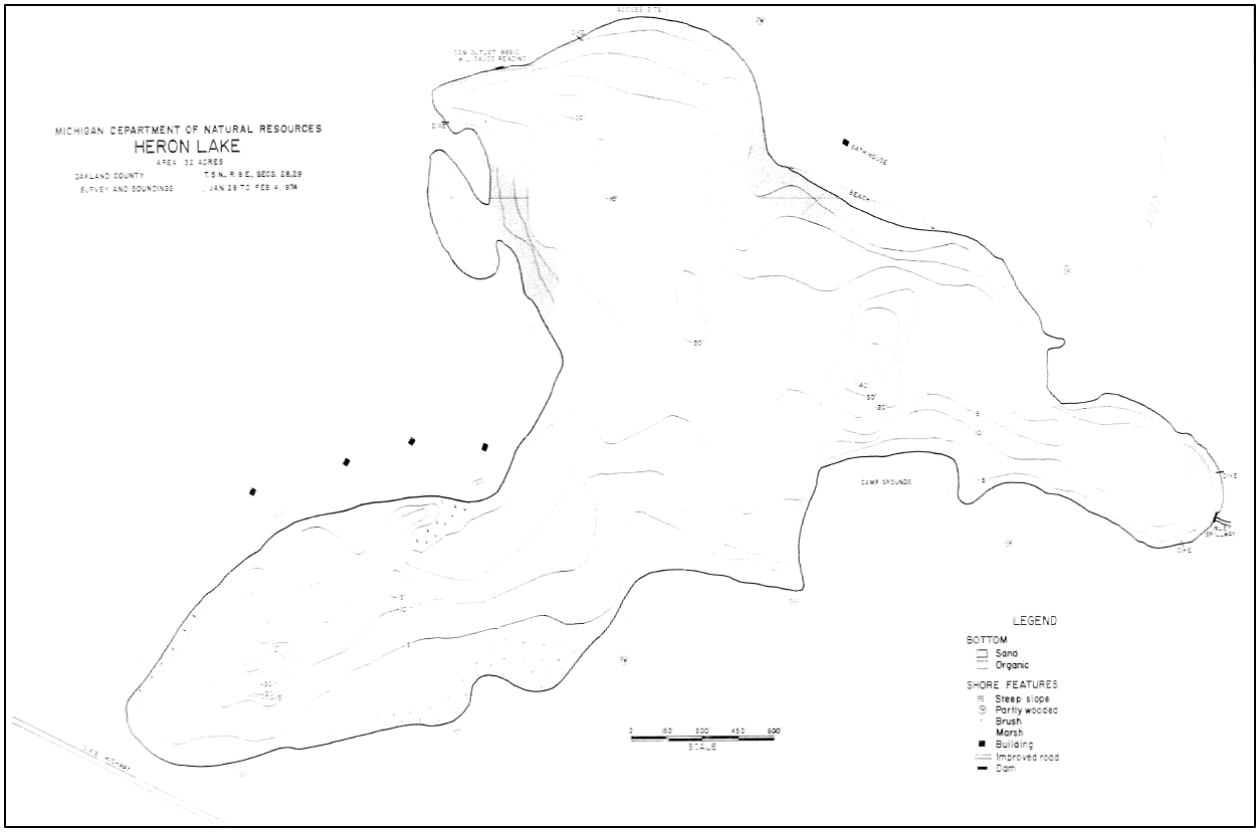


**Figure 4.** Bathymetric map of Heron Lake.