Island Lake
Schoolcraft County / T43N/R16W/S14
Manistique River, last surveyed 2022

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Environment

Location
Island Lake, covering 107 acres, is a natural lake located in the Manistique River watershed in southwest Schoolcraft County, in Michigan's Upper Peninsula (Figure 1). Situated about 12 miles north of the City of Manistique, Island Lake lies within Hiawatha Township.

Geology and Geography
The lake spans three distinct geological regions in Michigan: the Big Hill Dolomite, Queenston Shale, and Manitoulin Dolomite bedrock formations (MDNR 2001). Surrounding surficial landforms are primarily composed of moraine (76.1%), with the remaining (23.9%) categorized as `other'. Land surrounding the lake is dominated by forest (70.2%), followed by wetland (10.0%), urban areas (9.8%), water (5.6%), grassland (4.3%), and agriculture (0.1%) (Figure 2). An interesting feature of the lake is the presence of an undeveloped island that is approximately 2.4-acres in size.

The surficial geology in this region features a mix of large coarse-textured materials (76.1%) and organic materials (23.9%). Coarse textured rock materials in this region are predominately sedimentary and provide nearshore habitat for lithophilic fishes, that rely on rocky substrate for spawning. Additionally, coarse-textured materials support cool groundwater exchange in deeper lake areas, which is essential for the survival of cool- and cold-water species. In contrast, untextured organic materials are present along remaining shoreline areas and exhibit low to medium groundwater permeability. The soil surrounding Island Lake consists mainly of Stutts-Kalkaska fines and McMillan-Greylock sandy loam (USDA 2025). Fine substrates such as sand or sandy loam that surround the Island Lake lakeshed can negatively impact nearshore spawning habitat by infilling rocky interstitial spaces that are essential for developing fish eggs and embryos.

Watershed Description
Island Lake resides within the Manistique River watershed, however there are no significant tributaries or outflows that connect directly to the Manistique River. Island Lake is connected to Dodge Lake via a small channel located on the southeast end of the lake. The Island and Dodge Lake lakeshed (Figure 3) encompasses 730 acres, of which nearly 25 percent is water (MGLP 2025). Approximately 90 percent of the lakeshed is currently unprotected and is vulnerable to residential and agricultural development. The immediate shoreland area of Island Lake encompasses a total of 145 acres (MGLP 2025). Approximately 91 percent of the immediate shoreline area is unprotected and vulnerable to residential and agricultural development.

Chemical and Physical Characteristics
Total Alkalinity - Total alkalinity is a measure of buffering capacity and plays an important role in determining a waterbody's pH (Wetzel 2001, Wehrly et al. 2015). Alkalinity values (i.e., concentration of CaCO3) in Michigan inland lakes can be classified into low (< 49.5 mg/L), medium (49.5 to 141.5)

and high (>141.5) categories. Alkalinity has not been measured in Island Lake. However, the connected Dodge Lake was sampled for Alkalinity in 2004. In 2004, Alkalinity reported from the two basins in Dodge Lake were 31.0 and 17.0 mg/L, respectively. Results from alkalinity sampling suggest that Dodge Lake (and perhaps Island Lake) has a low alkalinity compared to other inland lakes in Michigan (Wehrly et al. 2015). Typically, disconnected inland lakes like Dodge and Island Lake have low alkalinity values and support a lower biomass and diversity of aquatic organisms (Wehrly et al. 2015).

Nutrients - Phosphorus and nitrogen are two important nutrients that influence production, biomass, and species composition of aquatic and nearby terrestrial plants in lake ecosystems. Concentrations of these two nutrients vary naturally with lakes depending on geology, watershed characteristics, as well as with nutrient cycling processes and water residence time within the lake. Excessive nutrient inputs from human activities can lead to an increase in the production of phytoplankton and aquatic macrophytes (i.e., eutrophication), leading to decreased water clarity, harmful algal blooms, and/or nuisance macrophyte growth. As plant biomass decomposes, oxygen in the water is consumed by microorganisms and can be reduced to levels that compromise fish habitat and subsequently fish abundance. Alternatively, inland lakes that are characterized as having `too few' nutrients tend to have lower levels of primary production and thus much lower growth rates for fish and less biomass per acre (e.g., standing crop).

Total phosphorus occurs in relatively low concentrations in the aquatic environment and as a result tends to be the limiting nutrient for primary producers (periphyton, phytoplankton, and aquatic macrophytes) in aquatic ecosystems. Phosphorus values in Michigan inland lakes varies across low (<0.009 mg/L), medium (0.009 to 0.020 mg/L), and high (>0.020 mg/L) concentrations. Total phosphorus has not been measured in Island Lake. However, connected Dodge Lake was sampled for total phosphorus in 2004 at two locations including an eastern and western basin. In 2004, total phosphorus reported from the two basins in Dodge Lake was 0.015 and <0.004 mg/L, respectively. Results from total phosphorus sampling in the east and west basin of Dodge Lake suggest a low to moderate phosphorus concentration, respectively, compared to other inland lakes in Michigan.

In contrast to phosphorus, total nitrogen occurs in relatively higher concentrations in aquatic ecosystems and as a result, rarely limits primary production in lakes. Nitrogen values in Michigan inland lakes varies across low (<0.430 mg/L), medium (0.430 to 0.750 mg/L), and high (>0.750 mg/L) concentrations (Wehrly et al. 2015). Total nitrogen has not been measured in Island Lake. However, Dodge Lake was sampled for total nitrogen in 2004 at two locations including an eastern and western basin. In 2004, total nitrogen reported from the two basins in Dodge Lake was 0.440 and 0.354 mg/L, respectively. Results from total nitrogen sampling in the east and west basin of Dodge Lake suggest a low to moderate nitrogen concentration, respectively, compared to other inland lakes in Michigan.

Dissolved Oxygen - Dissolved oxygen (DO) is a critical component to available habitat in aquatic ecosystems. Dissolved oxygen in lakes originates from atmospheric exchange as well as from aquatic plants during photosynthesis. Concentration of DO in lakes can limit the distribution and growth of fish in lakes as well as the size composition and biomass of zooplankton. Concentrations of DO begin to limit cool- and warmwater fish populations at approximately 3.0 mg/L and are often lethal below 0.5 mg/L (Schneider 2002). DO is considered hypoxic at concentrations < 2 - 4 mg/L and anoxic at 0 mg/L. Island Lake was sampled for dissolved oxygen during the winter and summer of 2022 (Figure 4). During winter and summer of 2022, the water column in Island Lake contained sufficient levels of dissolved

oxygen to support aquatic life to a depth of 32- and 15-ft, respectively. Beyond 15- to 30-ft, Island Lake transitions from being hypoxic to anoxic quickly providing unsuitable conditions for aquatic life. At these depths, low oxygen conditions are expected due to the lack of sunlight limiting photosynthesis, limited atmospheric gas exchange, and the decomposition of organic material near the lake bottom.

Temperature (stratification) - Thermal stratification occurs in deeper lakes during the summer months and is characterized by three water layers. The uppermost layer (epilimnion) is typically warmer and has adequate levels of sunlight to support photosynthesis. The middle layer (metalimnion) is the region where a more significant change in water temperature occurs. The point at which temperature change or drop is the greatest in this middle layer is called the `thermocline'. The bottom layer (hypolimnion) lies directly below the thermocline and typically contains less dissolved oxygen compared to other layers. A temperature profile collected from Island Lake during the summer of 2022 (Figure 5) suggests that the lake does stratify with a thermocline located at a depth of 15-ft.

Transparency - Water transparency, measured using the Secchi disk, provides an index of phytoplankton production and overall lake productivity. For example, lakes with greater transparency are often classified as oligotrophic, meaning there are low levels of lake productivity (e.g., lower standing crop biomass). Summer Secchi depths vary considerably across the state with lakes having low (<7.5-ft), medium (7.5 to 13.5-ft), and high (>13.5-ft) transparency. A Secchi depth reading was collected in Island Lake during the summer of 2022 and was reported to be 14.0-ft, which is high compared to other inland lakes in Michigan.

Chlorophyll-a - Summer chlorophyll-a concentrations in the upper water column provide a measure of lake primary production by phytoplankton and can be used to evaluate overall lake productivity. Higher chlorophyl-a concentrations suggest high production of phytoplankton, high nutrient inputs, and higher overall lake productivity. Low chlorophyl-a concentrations suggest phytoplankton production is limited by low nutrient availability, or by high rates of grazing by zooplankton. Chlorophyl-a concentrations in Michigan inland lakes vary across low (1.9 ug/L), medium (1.9 to 4.8 ug/L), and high (>4.8 ug/L) values. Chlorophyl-a concentrations have not been measured in Island Lake. However, in 2004, chlorophyl-a concentrations were collected from the two basins in Dodge Lake and were reported to be undetectable in the eastern basin and 2.0 ug/L in the western basin. Results from chlorophyl-a sampling in the east and west basin of Dodge Lake suggest low to moderate productivity, respectively, compared to other inland lakes in Michigan.

Trophic Status - Trophic status refers to an index that allows managers to characterize Michigan's inland lakes into categories that define the level of primary production in a lake. The Carlson's Trophic State Index (TSI) uses measurements of phosphorus, Secchi depth feet (ft), and chlorophyll-a to produce an index with values from 0 to 100 (Fuller and Jodoin 2016). Threshold values for TSI are broken down into three categories where TSI <38 values are Oligotrophic, from 38 to 48 are Mesotrophic, from 49 to 61 are Eutrophic. Phosphorus, Secchi depth, and chlorophyl-a samples have not been collected in Island Lake. However, samples were collected from neighboring Dodge Lake in 2004 and are likely to be similar to the productivity of Island Lake given their shared lakeshed (Figure 2 and Figure 3). In 2004, Secchi depth and chlorophyl-a data collected from Dodge Lake suggest a TSI value less than 38 (Oligotrophic), while the phosphorus value reported in 2004 suggest a TSI value between 38 and 48 (Mesotrophic). Based on values reported from data collected in 2004, Island Lake could be characterized as an Oligo-Mesotrophic inland lake with low to moderate levels of productivity.

Development, public ownership, and access

In August of 2022, the Island Lake littoral zone and lakeshore were visually surveyed to quantify physical habitat parameters including residential development (dwellings per mile), boat dock density (docks per mile), large woody debris (submerged logs per mile) and the average percent shoreline armored (Table 1). Results of the physical habitat survey show that shoreline armoring and housing density are below the regional average (Table 1). However, the density of boat docks is above the regional average (Table 1). The density of large woody debris in Island Lake is below the regional average, which may be explained by the above average density of boat docks. Each spring, as docks are deployed, individuals typically remove large woody debris in excess to clear areas for docks. Submerged trees and large woody habitat can benefit aquatic organisms, namely fish, by providing shelter and feeding areas for a diversity of species. Submerged trees and large woody debris also help to reduce wave-induced erosion and can stabilize sediment on the lake bottom.

Lands adjacent to the Island Lake shoreline are held entirely in private ownership. However, anglers may access Island Lake via the neighboring Dodge Lake which has a public access site located on the southwest side of Dodge Lake.

History of the Fishery

Fisheries management of Dodge Lake and Island Lake began during the 1930s when stocking of warmwater species began (Table 2), and the lake was mapped (1936 to 1937) to gather acreage and depth information. Throughout the 1930s, Dodge and Island lakes were stocked with Bluegill, Largemouth Bass, Smallmouth Bass, and Walleye. The status of these species in was unknown prior to stocking, however, the intent was likely to establish a recreational fishery as this was a common practice during this period. During the 1930s and 1940s, warm- and cool-water species such as Bluegill, Largemouth Bass, Walleye, Smallmouth Bass, and Yellow Perch were stocked in many inland lakes in Michigan. However, by the early 1940s stocking of these species had already been largely reduced given their unique ability to reproduce naturally beyond state hatchery capabilities (Cooper 1948). By 1946, the Michigan Fish Commission had a policy to curtail stocking of many of these species given the "incontestable evidence that the average planting of these species has involved an insignificant number of fish compared to the number already present" (Cooper 1948, pp. 8). Stocking of Bluegill, Largemouth Bass, Smallmouth Bass, and Walleye ceased in Dodge Lake by 1941, and Island Lake by 1942.

During the 1940s and 1950s, Dodge and Island Lake were stocked with a mixture of yearling and legal-sized Rainbow Trout with the intent of providing a recreational fishery. During 1942, stocked rainbow trout were tagged with metal clips so anglers could report their catch. Early stocking efforts were followed by concerns from area resort owners. Concerns reported were that fishing was poor, likely the result of stocking smaller (yearling) Rainbow Trout compared to the legal-size fish stocked in other years. Additionally, there were concerns pertaining to anglers trespassing as this lake was considered `semi-private' at that time, however, there were plans on behalf of the fisheries manager to establish a public access site. In 1957, the State of Michigan purchased a parcel of land for one dollar providing the opportunity to establish a public access site on Dodge Lake through which anglers could also access Island Lake.

During the 1960s, Dodge and Island Lake continued to be managed to provide recreational Rainbow Trout fisheries with additional angling opportunities for various panfish species. In the early 1960s, lake

residents inquired about whether Walleye could be stocked in Dodge or Island Lake in an attempt to improve the fishery. There were also reports of poor Bluegill fishing and area residents were concerned that Rainbow Trout stocking and the increased presence of outboard motors was negatively impacting the Bluegill population. These inquiries were surprising to area managers given that the Dodge and Island Lake fisheries provided a good mix of species for anglers to target including Northern Pike, Largemouth Bass, Smallmouth Bass, Bluegill, Pumpkinseed, Rock Bass, Yellow Perch, Rainbow Trout, and suckers. Additionally, angler reports received by division staff at that time suggested fishing had been favorable in Dodge and Island Lake. The following year (February 1961), a 16-year-old harvested the state record Northern Pike by spear from Dodge Lake. This state record remains today (51.5 inches in total length, 39 pounds) (Figure 6). In response to concerns about Bluegill declines, managers suggested that Rainbow Trout, being a planktivore, could be competing with Bluegill for food.

By the mid-1960s, fisheries managers began to receive letters regarding the concern of low water levels in Dodge and Island Lake. Letters were received from the local City Manager, Sherrif, and the area lake association stating the lake levels were so low, the channel connecting Island and Dodge Lake was without water. One anecdotal report suggested that the water level was down approximately 4-feet. During this period, particularly in 1964, Great Lakes water levels were especially low, confirming residents' observations.

During the late 1970s, areas adjacent to Dodge and Island Lake were being considered for the development of a subdivision. At that time, there were concerns regarding the potential impacts such a development might have on the aquatic environment. Fisheries managers were concerned that the addition of nutrients to the lake from additional septic systems or fertilizer would cause an increase in aquatic vegetation. Excessive vegetation was concerning as this had resulted in the stunting of fish populations in other Michigan waterbodies. Additionally, there was a concern that increased residential development along the shoreline would result in the removal of brush, fallen trees, and natural vegetation resulting in negative impacts to popular game species (e.g., Largemouth Bass).

During the 1970s and 1980s, Dodge Lake and Island Lake continued to be stocked with Rainbow Trout. By the mid-1970s the public access site was receiving steady use and compliments were shared with fisheries managers regarding the upkeep and enforcement of the site. By the late 1970s conflicts had arisen between recreational boaters and fisherman. As a result, local township officials proposed local watercraft controls for Dodge and Island lakes to mitigate those conflicts. To date, it is unlawful to operate a vessel at high speed or to have in tow, or otherwise assist in the propulsion of, a person on water skis, surfboard, or other similar contrivance from 6:30 p.m. to 10:00 a.m. the following day. This watercraft control measure took effect during the winter of 1981.

During the mid- to late-1980s, the Dodge and Island lakes fishery had begun to change. Despite the annual stocking of Rainbow Trout, fishing reports for Rainbow Trout were poor. Fishery managers responded to letters from area property owners suggesting two possible explanations for the poor survival of stocked Rainbow Trout. The first, average size of stocked Rainbow Trout had declined and second, Fisheries Division had recently abandoned the captive broodstock program and had begun acquiring Rainbow Trout eggs from a private hatchery in Ennis, Montana. The later explanation was unlikely to explain poor catches as interagency reports show that Rainbow Trout stocked up to 1983 were from a domestic source. Stocking of Rainbow Trout in Dodge and Island Lake, sourced from Ennis Montana, did not occur until 1985, when management staff had already received poor fishing reports pertaining to

the previous three years' fishing seasons. The size of fish stocked did provide a better explanation for fishing reports received during this period. Until 1983, stocked Rainbow Trout averaged 7.8 inches in total length. However, fish stocked after 1983 averaged 6.9 inches in total length. In 1986, larger Rainbow Trout (7.4 inches) were stocked, however, anglers reported poor returns of those fish as well suggesting size at stocking may not have been the limiting factor.

Research conducted throughout the mid-1960s to mid-1970s (Galbraith 1966, Galbraith 1975) showed that considerable reductions in zooplankton could occur in lakes stocked consistently with Rainbow Trout. Declines in zooplankton may have been even more probable in the presence of other species, including Yellow Perch and Bluegill, which compete for limited zooplankton resources in low productivity systems such as Island and Dodge lakes. During this period, Rainbow Trout were stocked in waterbodies with additional gamefish present, however, where Bluegill and Yellow Perch populations existed it became difficult to manage a lake to provide a consistent and reliable recreational fishery for Rainbow Trout.

In response to concerns expressed by area anglers, managers conducted a survey yielding no trout and then provided a letter explaining that the Dodge and Island lakes were relatively sterile waters, but both provided a variety of fishing opportunities that are used by many people with diverse interests. Those benefits aside, the lakes supported populations of competing species that detracted from trout management potential. Therefore, anglers were presented with three fisheries management alternatives to consider at this time: 1) manage for a single species such as Rainbow Trout which required whole-lake chemical treatment, 2) manage Dodge and Island lakes as "two-story" trout lakes that provide warmwater fishing opportunities and continue with stocking of Rainbow Trout and Splake, (required only a nearshore chemical treatment), and 3) manage for cool- and warmwater fish species and discontinue trout stocking.

In a letter provided by area residents, option 2 was chosen almost unanimously as the desired path forward for Dodge and Island lakes. This strategy required a nearshore chemical treatment with Fintrol 5-88 concentrate to reduce the abundant population of Yellow Perch. While costly, option 2 provided an alternative that still required chemical treatment, however, at a much lower cost compared to option 1. An additional benefit provided by option 2 was that alternate gamefish species (i.e., Largemouth Bass, Northern Pike) were not likely to be impacted significantly by the near-shore treatment.

Following treatment that occurred during the late 1980s, Dodge and Island Lake were stocked continuously with Rainbow Trout and Splake to maintain the "two-story" fishery through the late 1990s. Netting surveys were conducted by Fisheries Division in 1992 and 1997 to evaluate stocking of Rainbow Trout and Splake. Surveys conducted in both Dodge and Island Lake in 1992 and 1997 yielded a total of eight Splake from only Island Lake suggesting limited to no survival of stocked fish during that period. Stocking of Rainbow Trout and Splake ceased in Dodge Lake in 1997, however Island Lake continued to receive annual plants of Splake until 2006.

During the early 2000s, Dodge and Island Lake were surveyed by Fisheries Division to gather general fish community information. At that time, the Dodge and Island Lake fisheries appeared to be in fair condition. Island Lake supported a simple fish community consisting primarily of a Bluegill and Largemouth Bass fishery with low numbers of other fishes. Young Bluegill were reportedly growing slowly, though this was expected following strong year classes of natural reproduction that were

produced from 2002 to 2004. Large Bluegill (greater than 7 inches) were reportedly available to the anglers and appeared to have outgrown the forage limitations of the small size classes. A decline of Bluegill >7 seven inches was reported in 2006 suggesting that anglers were removing many from the fishery just as they become attractive to harvest. Yellow Perch were reported to be in stable abundance and angler reports from that period suggested that some large Yellow Perch were available for harvest. Splake that had been stocked during this period were not well represented during surveys conducted in the 2000s, suggesting limited to no survival of trout stocked in previous years. Splake stocking ceased during this period.

In the 2010s, fisheries management in Dodge and Island Lake was focused on gathering information about the panfish community while a new invasive species was documented in Dodge Lake. In 2013, the Freshwater Jellyfish (*Craspedacusta sowerbii*) was first documented to occur in Dodge Lake. The Freshwater Jellyfish has been documented in several inland lakes throughout Michigan, and they are typically observed in shallow water during the later summer to early fall. Freshwater Jellyfish feed on zooplankton including daphnia and copepods, however, it is unknown to what extent this invasive species might impact food resources for the native fish community in Dodge and Island lakes.

During the mid-2010s, anglers reported a severe decline in the Bluegill fishery in Dodge and Island lakes. Therefore, to gather information about the panfish community in Dodge and Island Lake, a netting survey was conducted by the Michigan Department of Natural Resources Fisheries Division. Results from this survey demonstrated that while the average size of Bluegill was small, the abundance of Bluegill was considered healthy with multiple year-classes present. Managers recommended at that time that habitat deficiency issues be addressed to improve the abundance of nearshore physical habitat in Dodge and Island Lake.

During the 2020s, additional survey effort was given to Dodge and Island Lake to quantify the abundance of physical habitat in the lakes, while gathering more recent fish community information. A comprehensive survey of both lakes was conducted in 2022, and Fisheries Division managers attended an association meeting that summer to provide a summary of what information would be gathered as part of this survey. This most recent survey prompted drafting this Status of the Fishery Resource report and will guide fisheries management for Island Lake into the future.

Current Status

Methods

To assess the status of the Island Lake fish community, Fisheries Division conducted a survey beginning 13 June 2022. Survey protocols were consistent with the Status and Trends Inland Lake survey program (Wehrly et al. 2015). A variety of gear types were used including small- and large-mesh fyke nets, experimental gill nets, a seine, and boat electrofishing. The small-mesh fyke nets were set for two net nights, while the large-mesh fyke nets were set for three net nights, resulting in a total effort of four net nights for the small-mesh and twelve net nights for the large-mesh nets. Two experimental gill nets were set for two nights, totaling four net nights. A total of four seine hauls were performed in nearshore areas. Boat electrofishing consisted of three transects approximately a quarter mile length totaling 30.12 minutes of effort.

To provide general information about the composition of the fish community in Island Lake, species captured were grouped into three categories. Largemouth Bass, Northern Pike, Smallmouth Bass and

Walleye were categorized as "piscivores"; Banded Killilfish, Bluegill, Bluntnose Minnow, Pumpkinseed, Rock Bass, Sand Shiner, and Yellow Perch were categorized as "planktivores-insectivores"; and Iowa Darter were categorized as "benthivores".

Gamefish species captured including Bluegill, Pumpkinseed, Largemouth Bass, Smallmouth Bass, Northern Pike, and Walleye were measured to the nearest tenth of an inch. Total length information collected was used to compute the average size and range in size for each gamefish species, as well as a length-abundance distribution. The catch per unit effort (CPUE) data from this survey were compared to the summary of regional and statewide CPUE data from inland lakes as part of the Status and Trends program (Wehrly et al. 2015).

Age structures (10 per inch group) were collected from each gamefish species for age analysis. Scale samples were collected from panfish species less than 6.0-inches and bass less than 10.0-inches. Anal fin spines were collected from panfish greater than 6.0-inches, bass greater than 10.0-inches, and all Northern Pike. Dorsal spines were collected from all Walleye captured. Weighted age compositions using length and age references for each gamefish species were calculated as described by Schneider (2000a). A mean growth index for each age class was calculated by subtracting the state average mean length-at-age from that of the 2022 Island Lake survey. Growth indices for age classes represented by a minimum of five fish were averaged to provide a mean growth index (Schneider et al. 2000b). Fish growing slower than -1.00-inch below the state average are considered "below average", while fish growing faster than 1.00-inch above the state average are considered "above average". Bluegill are the exception where fish growing slower than -0.50-inches and faster than +0.50-inches compared to the state average are considered below or above the state average, respectively. Bluegill size structure was rated using an index based on the mean growth index and the proportion of fish greater than 6, 7, and 8 inches captured using large-mesh fyke nets and electrofishing (Schneider 2000b; Schneider 1990).

Results

A total of 4,444 fish weighing 196.6 pounds and representing 12 species were captured during the 2022 survey (Table 3). Piscivores, such as Largemouth Bass, Northern Pike, Smallmouth Bass, and Walleye comprised 3 percent of the catch by number and 33 percent of the catch by biomass. Planktivores-Insectivores, such as panfish, Bluntnose Minnow, Sand Shiner, and Yellow Perch comprised 97 percent of the catch by number and 67 percent of the catch by biomass. Iowa Darter were the only species captured representing the category of `benthivores' and comprised less than a percent of the catch by number and biomass. The estimated standing crop (Schneider 2000b) of Island Lake in 2022 was approximately 33.1 pounds of fish per acre.

Bluegill - A total of 895 Bluegill were captured across all gear types. Bluegill averaged 4.5 inches and comprised 20.1 percent of the catch by number and 42.9 percent by biomass. Bluegill size ranged from 1.0 to 10.0 inches (Table 4) with 16 percent of the catch meeting or exceeding the preferred size for harvest (i.e., 6-inches). The CPUE for Bluegill captured in Island Lake using large-mesh fyke nets and electrofishing was 52.3 fish per net night and 2.0 fish per minute, respectively. A total of 6 age classes of Bluegill were represented in the catch. Enough samples were gathered from ages 3 through 6 years old to make inferences about growth in Island Lake (Table 5). Age and growth analysis suggests that 3- and 4-year-old Bluegill are growing below the state average, while ages 5 and 6 are growing well above the state average (Table 5). According to the Bluegill size score index (Schnieder 1990), fish captured by large-mesh fyke nets and electrofishing were rated as "acceptable" to "poor", respectively.

Largemouth Bass - A total of 109 Largemouth Bass were captured across all gear types. Largemouth Bass averaged 8.4 inches and comprised 2.5 percent of the catch by number and 25.1 percent by biomass. Largemouth Bass size ranged from 3.0 to 17.0 inches (Table 4) with 6 percent of the catch meeting or exceeding the minimum size for harvest (i.e., 14-inches). The CPUE for Largemouth Bass captured in Island Lake by boat electrofishing was 1.5 fish per minute. A total of 8 age classes of Largemouth Bass were represented in the catch. Enough samples were gathered from ages 2 through 4 years old to make inferences about growth in Island Lake (Table 6). Age and growth analysis suggests that age 2- and 3-year-old Largemouth Bass are growing below the state average, while age 4 are growing comparable to the state average (Table 6).

Pumpkinseed - A total of 72 Pumpkinseed Sunfish were captured across all gear types. Pumpkinseed averaged 6.1 inches and comprised 1.6 percent of the catch by number and 7.7 percent by biomass. Pumpkinseed size ranged from 3.0 to 8.0 inches (Table 4) with 46 percent of the catch meeting or exceeding the minimum preferred size for harvest (i.e., 6-inches). The CPUE for Pumpkinseed captured in Island Lake using large-mesh fyke nets and electrofishing was 5.3 fish per net night and 0.2 fish per minute, respectively. A total of 3 age classes of Pumpkinseed were represented in the catch. Enough samples were gathered from ages 3 and 4 years old to make inferences about growth in Island Lake (Table 7). Age and growth analysis suggests that age 3 Pumpkinseed are growing above the state average, while age 4 Pumpkinseed are growing comparable to the state average (Table 7).

Additional gamefish - Northern Pike (Low), Rock Bass, Smallmouth Bass, Walleye, and Yellow Perch were also captured in Island Lake during the 2022 survey. However, too few individuals were captured to make robust conclusions about their growth. Catch rates for these species were generally low relative to other Michigan lakes sampled using the Status and Trends inland lake sampling protocol (Table 8).

Forage fish - Species of forage fish, including Banded Killifish, Bluntnose Minnow, Iowa Darter, and Sand Shiner were also captured in Island Lake during the 2022 survey. Catch rates for these species were considered low or moderate compared to other Michigan lakes sampled using the Status and Trends inland lakes sampling protocol. However, the relative abundance of Sand Shiners captured in small-mesh fyke nets was considered `high'.

Analysis and Discussion

Island Lake is a medium-sized deep lake with low to moderate levels of productivity (e.g., low to moderate standing crop biomass). Results of the physical habitat survey suggest that residential development along the Island Lake shoreline is below average. However, there is limited physical habitat in the form of submerged woody habitat in Island Lake. Despite low levels of physical habitat, such as submerged woody habitat. Island Lake provides anglers with an acceptable mixed-bag fishery comprised of panfish and Largemouth Bass with occasional catches of good-sized Northern Pike, Rock Bass, Smallmouth Bass, Walleye, and Yellow Perch.

Chemical and biological parameters used for Island Lake were measured in Dodge Lake in 2004 but likely reflect the current conditions in the lake. Island Lake is relatively deep, providing thermal refugia to cool-water fishes, and has sufficient levels of dissolved oxygen to support aquatic life during the harsh periods of late winter and summer. Island Lake has relatively low to moderate productivity, which is characteristic of deep inland lakes in Michigan that have high transparency. However, the threat of

invasive species (namely, Zebra Mussels) is a concern for Island Lake. The introduction of Zebra Mussels in Island Lake could reduce lake productivity resulting in a disruption to the food chain. The introduction of Zebra Mussels is especially concerning given that they have been documented recently in Indian Lake (in 2019), which is located close to Island Lake.

During the 2022 Fisheries Division survey, the invasive perennial reed grass better known as Phragmites, was documented on the north shore of Island Lake. Invasive species outreach, education, and prevention measures are needed in Island Lake to ensure Zebra Mussels are not introduced and that Phragmites does not spread in the Island and Dodge Lake system. In addition to improving efforts to reduce the likelihood of introducing invasive species, improvements of nearshore physical habitat should be considered.

Physical habitat parameters measured indicate that the Island Lake shoreline is largely intact and in a healthy state. However, the density of submerged woody habitat in Island Lake is well below the regional average. Natural undeveloped lakes throughout northern Michigan and Wisconsin have large woody debris densities ranging from 470 to 1,545 logs per mile of shoreline (O'Neal and Soulliere 2006). Protection and rehabilitation strategies that maintain or improve the abundance of woody debris nearshore are well developed (WI DNR 2014) and should be adopted in Island Lake. Improvements in nearshore woody habitat are expected to increase the relative abundance of forage fishes and panfish.

The number of fish species (or species richness) in Island Lake is comparable to other inland lakes in the northern region of the state (Wehrly et al. 2015). Oddly, very few benthivores (e.g., suckers, bullhead) have been captured in Island Lake historically, and that has not changed. Benthivores, or bottom dwelling species, play an important role in defining a healthy inland lake ecosystem (Cook et al. 2005). Benthivores such as suckers serve as forage for a variety of piscivores including bass, Northern Pike, and Yellow Perch at varying life periods (e.g., larval, juvenile, adult). Suckers are highly fecund and deposit eggs each spring that are consumed by Yellow Perch just prior to their own annual spawning cycle. The absence of benthivores, such as the Common White Sucker, suggests that additional predation pressure may be placed on species such Yellow Perch, Bluegill, and Pumpkinseed Sunfish resulting in fluctuations in the abundance and size structures of those species.

Panfish

Catch rates of Bluegill and Pumpkinseed in Island Lake are comparable to the region and suggest that an acceptable fishery exists for anglers. However, the abundance of Bluegill and Pumpkinseed declines quickly after reaching 6-inches suggesting that fishing pressure and harvest may be high. The average size of Bluegill is relatively small, yet opportunities to catch higher quality individuals exist. The average size of Pumpkinseed in Island Lake is higher compared to Bluegill, suggesting a more attractive fishery exists for that species. Anglers are encouraged to selectively harvest smaller Bluegill and Pumpkinseed while releasing larger individuals to help maintain an abundance of larger individuals.

Largemouth Bass

The catch rate of Largemouth Bass in Island Lake was high compared to other lakes in the region and across the state. The growth rate of Largemouth Bass is generally slow compared to the state average, taking approximately 5 or 6 years to reach legal size. Anglers should expect to catch many medium-sized individuals making this a good fishery to try new techniques. For example, anglers interested in learning new topwater techniques could target Island Lake during the early summer with artificial surface

baits. If the nearshore density of woody debris were improved in Island Lake, this could also provide good opportunities to experiment with artificial frogs.

Management Direction

Fish Community

The Island Lake fish community is currently in a healthy state offering acceptable angling opportunities for a variety of species including panfish, bass, and Northern Pike. At this time, there are no fisheries regulation changes needed for Island Lake. However, if statewide management plans are developed for panfish and bass species, additional or alternative regulatory options may become available. Anglers and area stakeholders interested in improving the fish community are encouraged to focus their efforts on invasive species prevention and removal, as well as nearshore habitat protection and improvement projects.

Invasive Species

Fisheries Division recommends that representatives from the Dodge and Island Lake Property Owners Association, as well as staff from the Schoolcraft County Conservation District and Cooperative Invasive Species Management Area (or CISMA) work collaboratively to apply for funding to implement programs geared toward outreach and education to prevent future introduction of invasive species in the Dodge and Island Lake region. For example, funding for prevention, detection, eradication, and control of aquatic invasive species may be possible through the Michigan Invasive Species Grant Program (MISGP 2025). The focus of eradication is especially important given the documentation of the invasive perennial grass, Phragmites.

Habitat Protection and Improvement

Shoreland and shoreline development have the potential to impact Island Lake causing issues such as poor water quality, erosion, and additional losses to fish habitat. The density of dwellings on Island Lake is stable and the rate of shoreline alteration or armoring is low (Figure 7), however, this could increase in the future. Based on a national lake assessment (USEPA 2024), the loss of natural shorelines is the biggest threat to the overall health of inland lakes in Michigan. Island Lake landowners are encouraged to consider adopting natural shoreline principles when designing shoreline modification projects. For more information about how to identify contractors and incorporate natural shoreline principles, landowners can contact the Michigan Natural Shoreline Partnership (MNSP 2025).

The density of nearshore woody habitat is limited in Island Lake. The Dodge and Island Lake Property Owners Association and the Schoolcraft County Conservation District are encouraged to work collaboratively with the Michigan Department of Natural Resources Fisheries Division and the Department of Environment, Great Lakes, and Energy to improve the density of nearshore woody habitat in Island Lake. An example of a project that serves to improve the density of nearshore woody habitat includes the "Fish Sticks" program (WI DNR 2014). Rehabilitation projects designed to improve the density of nearshore woody habitat could target regions of the lake shoreline where density values (number of logs per mile) are less than 200 (Figure 8). Funding for additional monitoring and improvement of nearshore woody habitat may also be available through the MDNR Fisheries Aquatic Habitat Grant program (MDNR 2025).

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Table 1. Physical indicators including dwelling density (dwellings per mile), boat docks (docks per mile), shoreline armoring (average percent armored), and large woody debris (trees per mile) measured in Island Lake, the regional average (Avg. Northern Lake Michigan Management Unit), 25th percentile, 75th percentile, and 2022 status for Island Lake.

Year	Dwelling Density	Boat Docks	Shoreline Armoring	Large Woody Debris
2022	12.3	10.6	4.0	99.2
Regional Avg.	13.3	9.7	10.1	205.4
25th Percentile	1.3	1.3	0.0	21.7
75th Percentile	21.8	16.6	14.7	230.3
2022 Status	Below Average	Above Average	Below Average	Below Average

Table 2. Decade, fish species stocked, and the total number of fish stocked in Island Lake, Schoolcraft County, Michigan (1935 to 2006).

Decade	Species Stocked	Number Stocked
1930s	Bluegill	11,000
1940s	Bluegill	3,600
1940s	Rainbow Trout	2,800
1940s	Smallmouth Bass	815
1950s	Rainbow Trout	8,400
1960s	Brown Trout	1,300
1960s	Rainbow Trout	28,150
1970s	Rainbow Trout	38,646
1980s	Rainbow Trout	35,795
1980s	Splake	2,300
1990s	Rainbow Trout	15,785
1990s	Splake	16,755
2000s	Splake	3,508

Table 3. Species, number captured, total weight in pounds, total length (in inches, in.), and the range in total length (in inches) of fish captured in Island Lake, Schoolcraft County during the 2022 general fish community survey.

Species	Number	Total Weight (lbs.)	Average Total Length (in.)	Range in Total Length (in.)
Banded Killifish	2	0.0	2.5	2.0 to 3.0
Bluegill	895	84.4	4.5	1.0 to 10.0
Bluntnose Minnow	113	0.5	2.2	1.0 to 3.0
Iowa Darter	6	0.0	1.6	1.0 to 2.0
Largemouth Bass	109	49.3	8.4	3.0 to 17.0
Northern Pike	2	5.4	23.0	21.0 to 24.0
Pumpkinseed	72	15.2	6.1	3.0 to 8.0
Rock Bass	71	22.1	7.0	3.0 to 10.0
Sand Shiner	3,151	7.9	2.1	1.0 to 3.0
Smallmouth Bass	2	3.2	14.5	13.0 to 15.0
Walleye	2	6.9	21.5	18.0 to 24.0
Yellow Perch	19	1.8	5.9	1.0 to 8.0
Grand Total	4,444	196.6		

Table 4. Species size (inch group) and abundance distribution from survey conducted in Island Lake, Schoolcraft County Spring of 2022.

Inch Group	Bluegill	Largemouth Bass	Pumpkinseed
1	146	-	-
2	38	-	-
3	57	2	3
4	249	3	12
5	262	2	24
6	95	15	15
7	21	33	11
8	17	13	7
9	8	14	-
10	2	4	-
11	-	6	-
12	-	8	-
13	-	2	-
14	-	4	-
15	-	2	-
16	-	-	-
17	-	1	-

Table 5. Bluegill age (years), number (N) aged, range in total length (TL, inches), State of Michigan average size at age (Avg. total length), average total length in Island Lake and the mean growth index of Bluegill collected in Island Lake, Schoolcraft County 2022.

Age	N Aged	TL Range (in.)	State Avg. TL (in.)	Avg. TL (in.)	Growth Index*
3	14	4.20 to 6.40	5.30	4.77	-0.53
4	25	5.10 to 7.70	6.20	5.67	-0.53
5	11	7.60 to 9.30	6.90	8.47	+1.57
6	7	8.70 to 9.70	7.40	9.20	+1.80
7	2	9.20 to 10.30	8.00	9.75	-
8	1	10.60 to 10.60	8.40	10.60	-

*Growth index is the average deviation from the state average length at age.

Table 6. Largemouth Bass age (years), number (N) aged, range in total length (TL, inches), State of Michigan average size at age (Avg. total length), average total length in Dodge Lake and the mean growth index of Bluegill collected in Dodge Lake, Schoolcraft County 2022.

Age	N Aged	TL Range (in.)	State Avg. TL (in.)	Avg. TL (in.)	Growth Index*
1	4	4.60 to 5.20	5.40	4.90	-
2	26	5.60 to 8.80	8.70	7.35	-1.35
3	20	8.60 to 12.00	10.60	9.69	-0.91
4	11	11.30 to 13.30	12.00	12.28	+0.28
5	2	14.20 to 14.60	13.70	14.40	-
6	2	14.20 to 15.50	15.00	14.85	-
7	2	14.70 to 17.80	16.70	16.25	-
8	1	15.90 to 15.90	17.60	15.90	-

*Growth index is the average deviation from the state average length at age.

Table 7. Pumpkinseed age (years), number (N) aged, range in total length (TL, inches), State of Michigan average size at age (Avg. total length), average total length in Island Lake and the mean growth index of Pumpkinseed Sunfish collected in Island Lake, Schoolcraft County 2022.

Age	N Aged	TL Range (in.)	State Avg. TL (in.)	Avg. TL (in.)	Growth Index*
3	7	4.60 to 7.60	5.20	6.21	+1.01
4	37	4.30 to 8.50	5.80	6.00	+0.20
5	3	5.80 to 8.60	6.30	6.81	-

*Growth index is the average deviation from the state average length at age.

Table 8. Relative abundance rating (Low, Moderate, or High) of less represented gamefish captured using different survey gear in Island Lake, Schoolcraft County 2022. Catch rates were compared to those conducted as part of the Statewide Status and Trends program (Wehrly et al. 2015).

	Northern Pike	Rock Bass	Smallmouth Bass	Walleye	Yellow Perch
Electrofishing	Low	Low	Low	Low	Low
Large Mesh Fyke	Low	Moderate	Low	Low	Moderate
Gill Net	Low	Low	Moderate	Low	Low
Small-Mesh Fyke	Low	Low	Low	Low	Low
Seine	Low	Low	Low	Low	Low

Figure 1. Map of Island Lake, Schoolcraft County, Michigan.

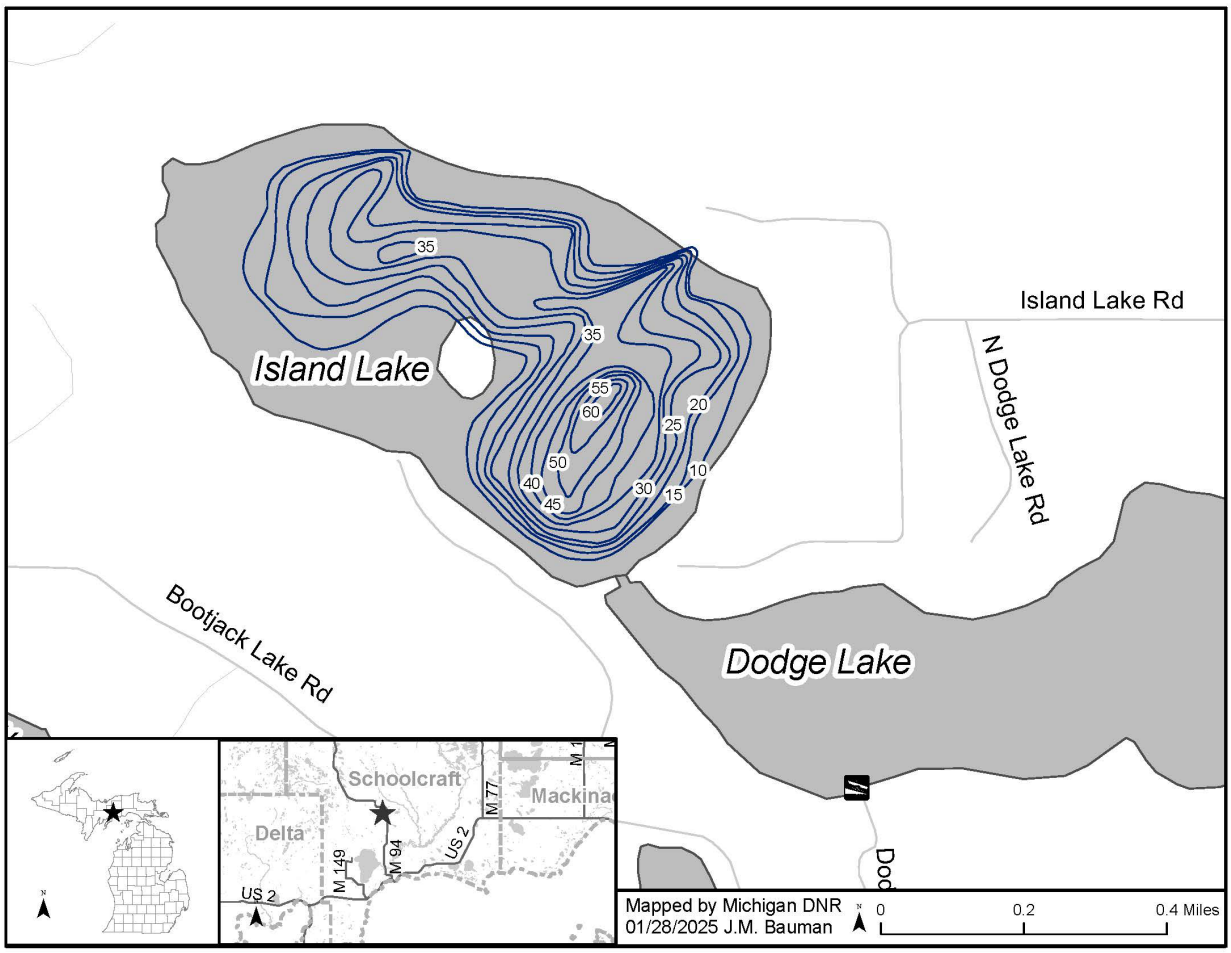


Figure 2. Land use map for the Dodge and Island lakes region.

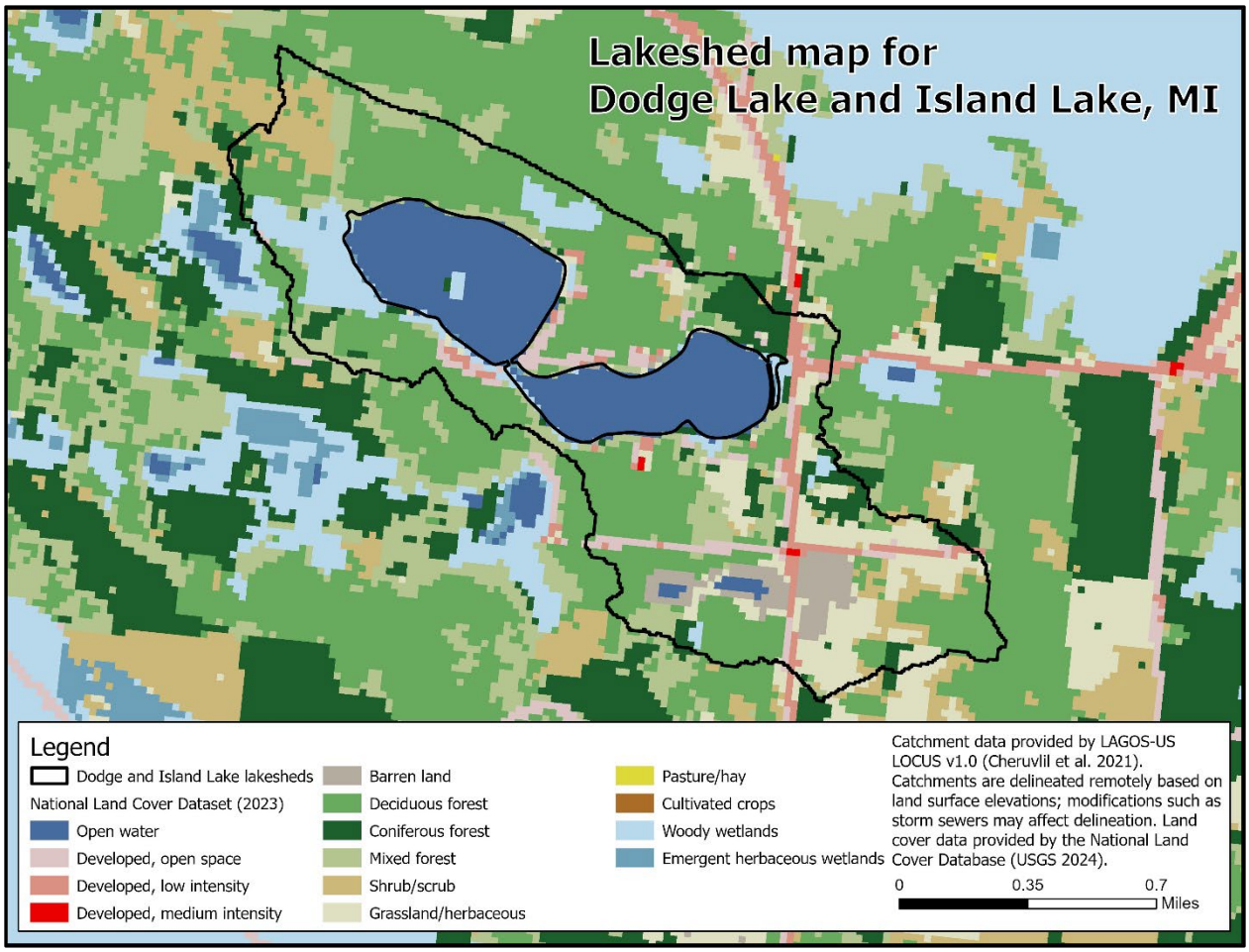


Figure 3. Catchment or ‘lakeshed’ map for the Dodge and Island lakes region.

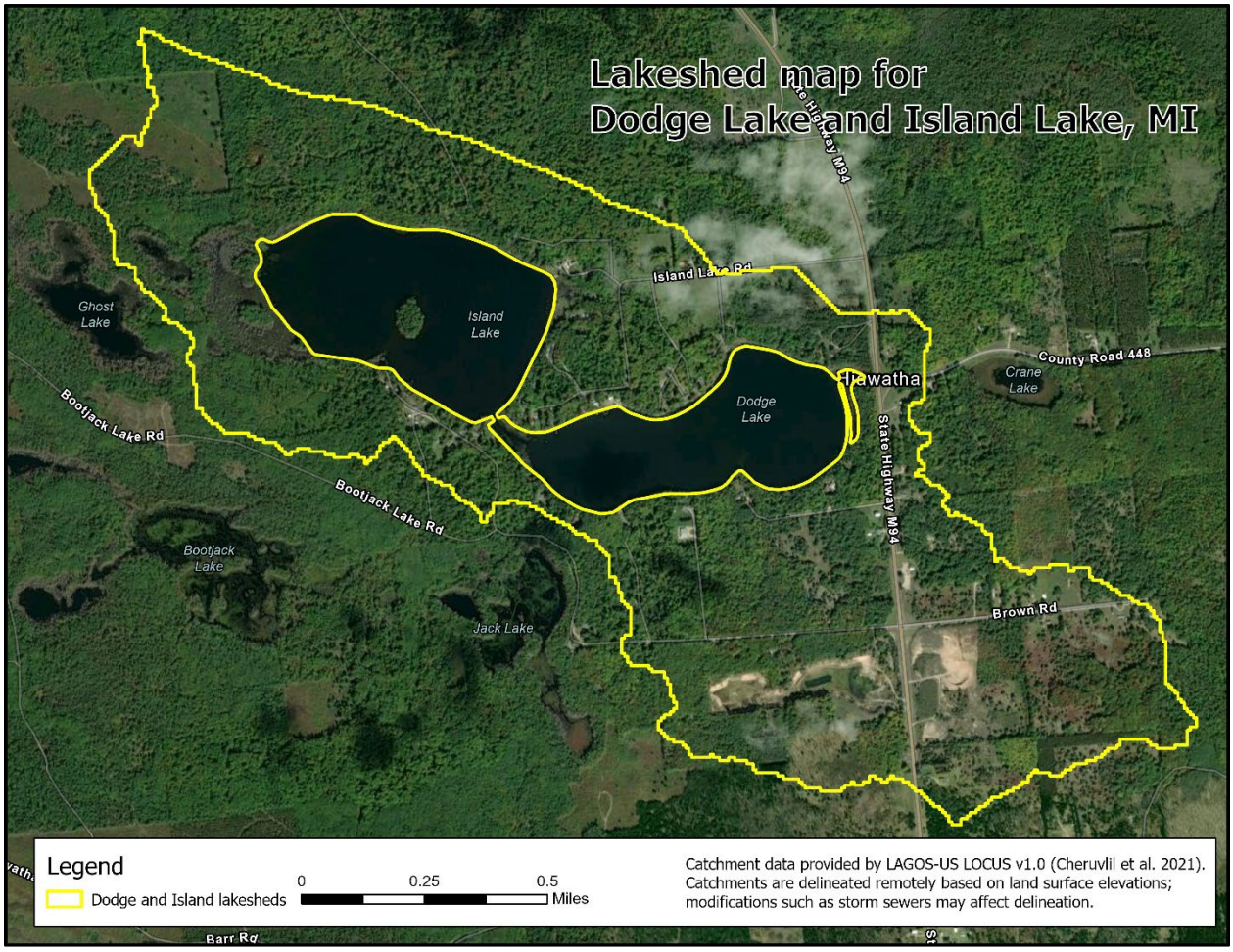


Figure 4. Depth and dissolved oxygen profile for Island Lake Schoolcraft County collected during winter (triangles) and summer (circles) of 2022.

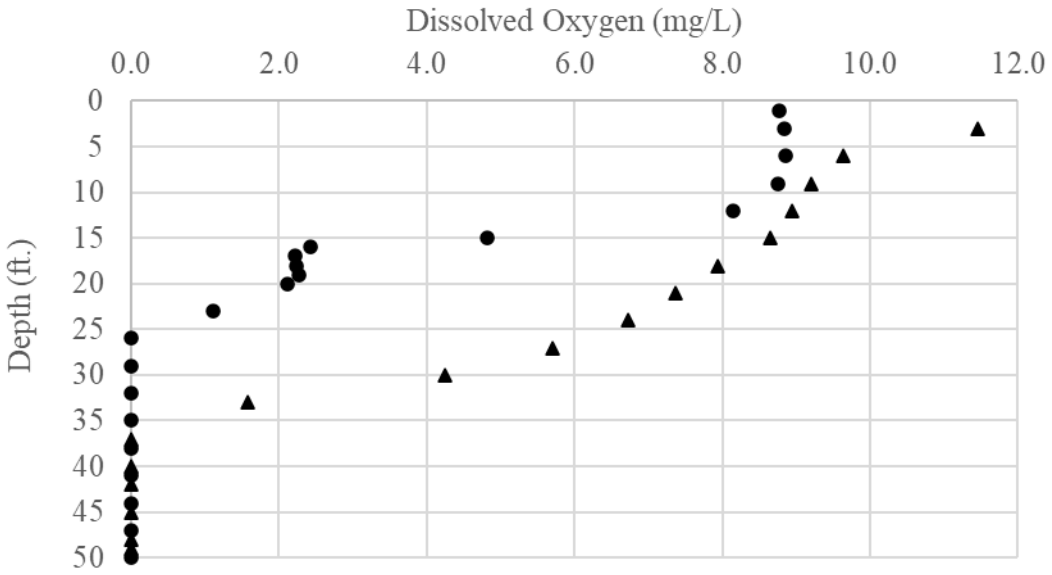


Figure 5. Depth and temperature profile for Island Lake, Schoolcraft County collected 18 August 2022.

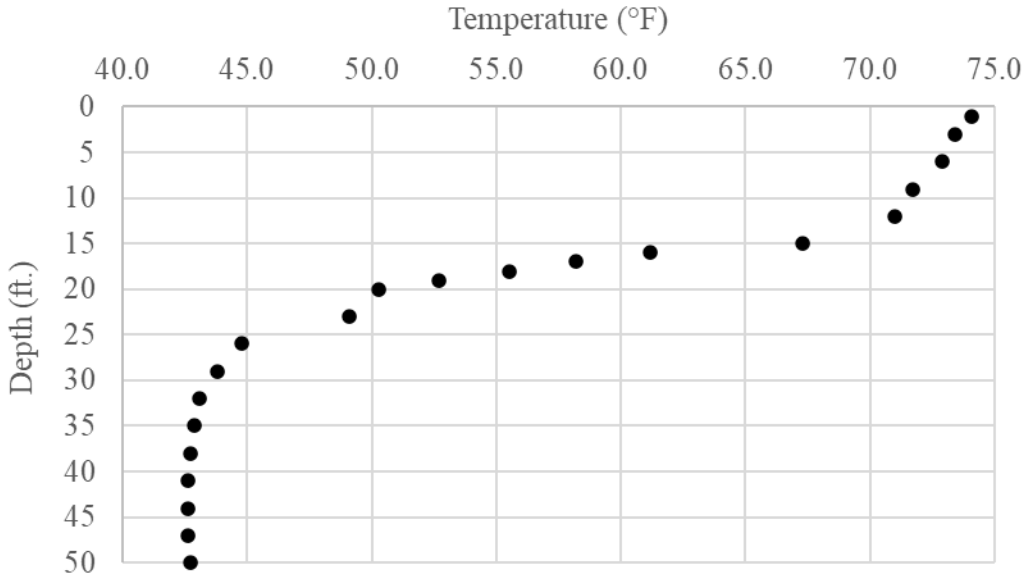
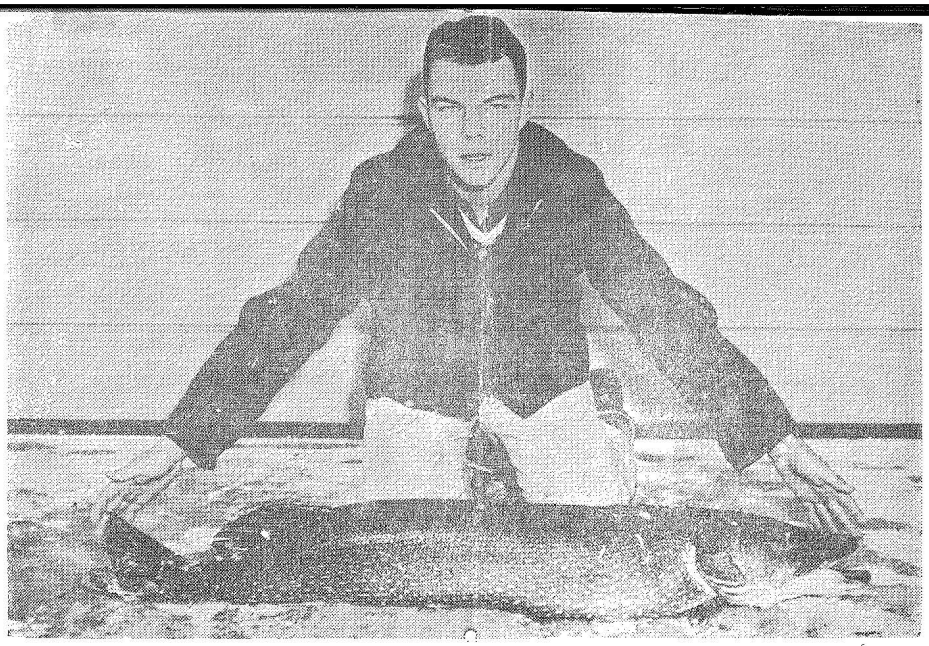


Figure 6. Newspaper article (Manistique Pioneer Tribune, February 9th, 1961) depicting current Michigan state record Northern Pike (51.5 inches total length, 39.0 pounds).



Larry Clough and His Record Pike, 51½ Inches Long and Weighing 39 Pounds

Dodge Lake Pike Breaks State Record

Dodge Lake, some 10 miles north of Manistique, may well prepare for a big influx of anglers as word gets around that a northern pike speared there last month set a new state record.

A 16-year-old Ludington youth speared only one northern on his week's fishing trip to Dodge Lake —but that catch weighed an even 39 pounds on grocery store scales and measured 51½ inches. It surpassed the previous record pike caught in Michigan by nearly four pounds and the largest taken in any manner by three pounds.

"It didn't put up much of a fight," the Ludington youth, Larry Clough said. "I was disappointed until I found out it set a new record." He speared the fish at 2:30 p. m. on Jan. 6.

The previous record holders both weighed 35 pounds. One was 52 inches long and was speared seven years ago in Millecoquins Lake in Mackinac County by Leonard Durga of Newberry. The other was 44 inches long and was speared in Lake Superior four years ago by Don Pickert.

Last year newspapers carried the story of a 36-pound pike, 47 inches long, which set a new mark as the largest recorded pike ever taken in Michigan, but it had been poisoned in Courtney Lake, Baraga County, during chemical treatment of the lake to reduce panfish populations.

also of Ludington, spent a week's vacation at Brady's resort on the connected Dodge and Island Lakes, for the sole purpose of spearing pike.

"The lake has a reputation for few fish, but big ones," Larry was quoted as saying, 'and I guess it's well earned, for this was the only pike we got there. Dad got two small ones in a different lake nearby, and I sat in the shanty four days before I saw a pike, on Thursday. It seemed to be as big as this one (maybe it was the same) but it didn't come into the hole so I could get a crack at it.

"Then, Friday afternoon I stood up to leave the shanty, leaned my spear against the wall and opened the door," Larry said.

"Something made me look back and here was the big fellow squarely below the hole in the ice. I grabbed the spear and heaved it. It was a light spear and didn t penetrate very deeply, but it caught him squarely."

Michigan has no foolproof system of maintaining fish records and bigger fish may have been taken. But the conservation department's fish division keeps track of all claimants which reach its attention, by direct reports from the field or in newspapers, but bigger fish could be caught and go unreported, which would be likely i the fish were taken illegally, fc instance.

ant about a 45-pound pike taken in the dim past by a Chicago resorter at Caribou Lake, but it was an old mounting with many coats of varnish and could not be identified positively or verified. Indeed, it looked to many observers more like a muskie than a pike.

The national pike record was set in 1940 when a 46 pounder was taken from Sacandaga Reservoir in New York State.

Figure 7. Island Lake, Schoolcraft County shoreline status depicting the percent shoreline that has been altered from its natural state. Each value represents a 1,000-ft transect surveyed during the 2022 Island Lake Status and Trends survey.

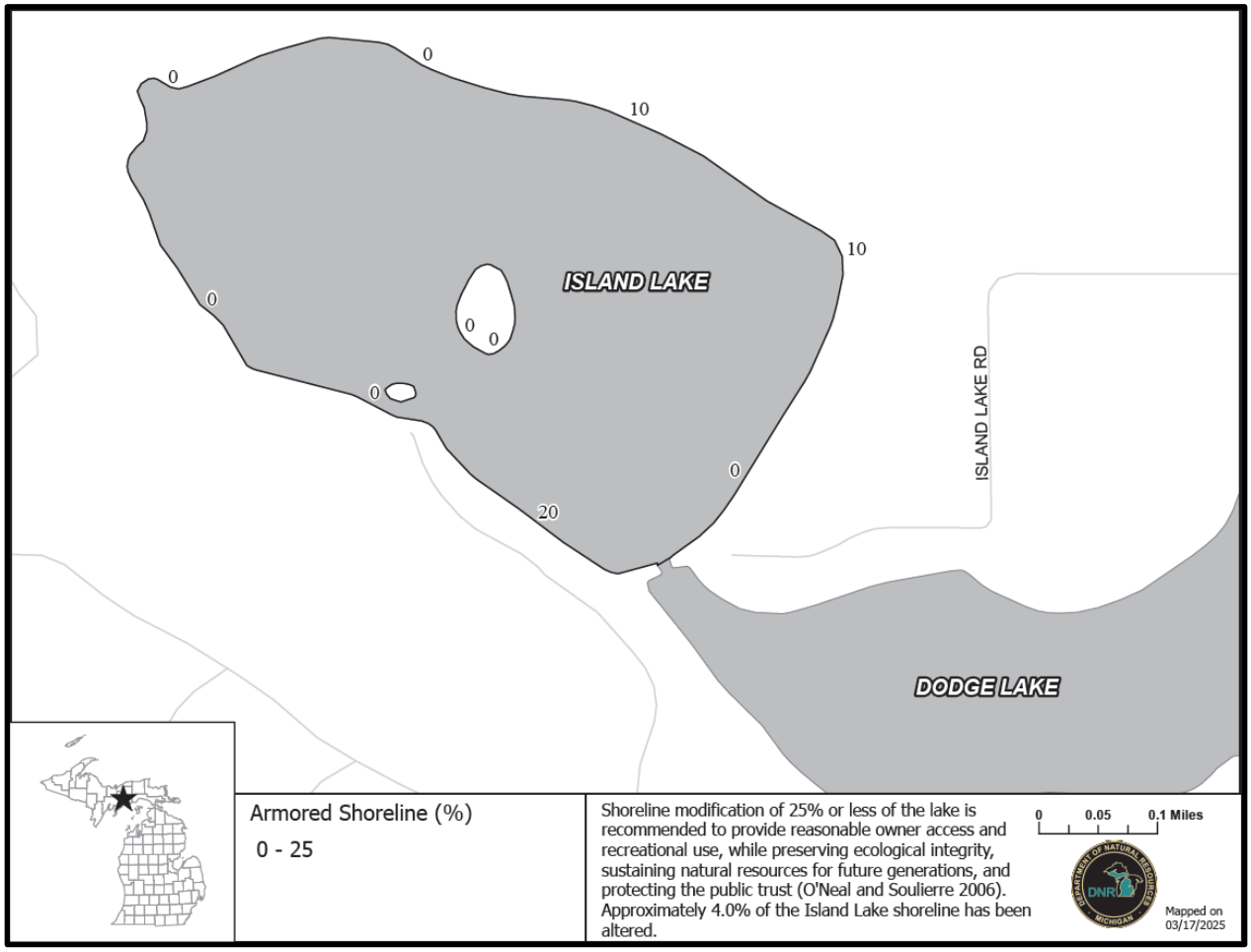
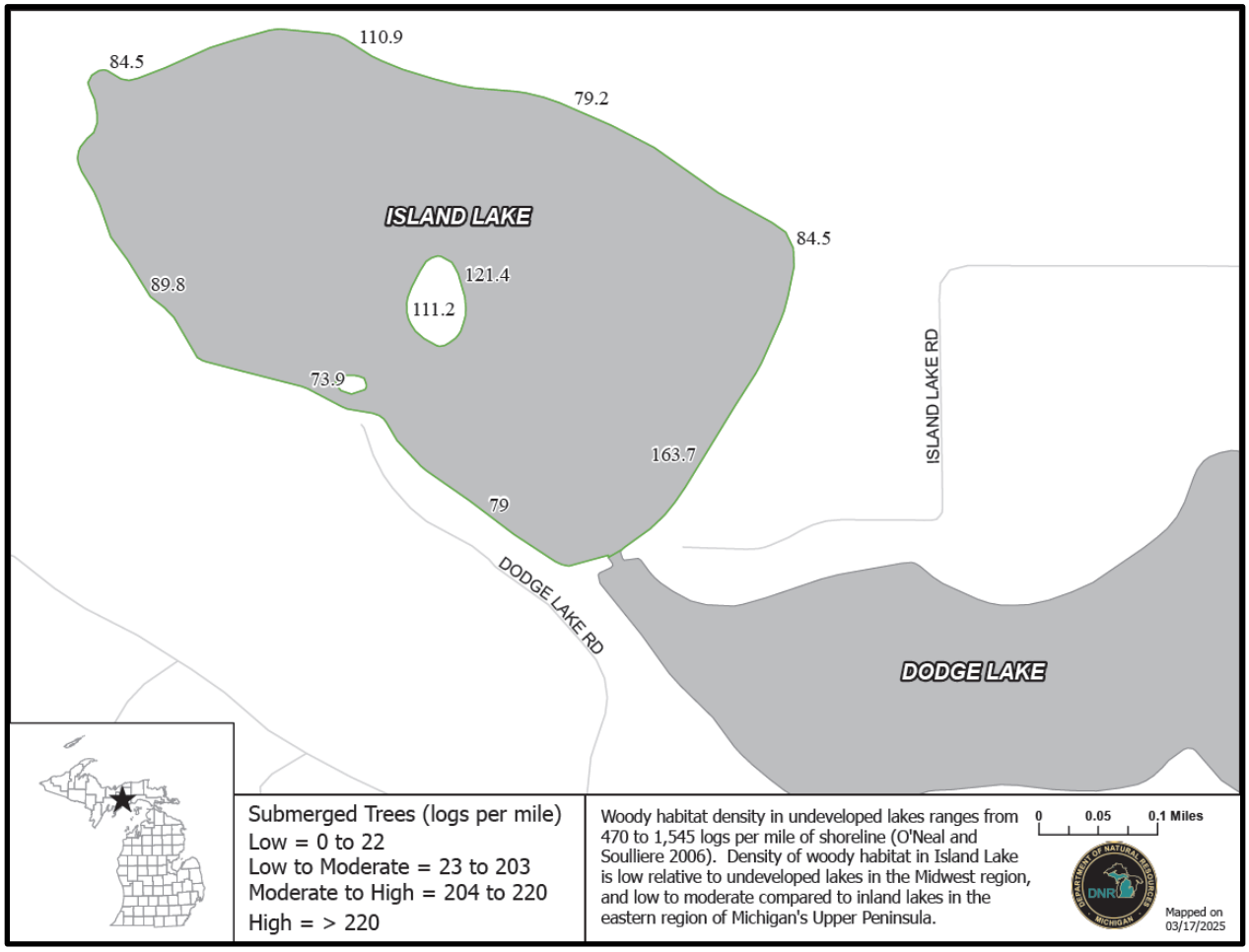


Figure 8. Island Lake, Schoolcraft County shoreline status depicting the density of submerged trees (logs per mile). Each value represents a 1,000-ft transect surveyed during the 2022 Island Lake Status and Trends survey.



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