HENDERSON LAKE FISH COMMUNITY EVALUATION

June 1-4, 2020

by Steven P. Sendek

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This survey was conducted to evaluate the fish community of Henderson Lake, Ogemaw County, Michigan and to provide information to help guide riparian owners in appropriate fisheries management options. Henderson Lake is located in east central Ogemaw County, has a surface area of 172 acres with a maximum depth of just over 20 feet (Figure 1- 2 LAKE MAP). Less than half the riparian zone is developed with the majority of development found along the east side and along a canal on the north side of the lake. Approximately 35% of the area of the lake is less than 10 feet deep. Bottom substrates are mainly organic with small areas of sand and gravels. Aquatic plant communities are diverse and in balanced.

Little if any historical fish community data exists for Henderson Lake, a search of the Michigan Department of Natural Resources, Fish Collection Data Base, found no fish collection information. The fish community is a warm water fish community composed of northern pike, largemouth bass, bluegill, black crappie, pumpkinseed sunfish and bullhead all which contributed to a good sport fishery.

Figure 1 Aerial View of Henderson Lake
Generated by Google Maps

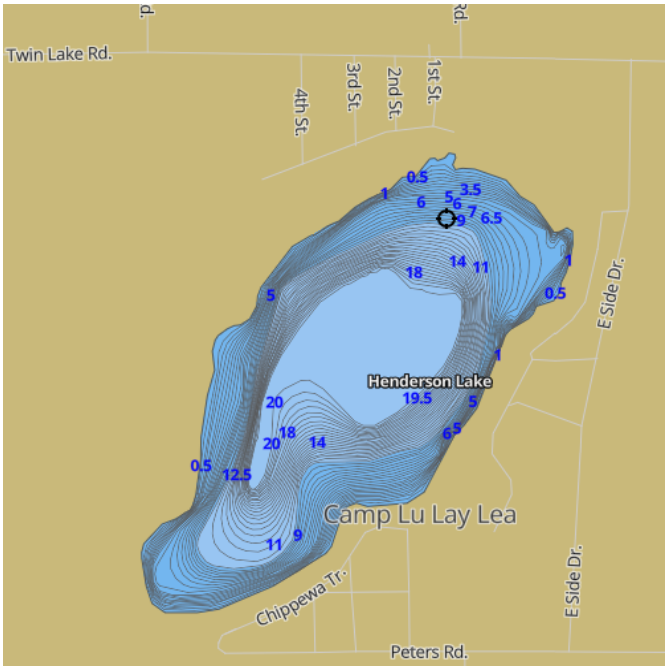


Figure 2 Contour Henderson Lake Map
Generated by Nautical Charts Map

Survey Methods

A netting survey was conducted from June 1 – 4, 2020. Netting gear used in the survey included 6 fyke nets (a style of trap net) of various mesh sizes (1/2", ¾" and 1' square mesh) (Figures 3-7 fyke net pictures with fish and aerial photos). The various mesh sizes allow for all sizes and ages of fish present in the lake to be captured and to minimize issues with netting gear selectivity (certain fish species and sizes do not easily enter dark small mesh nets and small fish swim through larger mesh nets). All 6 were set on Jun 1, tended daily until they were removed on June 4 for a total of 18 net nights of effort. Netting sites were selected at various locations around the lake to sample various lake habitat types, focusing on near shore structure preferred by the various species of fish in the lake (Figure 12 lake map with net locations). All fish captured in the survey were identified to species and measured for length.

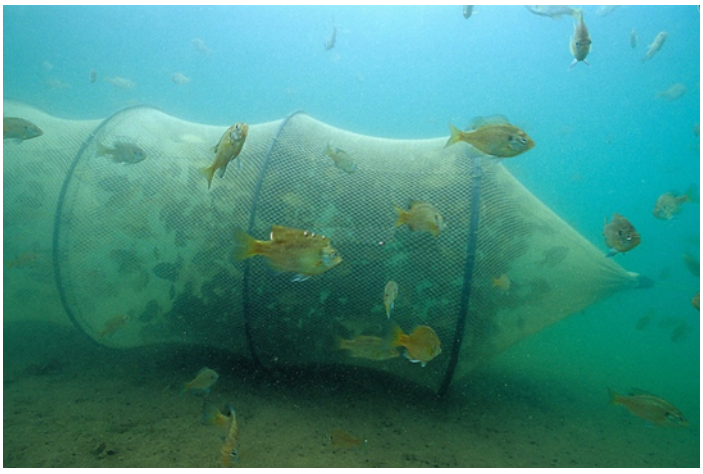


Figure 3 Fyke Net Funnel
pictures taken by Eric Engbretson

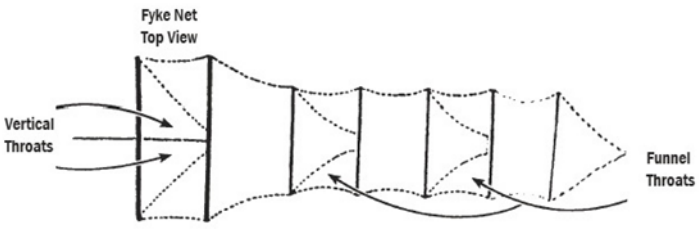


Figure 4 Drawing of a Fyke Net
by Duluth Fish Nets

Figure 5 Fyke Net Throat Funnel
pictures taken by Eric Engbretson

Figure 6 Fyke Net Setting Generated by Alex Sendek

Figure 7 Set Net Generated by Alex Sendek

Figure 8 Recording Data Picture Generated by Alex Sendek

Figure 9 Recording Data Picture Generated by Alex Sendek

Figure 10 Recording Data Picture Generated by Alex Sendek

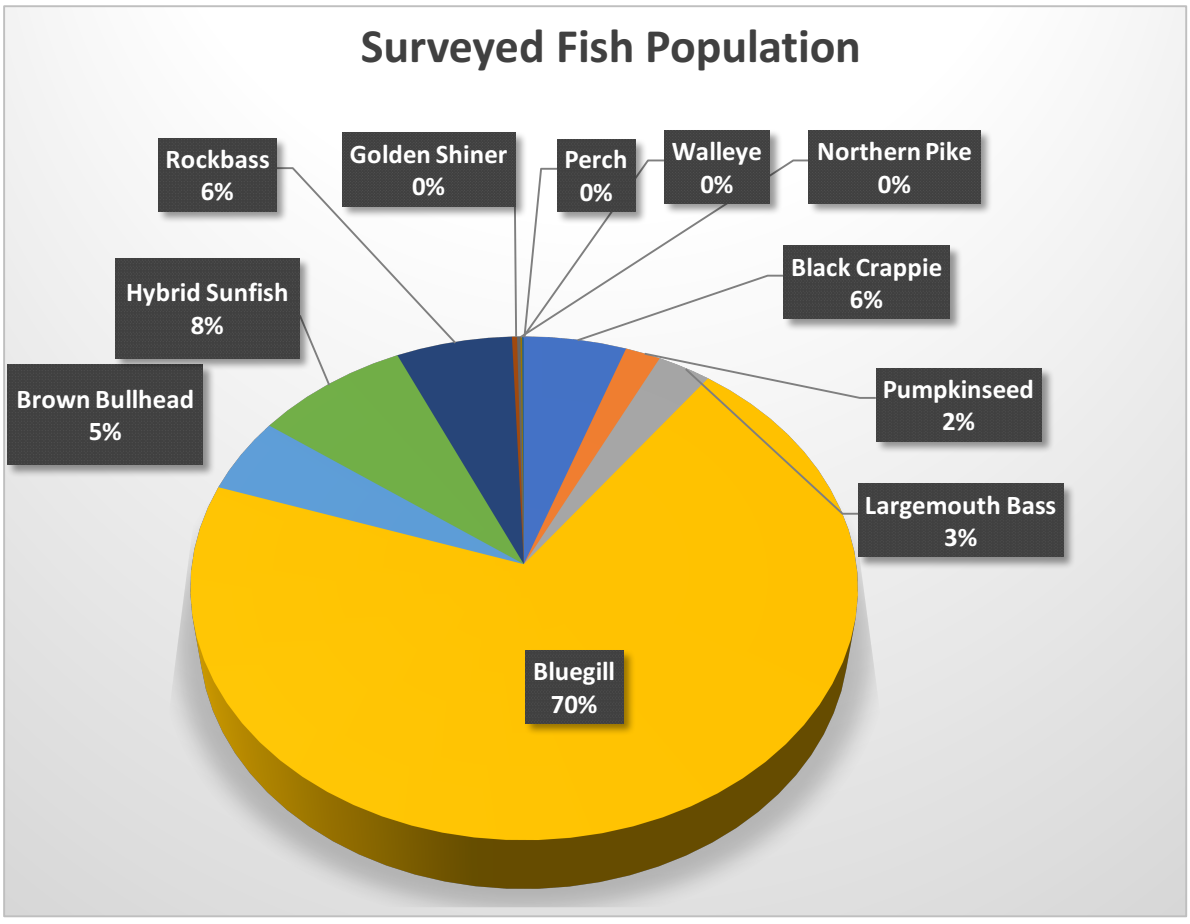
Figure 11 Recording Data Picture Generated by Alex Sendek

Figure 12 Aerial View of Net Sets Generated by Google Earth and Nick Sendek

Survey Results

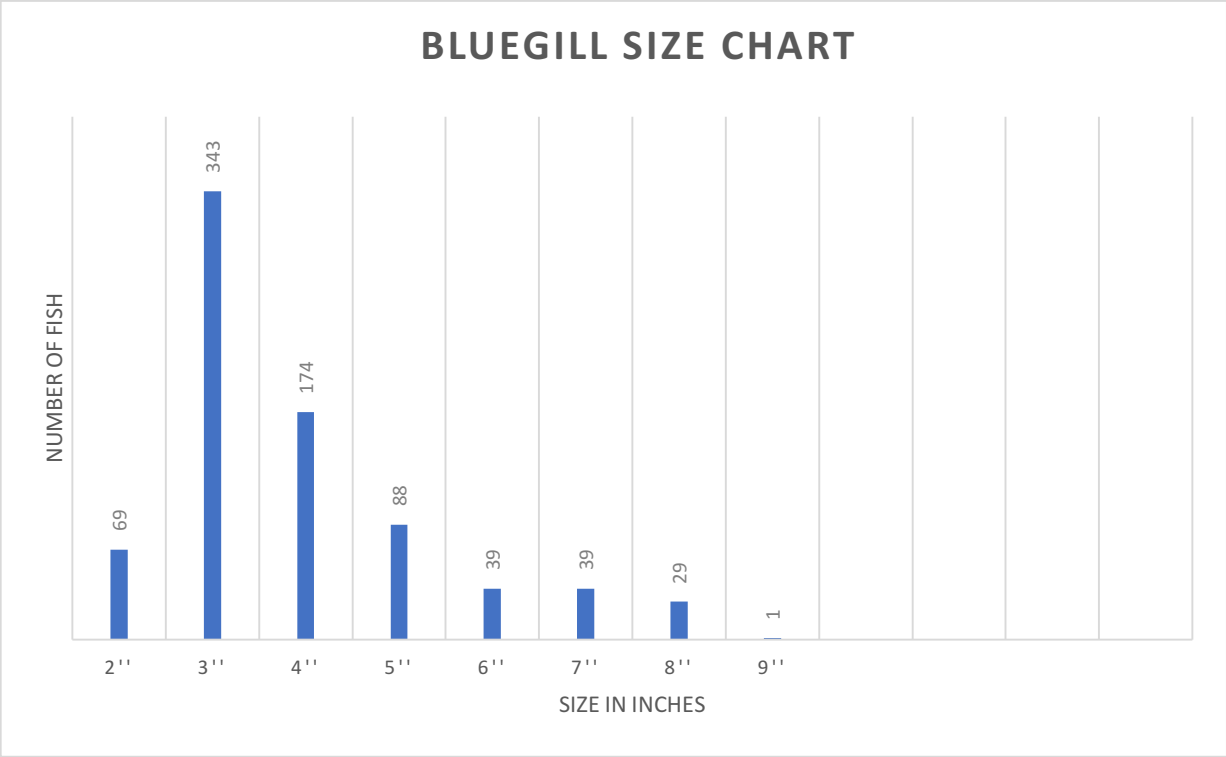
A total of 1,118 fish from 11 different species were captured (table1).

The most numerous species were bluegill (782), followed by hybrid sunfish (92), rockbass (69), black crappie (61), brown bullhead (54), largemouth bass (32), pumpkinseed (21), golden shiner (3), northern pike (2), yellow perch (1), and walleye(1). In general, the size distribution of all species appears typical of a healthy fish community (Species Bar Graphs 1-12) (Pie Chart 1 overall population). The panfish community is represented by good numbers of catchable fish (7"-9" bluegill, 7"- 9" hybrid sunfish, 11" – 13" black crappie and 7" – 8" pumpkinseed). Predatory fish are primarily composed of largemouth bass with a significant portion 14" and larger. Few other predatory fish were captured including 2 northern pike and 1 walleye. Brown bullhead were the only rough fish captured with many in the 10" – 13" size range.



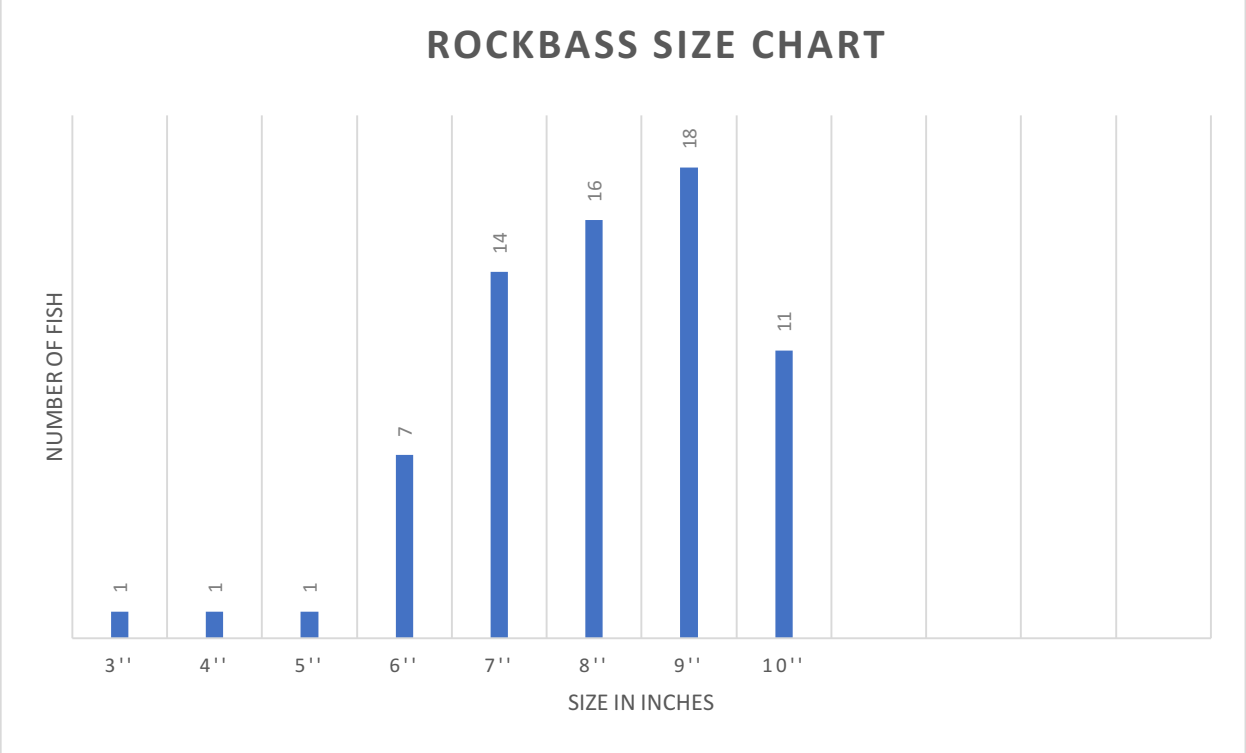
Pie Chart 1 Complete Fish Survey

Generated by Nick Sendek



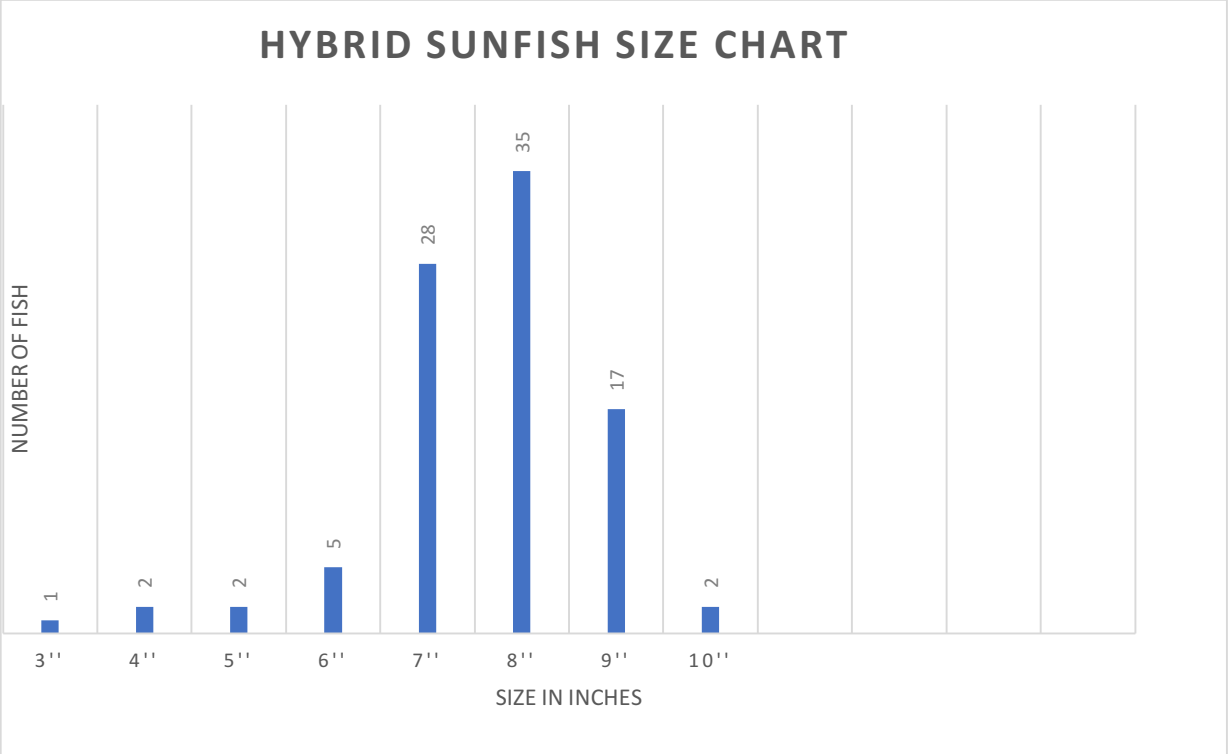
Bar Graph 1 Bluegill Size

Generated by Nick Sendek



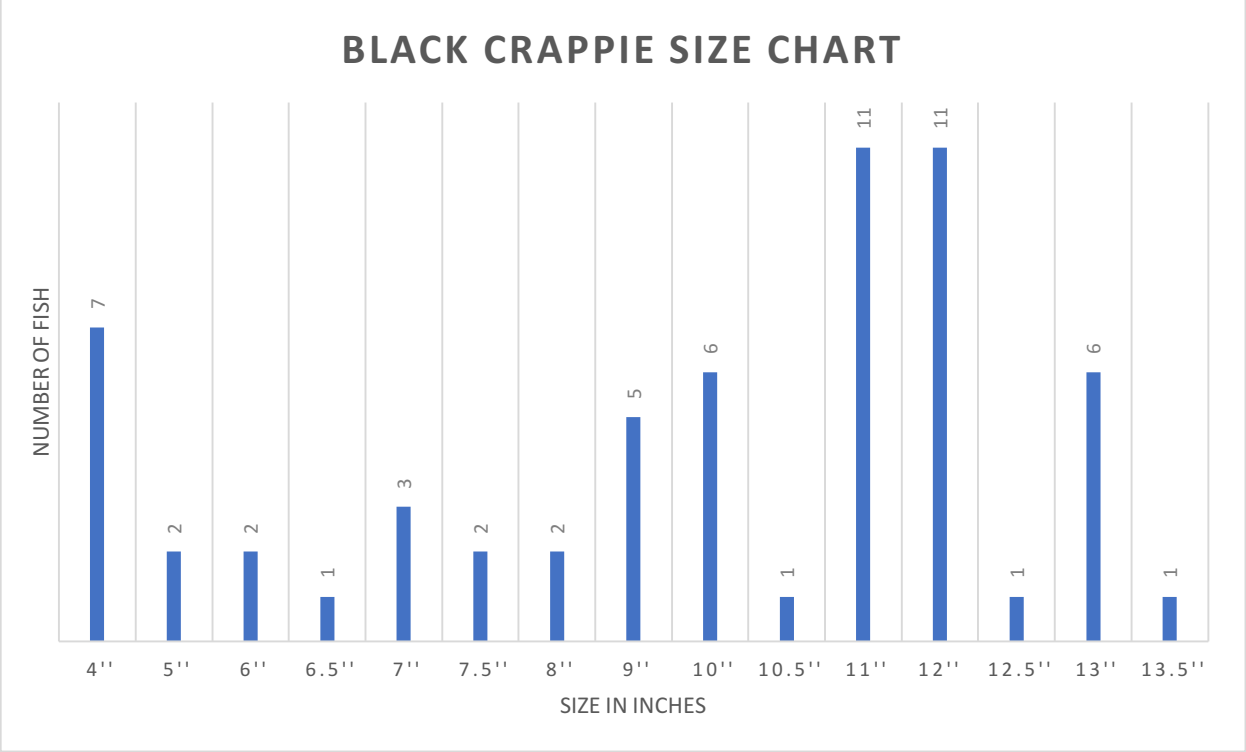
Bar Graph 2 Rockbass Size

Generated by Nick Sendek



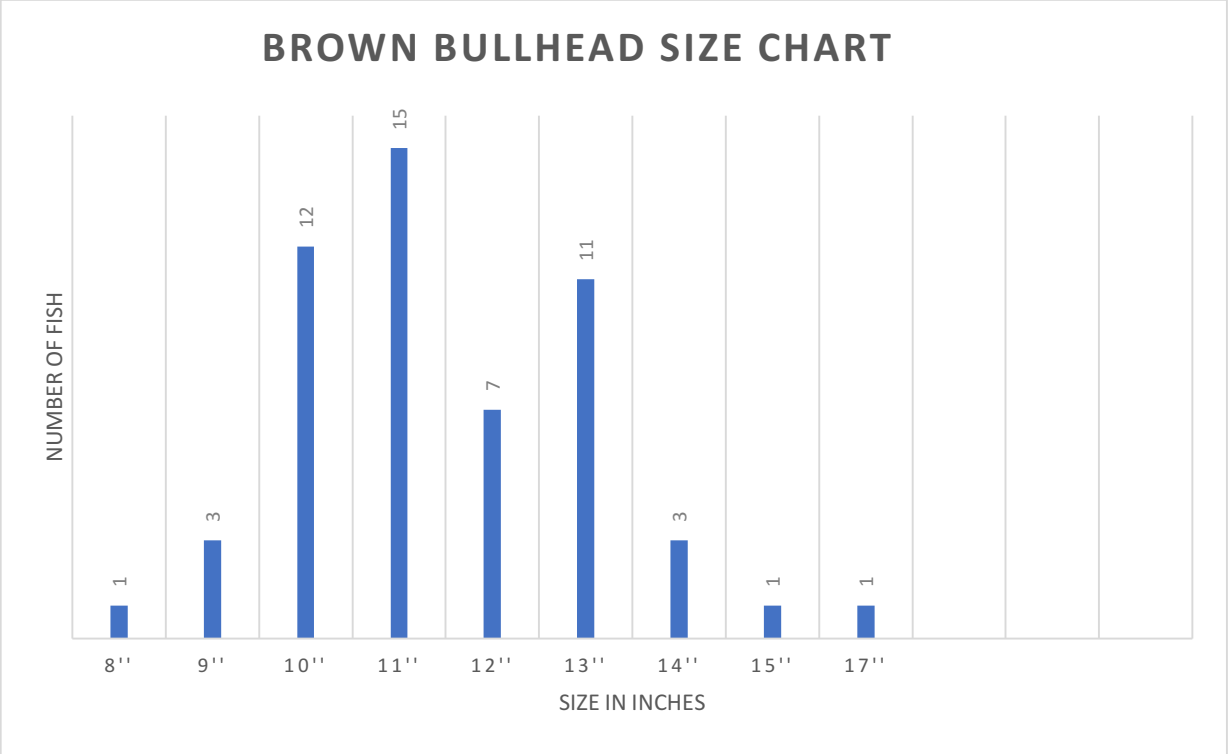
Bar Graph 3 Hybrid Sunfish Size

Generated by Nick Sendek



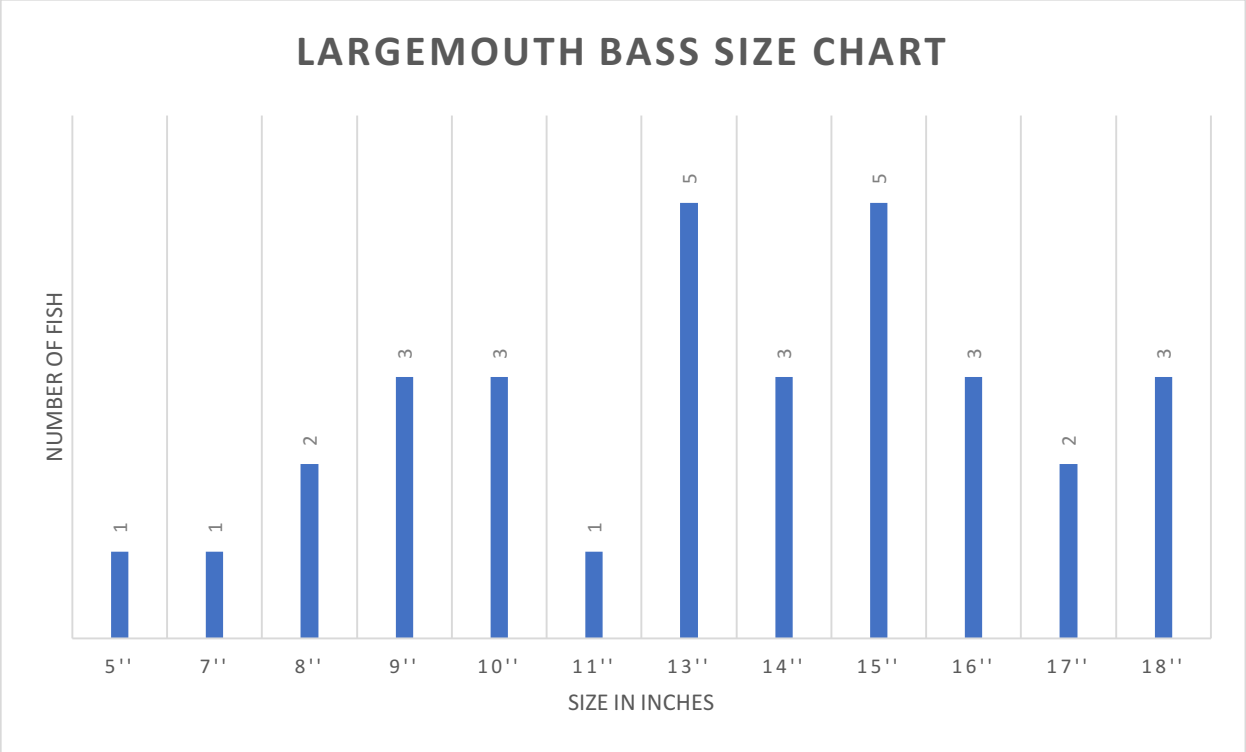
Bar Graph 4 Black Crappie Size

Generated by Nick Sendek



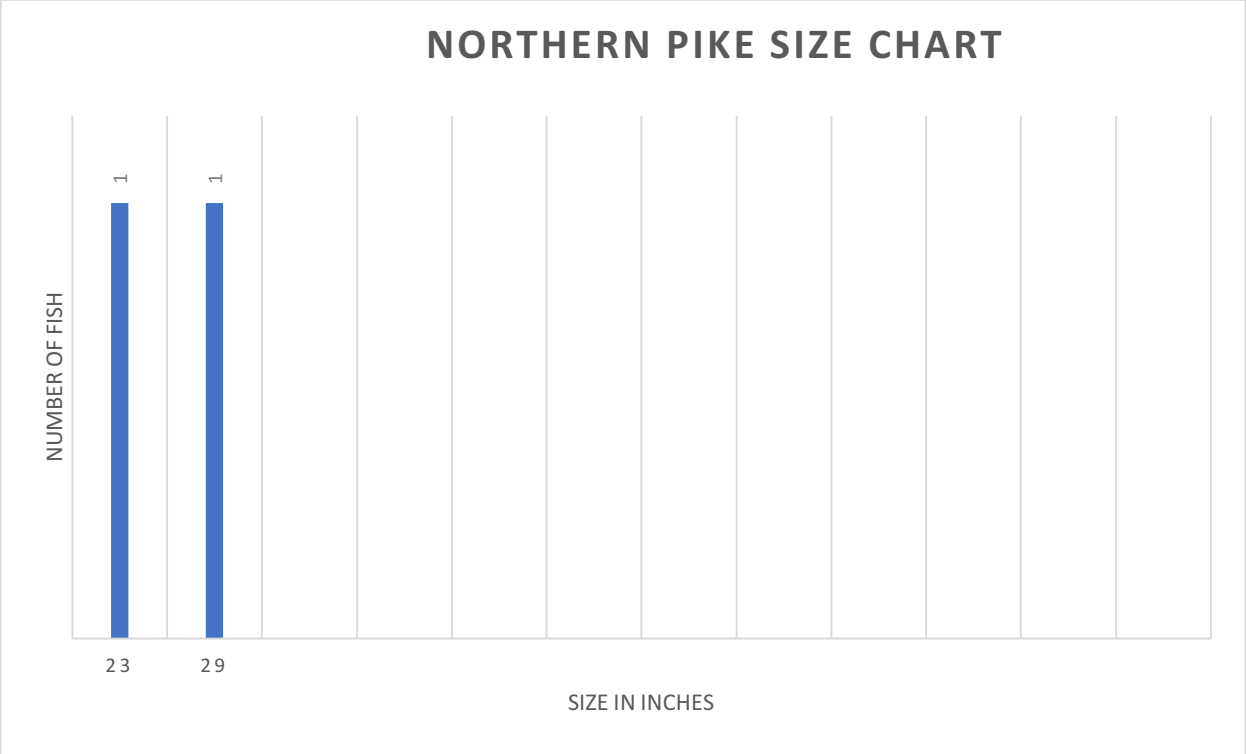
Bar Graph 5 Brown Bullhead Size

Generated by Nick Sendek



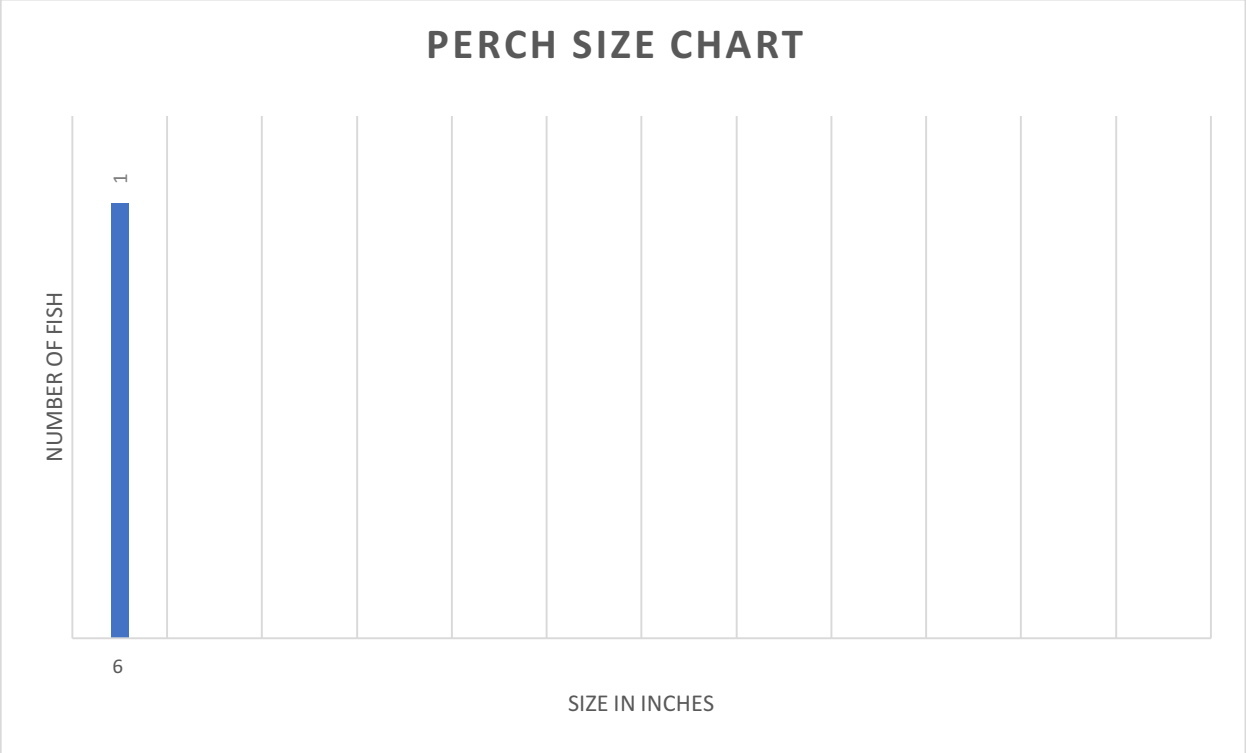
Bar Graph 6 Large Mouth Bass Size

Generated by Nick Sendek



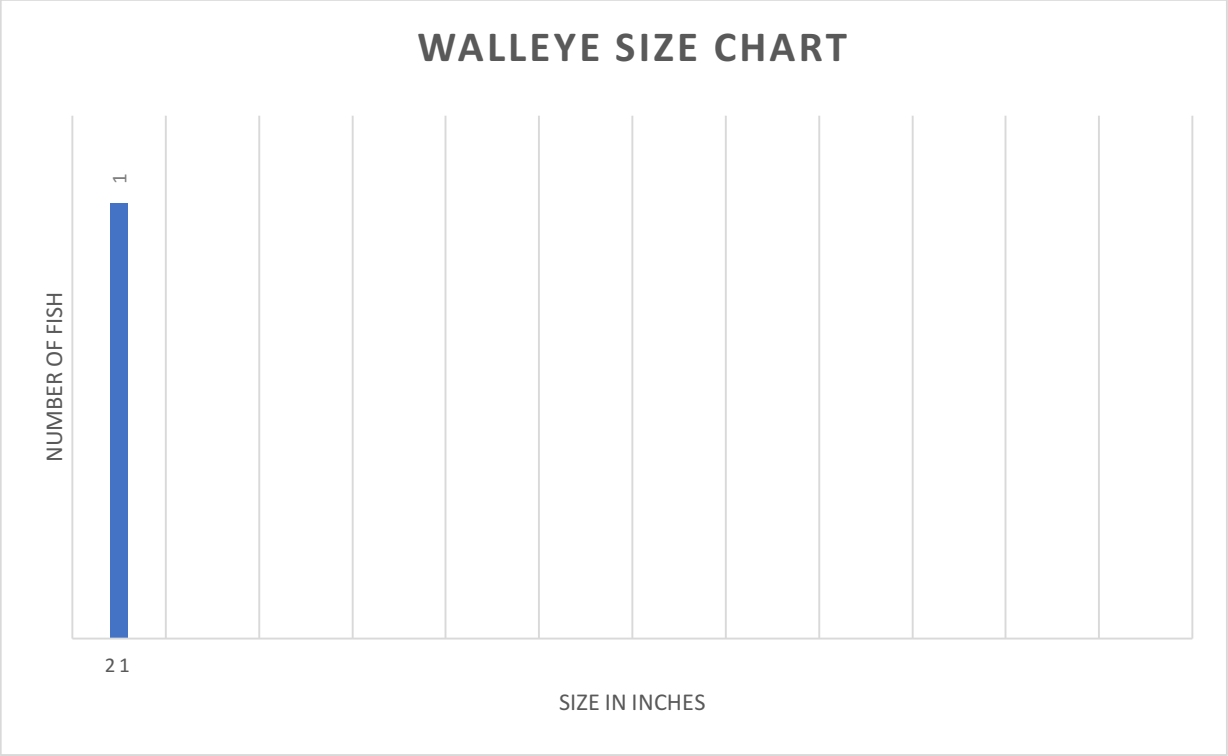
Bar Graph 7 Northern Pike Size

Generated by Nick Sendek



Bar Graph 8 Perch Size

Generated by Nick Sendek



Bar Graph 9 Walleye Size

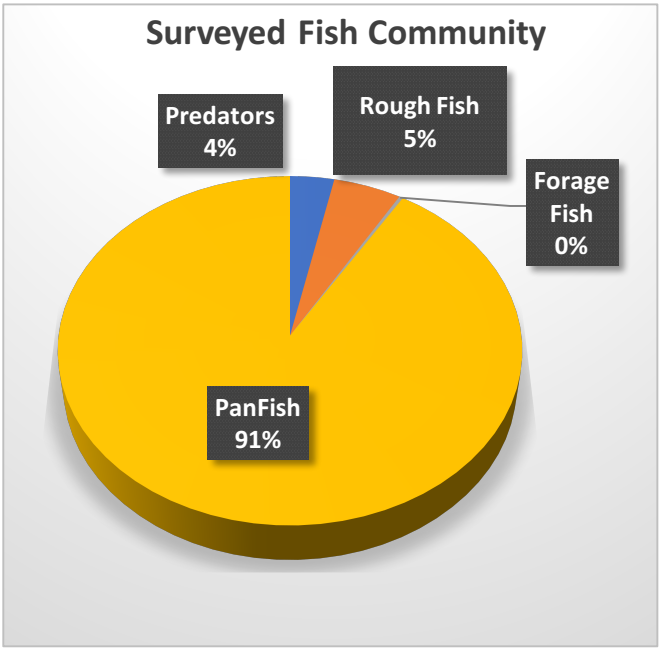
Generated by Nick Sendek

Trophic level groupings of fish (top predators, panfish, rough fish and forage fish) is dominated by panfish with 91% of the catch by number (Pie Chart 2). This is followed by rough fish (5%), predatory fish (4%) and forage fish (<1%). Panfish community appears good with diverse species (bluegill, hybrid sunfish, black crappie and yellow perch). Rough fish are composed solely of brown bullhead and appear to be numerous. The predatory fish community is composed primarily of largemouth bass with only 2 northern pike and 1 walleye being captured. Only one species of forage fish were captured (golden shiner) and is most likely underestimated due to the fyke net mesh size bias. Smaller forage species would not be held in these nets as they would swim through the mesh.

Fish Community Data	
Total Fish Count	1118
Black Crappie	61
Pumpkinseed	21
Largemouth Bass	32
Bluegill	782
Brown Bullhead	54
Hybrid Pumpkinseed	92
Rockbass	69
Golden Shiner	3
Northern Pike	2
Walleye	1
Perch	1

Table 1 Species List and Total Numbers

Generated by Nick Sendek



Pie Chart 2 Species List and Total Numbers

Generated by Nick Sendek

Overall community appears and balanced and growing well. The panfish community is diverse with numerous individuals of large size. Diversity of predators is low with largemouth bass dominating the community. Northern pike and walleye populations appear low. Brown bullhead were the only rough fish captured and appear to be in moderate numbers, but overall size is large indicating they are growing well and have not exceeded natural food supplies. Three concern with the fish community are present including the large number of small bluegills, low diversity of predatory fish (mainly largemouth bass), and high numbers of rough fish (brown bullhead).

Species Biology

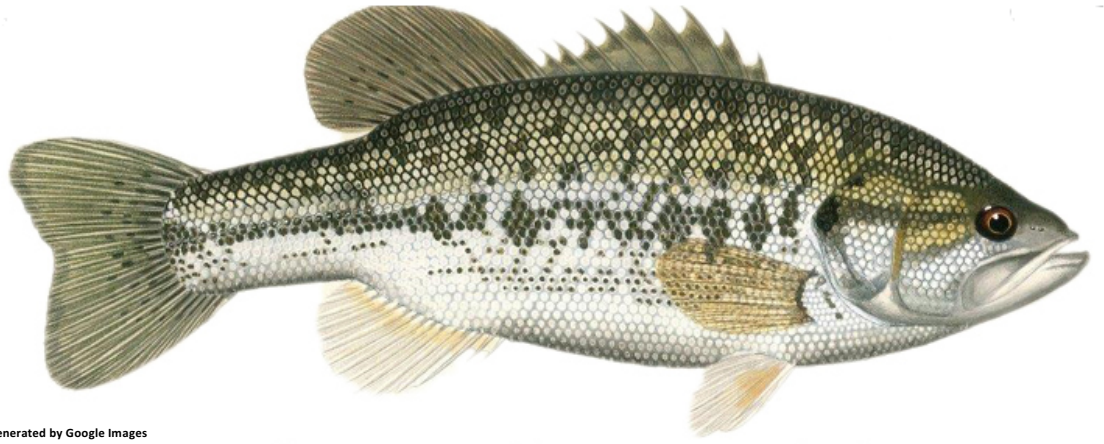
In order to understand the dynamics of the fish community and propose potential management actions, one must understand the biology of each species found in this body of water.

Northern pike (Esox Lucius)

Picture Generated by Google Images

Northern pike belong in the family Esocidae. They are an apex predator that can be best classified as an omnivorous carnivore in that they eat virtually any living vertebrate available to them within the size range they can engulf. Life expectancy for pike in this temperate range is 12 – 15 years and can attain a length in excess of 40 inches. Northern pike prefer cool water temperatures over warm water temperatures such that they grow better in lakes that are deeper and have summer temperature stratification. Males reach reproductive maturity at ages 2-3 and females mature at ages 3-4. Females typically grow faster, live longer, and grow larger than males. Spawning occurs shortly after ice-out in April or early May when water temperatures are 40-52 degrees. The female will be accompanied by one or two males, swim through and over submerged vegetation in the lake or connected streams depositing eggs. The eggs usually hatch in 4-5 days but will remain inactive, often attached to vegetation by means of adhesive glands on the head, for 6-10 days where they feed on the stored yolk sac. Growth is very rapid, by the end of a month they are 1.75" in length and 6 inches by fall. They are a prized gamefish, excellent table fare and an effective predator that helps maintain a healthy predator/prey relationship in the fish community.

Largemouth bass (Micropterus salmoides)



Picture Generated by Google Images

Largemouth bass belong in the family Centrarchidae (sunfishes). Largemouth bass are largely fish-eating predators as adults but food type changes with size from plankton, to insects, to fish, crayfish, and frogs. Life expectancy is 10-15 years and can attain a length over 20 inches. Largemouth bass prefer warmer summer water temperatures and rarely are found deeper than 20 feet. Males reach reproductive maturity at ages 3-4 and females at ages 4-5. Growth rates and ultimate size are greater in females. Spawning occurs from late spring to mid-summer when water temperatures reach 62 - 65 degrees. The male will construct a nest pocket in various types of bottom substrate including gravely sand to marl and soft mud in reeds, bulrushes, or water lilies. Nest are typically spread out 30 feet or more due to territorial tendencies between males. After the female deposits the eggs, the male will aggressively guard the nest until the eggs hatch in 3 – 5 days. After hatching the young will settle in the bottom of the nest for 6 or 7 days until the yolk sac is absorbed and they swim up and remain in a brood for up to 30 days. Changes in water temperature, wind, waves, nest desertion, predation by other sunfishes can limit the success of the hatch. Growth of the juvenile fish is rapid where they will be 2 -5 inches by the end of October. They are considered a prized gamefish and an effective predator on other sunfish helping reduce over population and stunted growth.

Bluegill (Lepomis macrochirus)

Picture Generated by Google Images

Bluegill belong in the family Centrarchidae (sunfish). They are considered on of the most generalized feeders with food preference consisting of insects, crustaceans, and plant material. Life expectancy is 8 – 10 years and can attain a maximum length of around 12. The adults prefer warm water inhabiting the shallow and weedy areas of the lake in summer, but they can move to deeper water during summer hot periods and during the winter months. Males typically reach reproductive maturity at age 2 -3 and females at age 3 -4.

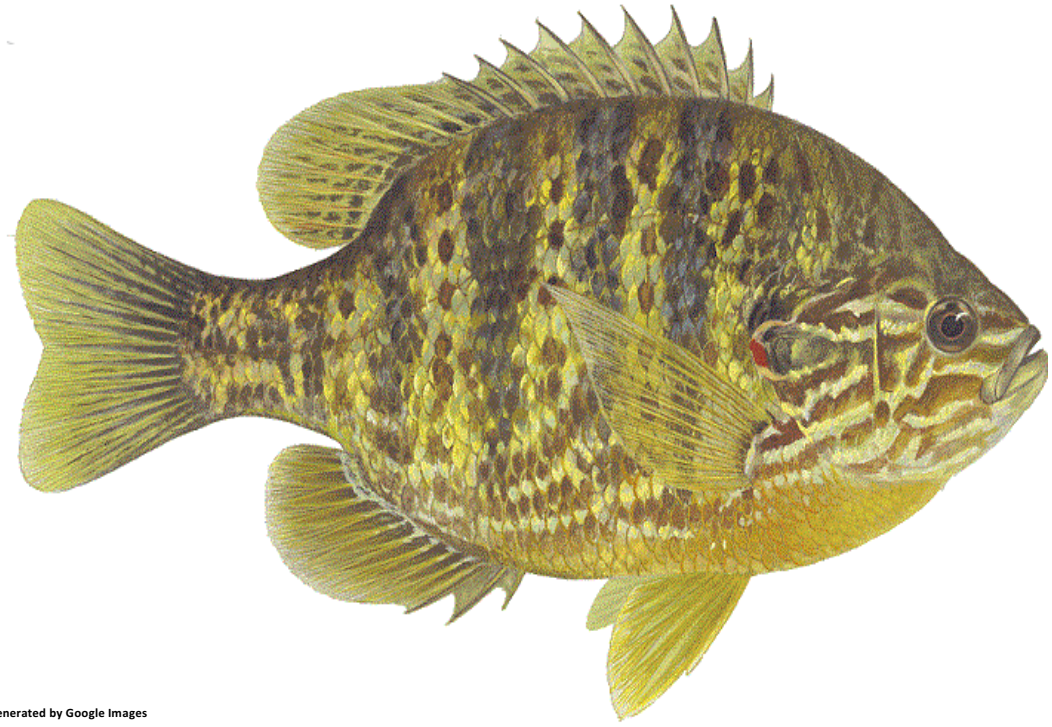
Spawning takes place in late spring to early and mid-summer with peak activity in June when water temperature reach 70 degrees. They are colonial nesters with the male constructing a pocket nest in shallow water over various types of bottom substrate including gravel, sand, or mud. After the eggs are laid in the nest, the male guards the nest against predators. Hatching occurs in 3-5 days. Predation/mortality is extremely high on juveniles, but over-population can occur and the bluegill community can stunt if there is a lack of predators. Bluegill are a very sought-after gamefish and for food.

Pumpkinseed (Lepomis gibbosus)

Picture Generated by Google Images

Pumpkinseed belong in the family Centrarchidae (sunfishes). They are typically slightly shorter and more robust than the bluegill. Their food preference is mainly insects and, secondly, other invertebrates. Life expectancy is 8-10 years with reproductive maturity at age 2. Spawning typically occurs late spring when water temperature reach 68 degrees. Males construct nests that are shallow depressions, in areas of submerged aquatic vegetation, are often numerous and close together over bottom types that can be gravel, sand or clay. Eggs hatch in 3 days and the male continues to guard them for another 11 days. If the young leave the nest during that period, the male will gather them in his mouth and return them to the nest. As with bluegill, predation/mortality is high on juveniles, but over-population can occur where the pumpkinseed community can stunt if there is a lack of predators.

Hybrid sunfish



Picture Generated by Google Images

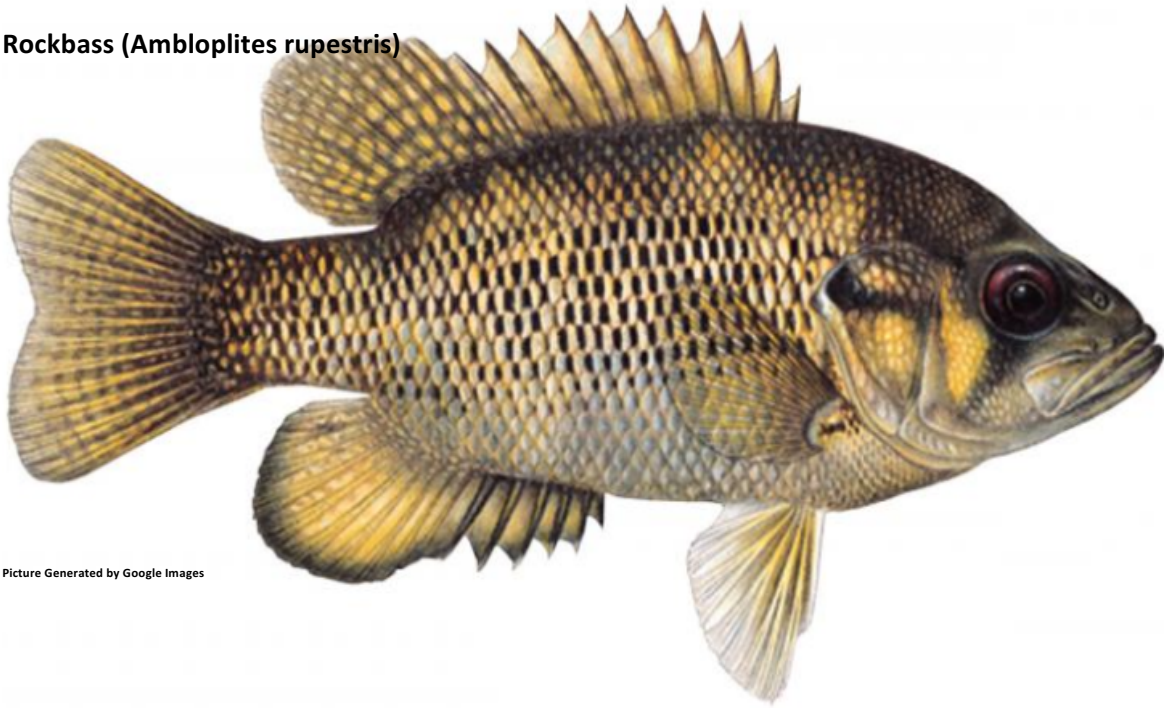
Hybrid sunfish result from natural or artificial cross breeding of various species of sunfish more specifically in this region this includes bluegill, pumpkinseed, and green sunfish. Hybridization can occur in natural populations if these species are present, but it is rare as each individual species have differing reproductive strategies such as spawning seasons, preferred spawning water temperatures, spawning locations, or spawning rituals. Most common are artificial hybridizations in fish cultural settings where manual cross fertilization is made, or rearing ponds are stocked with males of one specie and females of another specie and left to reproduce on their own. These hybrid offspring called F1 hybrid have skewed sex ratios (most F1 offspring are male) and have extremely fast growth rates, more commonly called "hybrid vigor". This vigor results from a general inability to reproduce where growth can be directed at increased body size and not reproductive tissues. There are rare instances were hybrids due crossbreed back in the wild to one of the parent species (male hybrid to female purebred) resulting in a F2 hybrid. Care must be taken when selecting a hybrid for stocking as not all hybrid parings exhibit this hybrid vigor. The most beneficial parings for hybrid vigor have been between female bluegill and male green sunfish.

Black crappie (Promoxis nigromaculatus)

Picture Generated by Google Images

Black Crappie belong in the family Centrarchidae (sunfish). They typically feed on minnows as adults, but insects and plankton will be part of their diet. Juvenile diets consist of planktonic crustacea and free-swimming dipterous (fly) larvae. Older life stages feed on minnows. Life expectancy is around 9 years and they can attain 17 inches in length. Preferred habitat includes weed edges and deeper water up to 25 feet. Age at reproductive maturity is 3-4 years. Spawning occurs mid spring when water temperatures reach 60 to 65 degrees. Males will fan over sand and gravel bottoms creating shallow nest but are not as nearly pronounced as other sunfishes including bluegill and pumpkinseed. Eggs hatch in 3-5 days with little to no parental guarding. Juvenile growth is rapid attaining 3 inches in size in October.

Rockbass (Ambloplites rupestris)



Picture Generated by Google Images

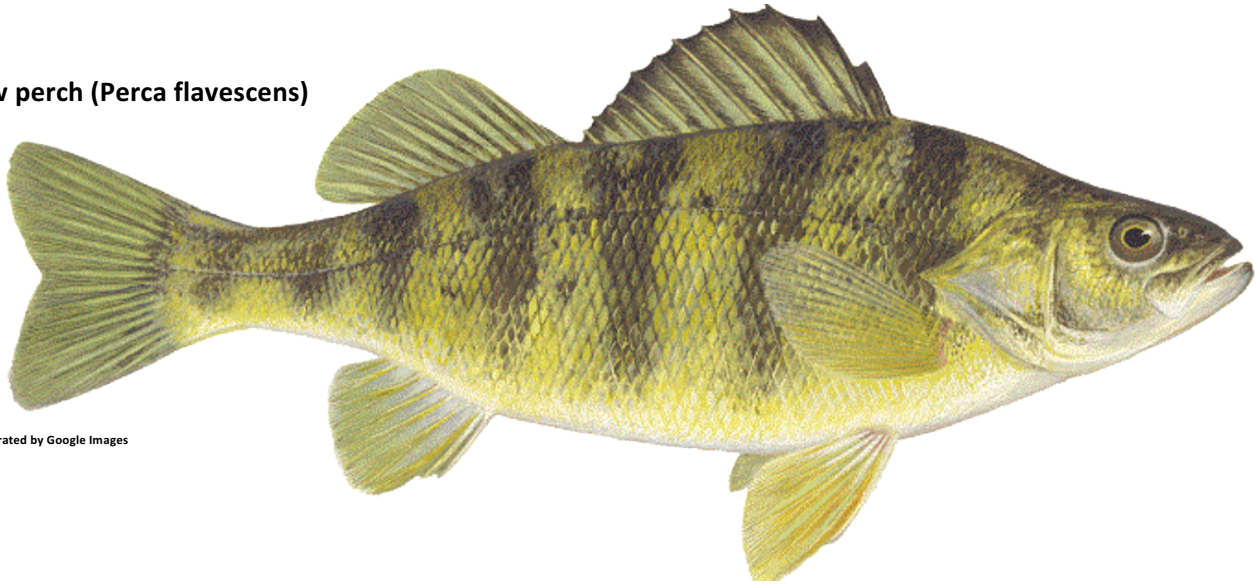
Rockbass belong in the family Centrarchidae (sunfishes). Their diet consist largely of aquatic insects, crayfish, small fish, and minnows. Life expectancy is 10-12 years with a maximum length of 14 inches. Preferred habitat includes shallow area with rocky/gravely bottoms and they do frequent submerged woody cover and brush. Reproductive age is reached at 2-3 years. Spawning occurs mid spring (May) when water temperature reach 60 degrees. The male fans a shallow nest in coarse sand or gravel. Often nest are close together in an area heavily used at spawning time and defense of territory and attempts to attract and hold females are very aggressive. Eggs hatch in 3-4 days with the male guarding the nest and young for a short period. Juvenile growth is rapid with young-of-year reaching 2 inches in October. Rockbass are not often sought by anglers but its flesh is white, flaky, and tasty.

Walleye (Stizostedion vitreum)

Picture Generated by Google Images

Walleye belong in the family Percidae (perch). They are an apex predator. Juveniles feed exclusively on plankton (copepods, cladocera and daphnia) until 6 weeks of age (2 inches) and then transition to minnows, small perch, small sunfish, and aquatic insects. Habitat preference is shallow, turbid lakes but they do well in clear water in depths 40 feet or less. Walleye are long lived at times more than 20 years and exceeding 35 inches in length. Males reach reproductive maturity in 2-4 years and females in 3-6 years. Spawning occurs in early spring when water temperatures reach the upper 48 degrees. Movements involve a spawning run to shallow shoals or to a tributary river where eggs are broadcast over a large area. Eggs hatch in 11 days and the young are left to fend for themselves. Walleyes are a prized food fish and gamefish. They are also a highly effective predator maintaining balance in panfish communities.

Yellow perch (Perca flavescens)



Picture Generated by Google Images

Yellow perch belong in the family Percidae (perch). Food preferences change with size and season but is largely immature aquatic insects, larger invertebrates, and small fishes. Habitat preference are diverse, and they can thrive under many lake habitat types. Reproductive maturity for males is reached a 3 years and females at 4 years. Life span can exceed 11 years and exceed 17 inches in length. Spawning occurs shortly after ice-out with movement to shallow and shoreline habitats. Eggs are transparent and extruded in a unique, transparent, gelatinous, accordion-folded string or tube. These tubes are draped over submerged vegetation or sunken brush and trees. Hatching takes 8-15 days with no parental care. Growth is rapid where young-of-years reach 4 inches in October. Yellow perch are preyed on by almost all other warm to cool water predatory fishes such as basses, sunfishes, crappies, walleye, and northern pike. Their high reproductive potential, voracious appetite, and effectiveness at feeding can in some places lead to serious competition with other game species and cause perch populations to stunt. They are a favored food fish and gamefish.

Brown bullhead (Ictalurus nebulosus)

Picture Generated by Google Images

Brown bullhead belong to the family Ictaluridae (catfish). They are considered a rough fish (non-desirable). They feed on or near the bottom, mainly at night, and food is searched out largely by means of the barbels, and by the senses of taste and smell. The adults are truly omnivorous in that their food is composed of offal, waste, molluscs, immature insects, terrestrial insects, leeches, crayfish, worms, plants, fishes, and fish eggs. They can tolerate poor water conditions such as low dissolved oxygen levels and pollution. Spawning occurs in late spring and early summer when water temperatures reach 70 degrees. Nests or burrows are excavated in soft sediments, under logs, boards or even inside automobile tires attached to dock posts for boat fenders.

The eggs are cared for by the adults and may even be moved around in the adult's mouth. After hatching the young are shepherded about for several weeks in loose school until they are about 2 inch long. Maximum age is about 8 years with a length up to 17 inches. Bullhead populations in large numbers can suppress other gamefish populations through competition for food and predation on juvenile fish. Bullhead are not generally considered a gamefish, but some consider them good table fare.

Management recommendations

The fish community in Henderson Lake appears to be diverse, growing well, and healthy. The only areas of concern are:

- Low predatory fish diversity and numbers
- High number of small bluegill
- Moderate to high numbers of Brown bullhead
- Lack on near-shore large woody cover/structure

Management Options:

Low predatory fish diversity and numbers

Ensure adjacent wetland habitats remain intact and connected to the lake to ensure northern pike have areas for reproduction (connected ponds, flooded marshes, and ditches). Ensure select areas in the lake have aquatic weed beds for pike spawning and juvenile pike cover.

Conduct a review of tributaries and marshes around the lake for potential pike spawning/rearing marsh enhancements.

Stock walleye fingerlings.

High number of small bluegill

The proposed management options to improve predatory fish number will address the concern over high numbers of small bluegills. Reduce hybrid sunfish stocking and increase walleye stocking.

Moderate to high numbers of bullhead

If bullhead numbers increase and or bullhead sizes decrease, consider conducting a removal of bullheads through an intensive spring (pre-spawn) netting project to remove captured bullheads.

Lack of near-shore large woody cover/structure

Add woody cover around the lake via large tree drops along the shoreline and/or sink small woody/brushy structure at select locations around the lake.

Resources

Scott, W. B., & Crossman, E. J. (1973). *Freshwater fishes of Canada*. Ottawa: Fisheries Research Board of Canada.