Kearsley Reservoir
Genesee County, T08N, R07E, Section 33
Kearsley Creek watershed, last surveyed 2021

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Environment

Kearsley Reservoir, a 175-acre impoundment of Kearsley Creek, is located northeast of Flint approximately one mile upstream of the Kearsley Creek confluence with the Flint River (Figure 1). The reservoir is relatively narrow and elongated in shape. Kearsley Creek enters from the south and discharges at the dam on the west shore. Chipmunk Creek, a second inlet, enters on the northeast shore. Public access to Kearsley Reservoir is possible along Layton Boulevard on the north shore. In addition, an undeveloped, gravel boat launch is located at the east end of the reservoir.

Kearsley Dam was originally constructed in 1929 for ice supply but the present use is designated for recreation. Kearsley Dam is a 450 ft earthen dike with a concrete control structure which uses vertical lift gates to regulate discharge. The earthen portion of the dam is crossed by Western Road. The control structure has a structural and hydraulic height of 33 ft, but normal head is maintained at 24 ft. Kearsley Dam has a designed discharge of 131,000 feet3/sec and a maximum storage capacity of 3,250 acre-ft. Typical storage is maintained at 1,800 acre-ft. The City of Flint owns Kearsley Dam and general operating procedures maintain water level at a fixed crest with a 2-3 ft winter drawdown. Kearsley Dam is regulated by Part 315, Dam Safety, of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The dam was last inspected in October 2019 and received a "satisfactory" score for the condition assessment. In addition, this dam is listed as having significant downstream hazard potential.

The Kearsley Reservoir drainage basin is extensively developed as suburban neighborhoods of the City of Flint. Commercial and industrial businesses are common along Western, Genesee, and Belsay roads. The immediate shoreline of Kearsley Reservoir is moderately developed. Kearsley Lake Golf Course, located on the east shore, maintains an earthen dike cart path to cross the upper impoundment and uses large culverts to direct Kearsley Creek inflow. Both the north and south shores are developed with residential housing.

Kearsley Reservoir is classified as a warmwater, eutrophic, medium size, shallow impoundment. Medium lakes are those between 100 and 1,000 acres and shallow lakes are systems known to stay isothermal during summer and not stratify. Water depths following the historic creek channel are approximately 15 ft deep. Bottom substrate is dominated by sand partially covered with a fine layer of silt. As with many impoundments in southern Michigan, eutrophication is accelerated from nutrient and sediment loading. Generally, most nutrients and sediments are transported into Kearsley Reservoir via inlets draining the upper watershed. As a result, Kearsley Reservoir is often turbid from algal growth or from sediments, particularly in spring and fall and following heavy precipitation.

Limnological parameters measured August 2021 included temperature, oxygen, and pH (Table 1). Thermal stratification did not occur with water temperatures holding constant at 76-79°F from the

surface to a depth of 13 ft. Oxygen concentrations ranged from 7.6 ppm at the surface to 1.6 ppm at the bottom. Poor oxygen concentrations for fish (< 3 ppm) were observed at depths greater than 10 ft.
The primary form of aquatic habitat in Kearsley Reservoir is vegetation. However, aquatic vegetation is not excessively abundant, likely due to the sandy substrate found in the reservoir. Isolated patches of Eurasion milfoil, water stargrass, and curlyleaf pondweed are present. Water lily is also present in areas along the shoreline.

History

Michigan DNR Fisheries Division has sampled Kearsley Reservoir for many years dating back to 1977. The first fisheries assessment occurred in 1977 and reported high abundance of Common Carp. As a result, Kearsley Reservoir was lowered to stream level and a rotenone treatment occurred. Rotenone is a fish toxicant, or piscicide, and can be used as a management tool to remove all or part of a fish population (McClay 2000). Typically, this strategy is reserved for systems with undesirable species or overabundant and stunted fish populations. After the rotenone treatment, the reservoir was stocked with Bluegill, Channel Catfish, Largemouth Bass, and Tiger Muskellunge (Table 2).

An assessment conducted in 1979 indicated the panfish fishery was developing and some Walleye had survived. However, Common Carp and bullhead (sp.) had re-populated themselves and were in high abundance. Brown Trout were stocked in 1980 and 1981 to provide an interim fishery while other fisheries developed. In 1984, fish stocking in Kearsley Reservoir was discontinued when the city boat launch and park were closed. Fisheries assessments continued using private access to the reservoir. Assessments in 1988 and 1995 showed similar fisheries existed with Bluegill and Black Crappie as the most abundant sport fish collected.

In 1998, the City of Flint was granted a permit for a 4 ft drawdown (from summer pool) for dam repairs. A permit violation occurred November 1999 when lift gates stuck in the open position resulting in the complete drawdown of the reservoir. Summer pool was not achieved until August 2000. In response, Fisheries Division conducted an assessment in September 2000. Although results of the September 2000 assessment showed declines in Bluegill and Black Crappie abundance, a decision was made to allow the fish community to rebound to pre-drawdown status without supplemental stocking. At this time Black Crappie, Bluegill, Brown Bullhead, White Sucker, and Channel Catfish dominated the catch.

In June 2006, a fish kill occurred in Kearsley Reservoir. Investigation by Fisheries Division personnel estimated mortalities of carp and panfish in the magnitude of several hundred fish. The exact cause of the fish kill was unknown but suspected to be from blue-green algae poisoning (Mycrocyistis spp.). Fisheries Division personnel believed the fish kill was partial and surviving fish could re-populate the fishery once again.

During June 2008, Kearsley Reservoir was surveyed as part of the Fisheries Division's Status and Trends Monitoring Program. This survey used various types of gear including trap nets, seines, and nighttime boat electrofishing. These various gears were used to capture a wide range of species and sizes to better understand the entire fish community as outlined by the Status and Trends Program protocol (Wehrly et al. 2015). Results from this survey suggested the Kearsley Reservoir fish community was stabilizing following the 2000 drawdown and 2006 fish kill. Bluegill abundance was extremely high relative to historic levels, but larger Bluegill were rare. Using the Schneider Index (Schneider 1990) for classifying Bluegill populations, Kearsley Reservoir scored 2.25 for a poor rating in 2008.

Larger predator species like Largemouth Bass, Channel Catfish, and Northern Pike were also sampled during the 2008 survey. The Largemouth Bass population appeared to be in good shape at the time with age distribution, size structure, and growth suggesting a healthy population with fair opportunity for anglers to catch legal size fish. Channel Catfish appeared in moderate abundance while Northern Pike were not abundant but provided additional angling opportunity.

Current Status

The most recent fish community survey for Kearsley Reservoir was completed from 24 May to 27 May 2021. This survey utilized four large-mesh fyke nets (6 ft by 4 ft pot frame; 1.5-in mesh) with 100 ft leads (4 ft lead height; 1.5-in mesh), three small-mesh fyke nets (6 ft by 3.5 ft pot frame; 0.18-in mesh) with 50 ft leads (4 ft lead height; 0.18-in mesh), one trap net (8 ft by 5 ft pot frame; 1.5-in mesh) with a 106 ft lead (6 ft lead height; 1.75-in mesh), one seine (25 ft by 5 ft; 0.18-in mesh), two 125 ft experimental gill nets (6 ft tall; 5 panels; 1.5 to 4.0-in mesh), and nighttime boat electrofishing to capture a wide variety of the fish community (Wehrly et al. 2015). Total effort for the survey was 25 net-nights, 4 seine hauls, and 30 minutes of electrofishing (Table 3).

Fish were identified to species and total length (TL; inch group) was recorded for all individuals. For game species, ages for up to ten fish per inch group were determined from scale and spine samples. For estimating age from dorsal spines, a thin cross section of the dorsal spine was cut using a Dremel grinding and cutting tool. Mineral oil was added to the section for clarity and age estimation occurred under a microscope. To estimate age from scales, four-to-six scales were pressed onto acetate film. Scale impressions were viewed under a microscope. Mean growth indices were calculated as described by Schneider et al. (2000). Mean growth index was calculated using only those age groups represented by five or more fish.

A total of 1,655 fish were collected during this effort representing 20 different species (Table 4). A variety of panfish were captured including Black Crappie, Bluegill, Pumpkinseed, Rock Bass, and Yellow Perch. In addition, top predators like Largemouth Bass and Northern Pike were common while Channel Catfish were present but less abundant. The primary forage species available to these predators were Golden Shiners. White Suckers were abundant and could also serve as forage at smaller sizes.

A total of 549 Bluegill (mean TL = 5.0 in; Table 4) were collected in the survey. Of these, 18% of the fish were larger than 6 in TL, which is the estimated minimum length at which anglers will harvest Bluegill (Figure 2). Overall, the mean growth index for Bluegill was 1.1, indicating good growth, but few older Bluegills (> age 3) were captured in the survey. The Bluegill population in Kearsley Reservoir scored 2.5 for a "poor/acceptable" rating using the Schneider Index for classifying Bluegill populations (Schneider 1990, Table 5).

A total of 253 Yellow Perch (mean TL = 6.9 in; Table 4) were collected. Yellow Perch ranged in size from three-to-ten inches TL and 39% of the Yellow Perch captured were above the estimated minimum length for harvest of 7 in TL (Table 4; Figure 2). The mean growth index for Yellow Perch was -0.4 which suggests average growth rates for the species when compared to statewide growth. Additionally, Yellow Perch longevity peaked at age 5.

A total of 30 Largemouth Bass (mean TL = 10.2 in; Table 4) were collected. Largemouth Bass up to 19 in TL were found and the mean growth index for Largemouth Bass was 0.5, suggesting adequate prey resources were available. The Largemouth Bass minimum length limit is 14 in and 20% of the fish captured exceeded this length (Table 4; Figure 2). Age estimates suggested 8 year-classes are present in the system and longevity peaked at age 10.

A total of 39 Northern Pike (mean TL = 24.3 in; Table 4) were collected. Northern Pike from 16-to-38 in TL were captured and the population exhibited a mean growth index of 3.5, suggesting excellent growth for this species when compared to statewide averages. The Northern Pike minimum length limit is 24 in and 56% of the fish captured exceeded this length (Table 4; Figure 2). There were nine year-classes present from age estimates and Northern Pike longevity peaked at age 9.

Analysis and Discussion

Kearsley Reservoir has a turbidity gradient from the mouth of Kearsley Creek on the east end, to the water control structure at the west end. In the east end of the reservoir (~20 acres), the water is more turbid, bottom substrate is comprised of organic material, and aquatic vegetation abundance is limited. Common Carp, bullhead (sp.), and Channel Catfish were more abundant in survey gear set in this area and represent species tolerant of this environment. Furthermore, Common Carp foraging behavior resuspends sediment, which likely adds to the turbidity observed in the area, and limits vegetation growth due to poor sunlight penetration and consistent bottom disturbance. Across the remaining 155 acres of the reservoir, turbidity decreases, the bottom substrate shifts to primarily sand, and aquatic vegetation is present but not abundant. These characteristics represent most of the reservoir environment. Survey gear captured more species overall and higher numbers of gamefish in this area of the reservoir.

While growth rates appear adequate, our data suggests few large, old Bluegill are present in Kearsley Reservoir. This has been a consistent theme in previous surveys. Typically, low abundance of large Bluegill is a function of density-dependent growth limitations. The young age-structure of Bluegill in Kearsley Reservoir does not appear to be a result of over-abundance given old, small fish are not present, which would suggest stunting. Prey availability may be limiting Bluegill growth at older ages. Kearsley Creek transports nutrients to the reservoir which likely supports an abundant plankton community. These prey items may be contributing to the survival of young Bluegill before they would undergo an ontogenetic shift to larger macroinvertebrates. However, the limited abundance of aquatic vegetation and lack of organic substrate over much of the reservoir bottom may not be yielding larger prey items at the necessary abundance to support larger Bluegill. Alternatively, Bluegill in this system are growing well at young ages, but rarely survive beyond age-3. Growth estimates indicate this is the age when Bluegill are reaching 6 in TL and susceptible to harvest. Given the proximity of Kearsley Reservoir to Flint and Metro-Detroit, over-harvest could be a factor for the lack of older fish in the system.

Unlike Bluegill, the Largemouth Bass and Northern Pike populations in Kearsley Reservoir are comprised of a wide range of sizes and ages. Our data suggests suitable habitat and forage exists to support the current predator community. The presence of Northern Pike in greater numbers than previous surveys may be due to the gear used in this survey. Most of the Northern Pike captured were in experimental gill nets set offshore. Previously, experimental gill nets were not utilized due to the abundance of bullhead spp. in the reservoir. We decided to implement this gear during the 2021 survey and bullhead spp. numbers were manageable.

Management Direction

Kearsley Reservoir continues to support a warm- and cool-water fish community and the fish populations have rebounded after the problematic events which occurred in the early 2000s. Overall, the fish community appears balanced given the average to above average growth exhibited by a variety of species. Future management should focus on accessibility, nutrient loading, and non-native species monitoring.

Firstly, access options are severely limited to Kearsley Reservoir and should be addressed. On the north side of the impoundment, along Layton Boulevard, carry-down access is available but presents some hazards given the proximity to the road. Only a thin piece of land is available here and expanding this access site is unlikely. Near the upstream end of the reservoir is a small, undeveloped boat launch owned by the Kearsley Lake Municipal Golf Course. This site is used by some small boat and shore anglers, but the location is not broadcast as being open to the public. Efforts will be made to communicate with the landowner, describe the value of the fishery to the area, and identify grant sources to pursue if they are interested in improving this access site.

Secondly, nutrient loading and eutrophication are a concern given the history of algal blooms that have occurred in Kearsley Reservoir. Identifying areas of improvement across the entire watershed is difficult given the scope but can be addressed on a finer scale when managers review permits for projects involving the aquatic resources in the watershed. Another approach will be to work with the golf course. Once again, communicating with their team will be necessary to highlight the importance of maintaining this fishery and explaining the importance of proper fertilizing practices and runoff control to minimize the probability of excess nutrients entering the reservoir.

Lastly, Kearsley Reservoir has some non-native aquatic organisms in the system (i.e., Common Carp, Round Goby, and Eurasian watermilfoil). Abundance of those three species does not appear to be substantially impairing the fishery, but they should be monitored with some consistency. Species diversity of the Kearsley Reservoir fish community has improved immensely since the first survey in 1977 and reverting to a scenario dominated by Common Carp would not be beneficial. Therefore, a netting survey to estimate relative abundance of Common Carp should be completed every three to five years if resources allow. Large-mesh fyke nets and trap nets would be the preferred gear for this survey. If the data from this survey suggests Common Carp are significantly increasing in abundance, then a more aggressive netting and removal strategy would be proposed. This proposed netting survey would not efficiently capture Round Goby, but effort targeting this species is a lower priority based on their current abundance, lack of preferred rock and cobble habitat, and the current predator community present in the reservoir. In contrast, estimating Eurasian watermilfoil abundance is a high priority and could be done at the time of a netting survey. Currently, this invasive aquatic plant is providing fish habitat and was not at nuisance levels that would prevent water recreation activities based on observations during the 2021 survey. If this changes, spot treatments with herbicide will be necessary to manage the abundance of this exotic plant.

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Table 1. Temperature, oxygen, and pH profile from the surface to the bottom in Kearsley Reservoir. Data collected August 2021.

Depth (ft)	Temperature (°F)	Oxygen (ppm)	pH
Surface	79.1	7.6	9.3
1	79.1	7.7	9.3
2	79.1	7.7	9.3
3	79.1	7.6	9.3
4	79.0	7.6	9.3
5	79.0	7.7	9.3
6	79.0	7.6	9.3
7	79.0	7.6	9.3
8	78.9	7.2	9.3
9	78.8	6.5	9.2
10	78.4	5.5	9.2
11	77.4	3.0	9.0
12	76.7	2.3	8.9
13	76.3	1.6	8.9

Table 2. Stocking history for Kearsley Reservoir from 1978-present.

Year	Species	Number	Size range (in)
1978	Bluegill	100,000	1-2
	Channel Catfish	20,000	4-7
	Largemouth Bass	370	2-4
	Tiger Muskellunge	275	8
1979	Bluegill	71,084	1-2
	Northern Pike	400,000	<1
	Walleye	400,000	<1
1980	Brown Trout	4,000	6-7
	Largemouth Bass	7,480	1-2
	Northern Pike	293,600	<1
	Tiger Muskellunge	1,000	6-7
	Walleye	400,000	<1
1981	Brown Trout	3,000	4-5
	Largemouth Bass	5,407	1-2
	Tiger Muskellunge	700	5-6
1982	Tiger Muskellunge	750	5-6
1984	Tiger Muskellunge	560	6-7

Table 3. Gear type, units of effort, and total effort for the 2021 survey in Kearsley Reservoir.

Gear Type	Units	Total Effort
Large-mesh fyke net	Net-nights	12
Small-mesh fyke net	Net-nights	6
Trap net	Net-nights	3
Seine	Hauls	4
Experimental gill net	Net-nights	4
Nighttime boat electrofishing	Minutes	30

Table 4. Species, number, length range (inches), and average length (inches) for all species caught during 2021 survey. Percent of individuals above legal size or estimated acceptable size for harvest for select species collected. Harvestable size is assumed to be 6 in for Bluegill, Green Sunfish, Hybrid Sunfish, Pumpkinseed, and Rock Bass, and 7 in for Black Crappie and Yellow Perch. Legal size for harvest is 12 in for Channel Catfish, 14 in for Largemouth Bass, and 24 in for Northern Pike.

Species	Number	Length range (in.)	Avg. length (in.)	% harvestable
Black Bullhead	18	8-13	11.0	-
Black Crappie	93	4-12	6.2	27
Bluegill	549	1-8	5.5	18
Bowfin	9	21-30	26.3	-
Brook Silverside	6	4-4	4.5	-
Brown Bullhead	23	6-13	11.2	-
Channel Catfish	17	8-30	23.0	94
Common Carp	37	7-30	22.1	-
Fathead Minnow	4	2-3	3.0	-
Golden Shiner	46	3-7	6.6	-
Green Sunfish	2	3-4	4.0	0
Hybrid Sunfish	1	5-5	-	0
Largemouth Bass	30	3-19	10.2	20
Northern Pike	39	16-38	24.3	56
Pumpkinseed	310	2-6	4.7	6
Rock Bass	16	2-8	5.9	19
Round Goby	11	2-4	3.4	-
White Sucker	143	5-19	15.4	-
Yellow Bullhead	48	6-12	9.9	-
Yellow Perch	253	3-10	6.9	39
Total	1,655			

Table 5. Kearsley Reservoir Bluegill classification using large-mesh fyke net data and the Schneider Index (Schneider 1990).

Metric	Value	Score
Average length (in)	5.5	3
% ≥ 6 in	24	2
% ≥ 7 in	5	3
% ≥ 8 in	0	2
Schneider Index Rank[1]		2.5 Poor/Acceptable

[1]1 = very poor, 2 = poor, 3 = acceptable, 4 = satisfactory, 5 = good, 6 = excellent, 7 = superior

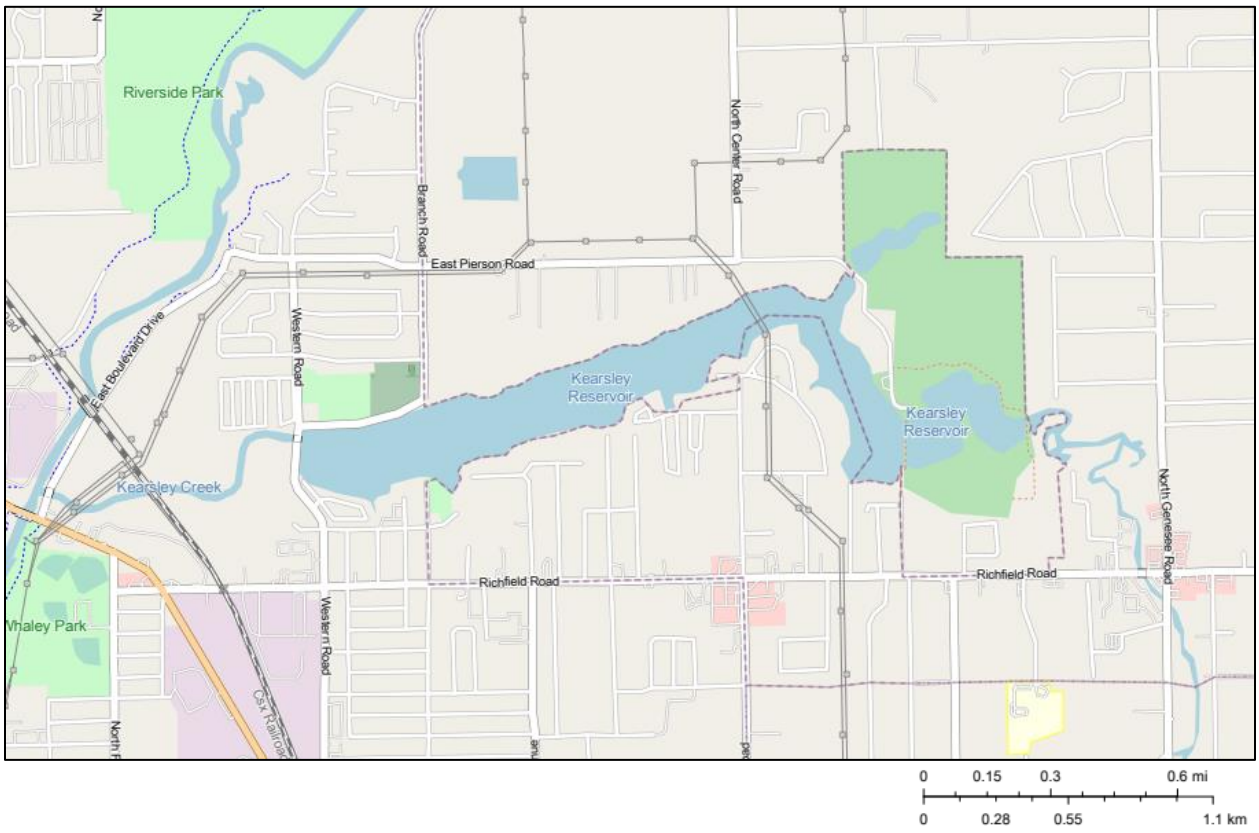

Figure 1. Kearsley Reservoir in Genesee County, Michigan.

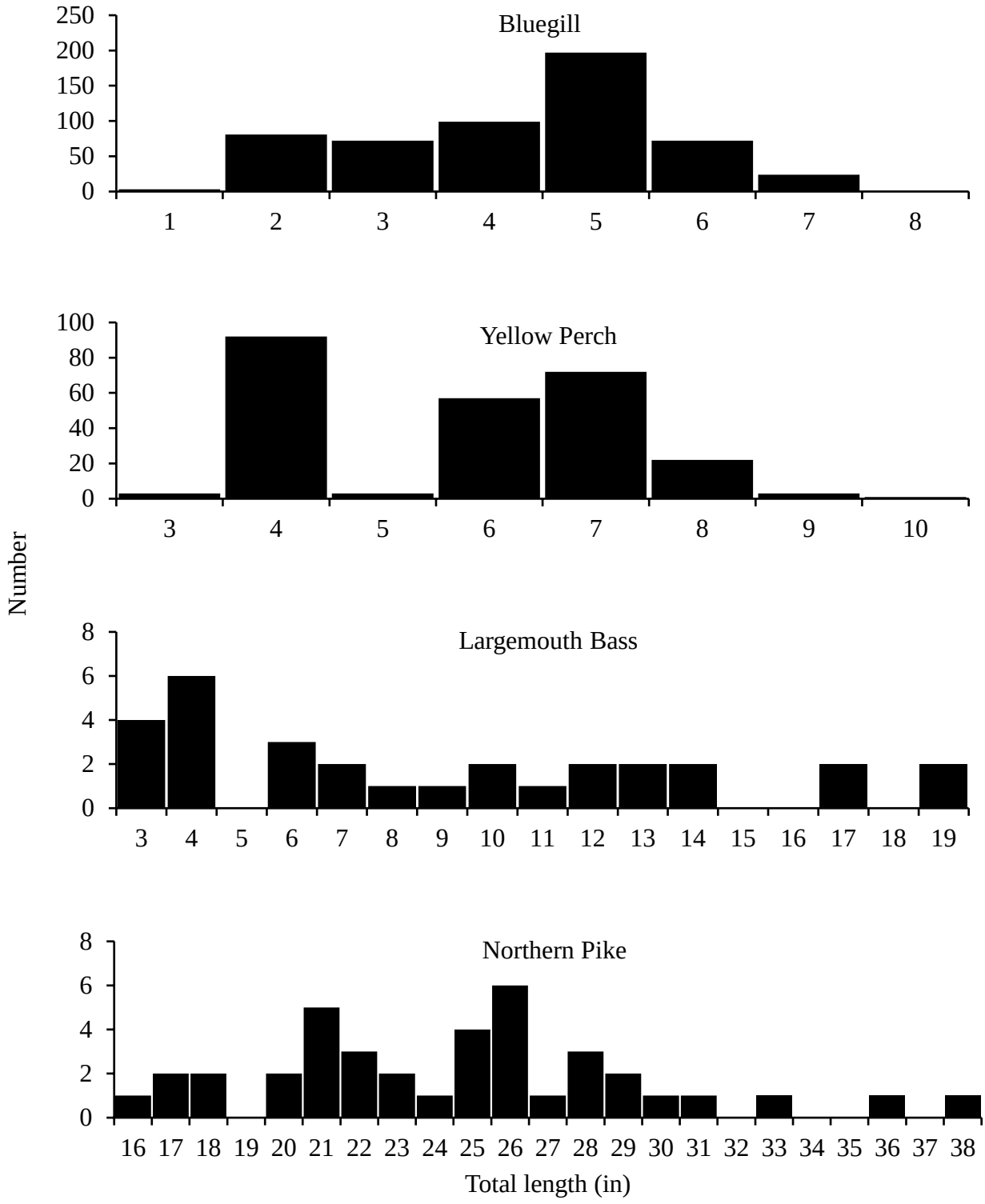

Figure 2. Length frequency for select species collected in Kearsley Reservoir during the 2021 fisheries survey.

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