

**Crowduck Lake: 2023 Fisheries Assessment Report**  
**Whiteshell Provincial Park, Manitoba**



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## **Introduction**

Crowduck Lake is a popular walleye and smallmouth bass fishery located in Whiteshell Provincial Park. It has an area of 5600 hectares, a mean depth of 7.5 m and a maximum depth of 18 m (Figure 1). Crowduck Lake is not road accessible, but anglers can access the lake by portage or by using Crow Duck Lake Camp's transport service. Boat caches are found at several lake access points. Crow Duck Lake Camp is the only lodge and outfitter on the lake. Crowduck Lake serves as an important reference lake for fisheries management actions in the Eastern region due to its history of stocking and regulation changes, as well as the ecological shifts that have occurred as a result of these actions in recent decades.

Historically, Crowduck Lake was a prolific northern pike fishery with a strong forage base consisting of ciscoes (tullibee), lake whitefish, yellow perch, and white suckers. The lake was stocked with smallmouth bass in 1957 and 1958 and walleye from 1985 to 1989. Prior to stocking, these species did not exist in Crowduck Lake. In 1991, the Fisheries Branch established a walleye limit of 0 to protect Crowduck Lake's growing walleye population. Over time, the walleye fishery yielded remarkable numbers and size. Walleye eventually became the dominant predator in Crowduck Lake, and species such as ciscoes and northern pike declined. A fisheries assessment in 2013 observed a high-density, slow growing walleye population and concluded that the pelagic forage base had declined. In response, the harvest of walleye was re-instituted in 2016, allowing for a two walleye limit. In 2023, Fisheries Branch staff returned to Crowduck Lake to re-assess the state of the fishery, evaluate the effects of walleye harvest on the walleye population and forage base, and to inform future management direction.

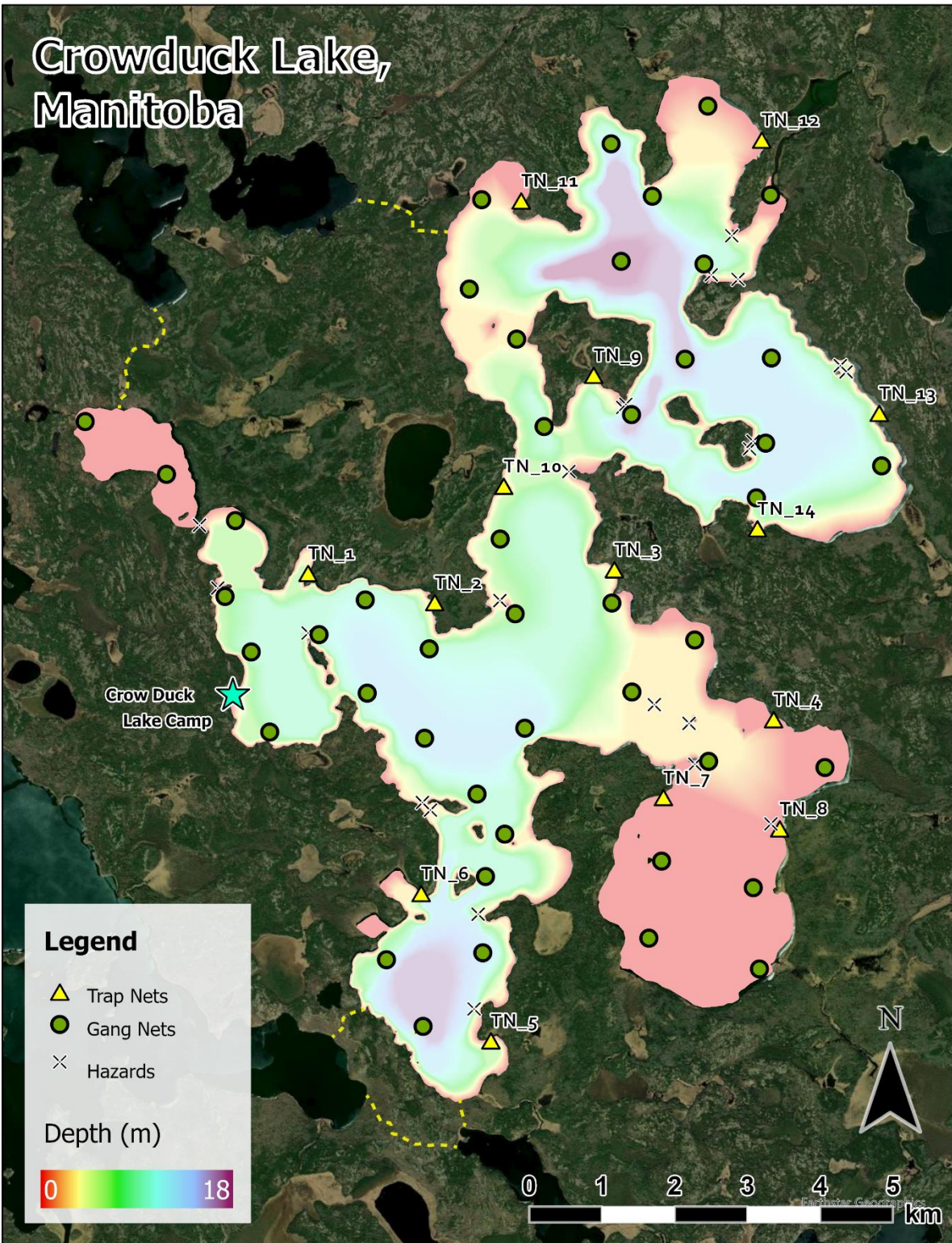
## **Methods**

Crowduck Lake was sampled from August 19 to August 24, 2023, using trap nets, gill nets, and minnow traps. Fish were measured and weighed, and a subset were lethally sampled to collect age, sex, and maturity data. These data were later compared to existing datasets from Whiteshell lakes surveyed in 2021. Northern pike were not aged in recent Whiteshell surveys, so age and maturity in Crowduck Lake were compared to data collected from lakes in Nopiming Provincial Park in 2022.

Trap nets were built to the specifications of the Ontario Ministry of Natural Resources' End of Spring Trap Netting (ESTN) program. Fourteen trap nets were set perpendicular to shore in early afternoon (max depth of 3.1 m) and pulled the following morning.

Gill nets were fished throughout the day. Forty-five double-ganged North American Standard gill nets were set for two hours in depths of 1.8 m to 17.4 m to sample littoral and pelagic fish communities. Each net was 1.8 m deep by 49.6 m long and included the following mesh sizes, in order: 76 mm, 114 mm, 51 mm, 89 mm, 38 mm, 127 mm, 64 mm, and 102 mm [3", 4.5", 2", 3.5", 1.5", 5", 2.5", 4"].

Additionally, 30 funnel-style minnow traps were set at depths of 0.5 m to 2.5 m to sample small-bodied fish. Minnow traps were baited with dog food, set near the trap net sites in early afternoon, and pulled the following morning.

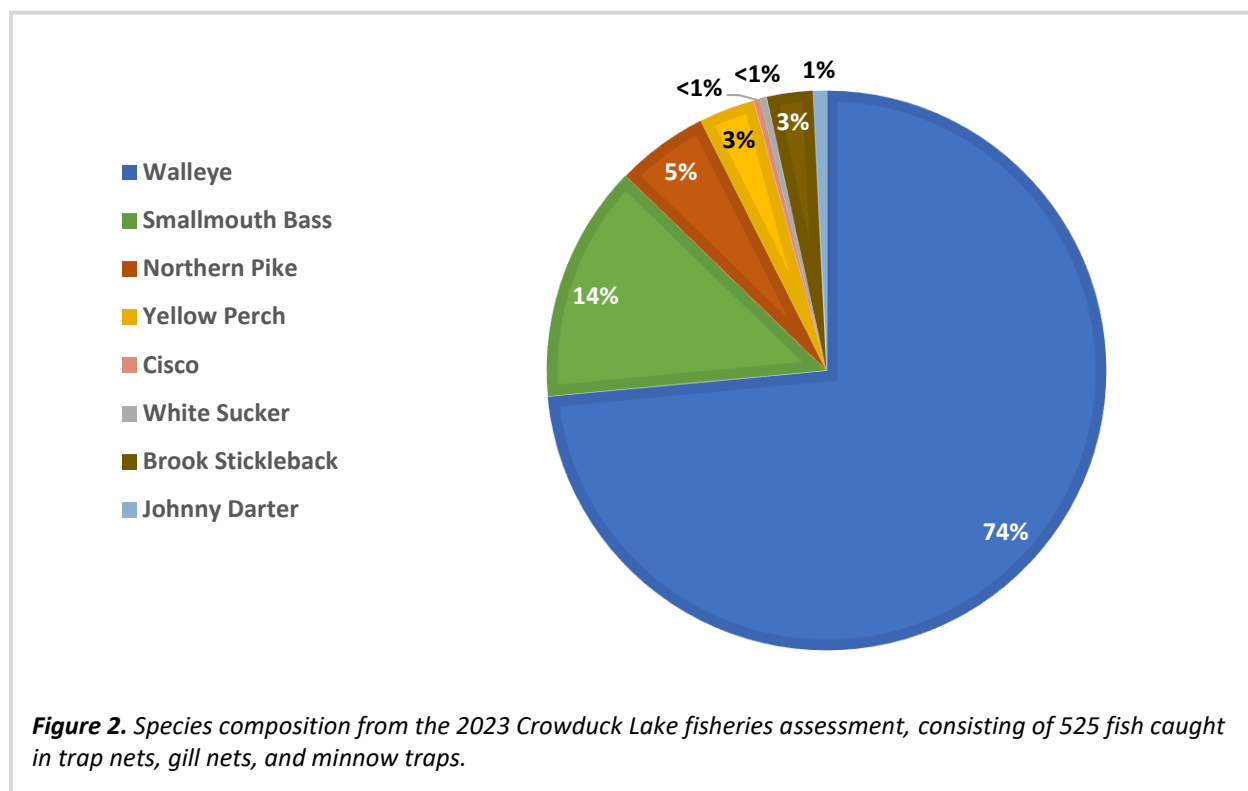


**Figure 1.** Map of Crowduck Lake and set locations. Minnow traps were set adjacent to trap nets. Depths in this map are approximate and should not be used for navigational purposes.



## Results

In total, 386 walleye, 72 smallmouth bass, 28 northern pike, 17 yellow perch, 2 ciscoes, 2 white suckers, 14 brook sticklebacks, and 4 johnny darters were sampled over the course of this survey (Figure 2). Walleye were primarily caught in trap nets, while smallmouth bass, northern pike, and yellow perch were more readily caught in gill nets (Table 1).

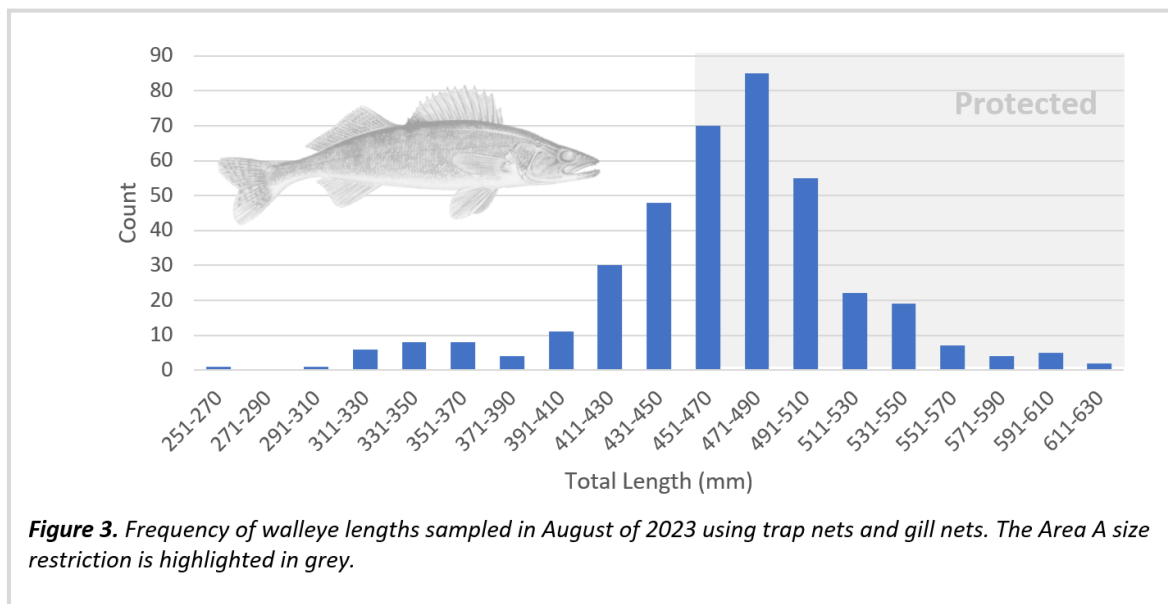


**Table 1.** Number of fish captured during the 2023 Crowduck Lake fisheries assessment, sorted by species and capture method ("Minnow" = minnow trap).

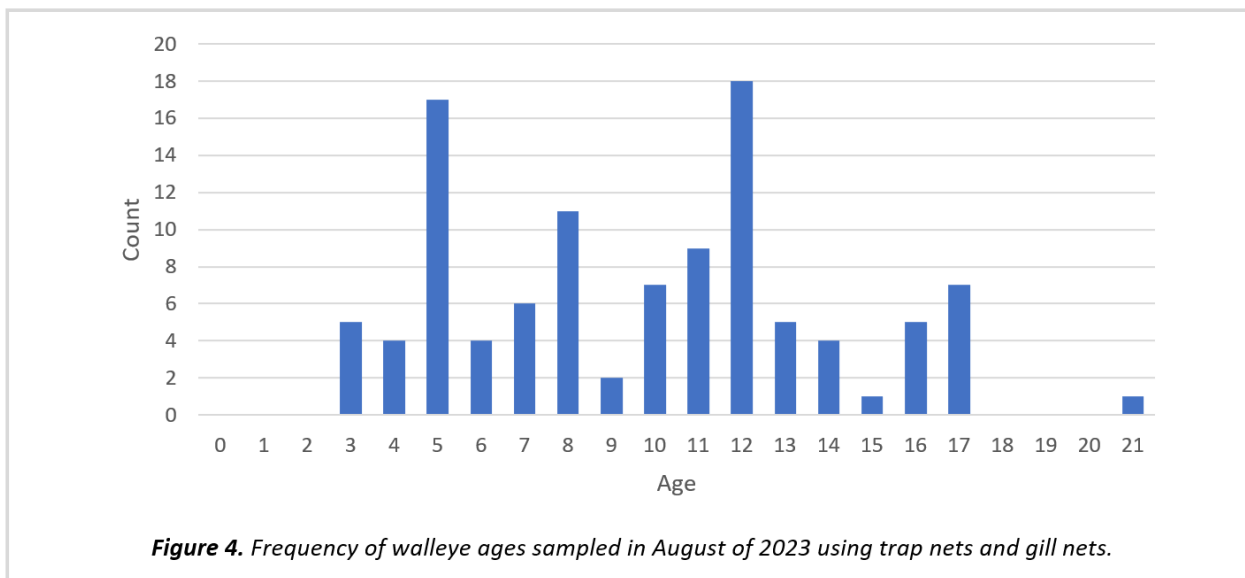
| Capture Method | Walleye | Smallmouth Bass | Northern Pike | Yellow Perch | Cisco | White Sucker | Brook Stickleback | Johnny Darter | Total |
|----------------|---------|-----------------|---------------|--------------|-------|--------------|-------------------|---------------|-------|
| Trap Nets      | 291     | 26              | 9             | 1            | 0     | 0            | 0                 | 0             | 327   |
| Gill Nets      | 95      | 44              | 19            | 8            | 2     | 2            | 0                 | 0             | 170   |
| Minnow         | 0       | 2               | 0             | 8            | 0     | 0            | 14                | 4             | 28    |
| Combined       | 386     | 72              | 28            | 17           | 2     | 2            | 14                | 4             | 525   |

## Walleye

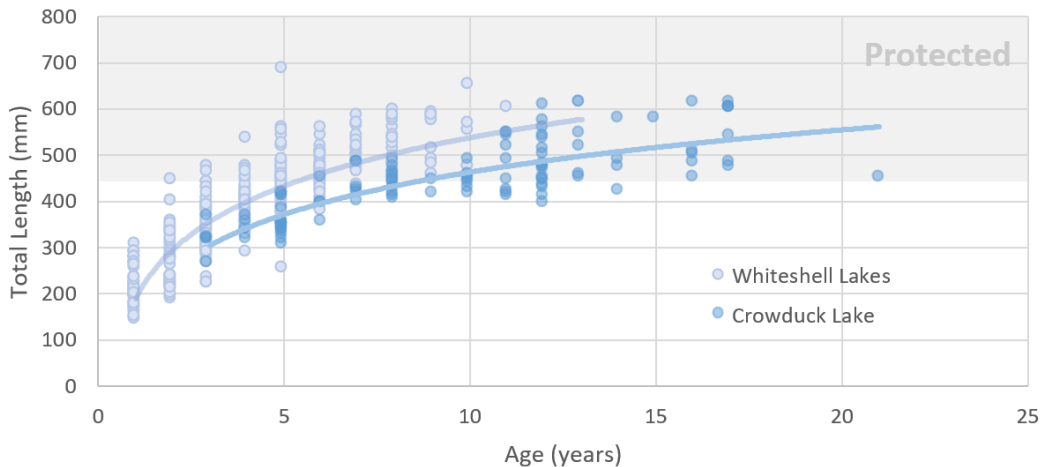
The average total length of walleye sampled during this survey was 46.8 cm (18.4 in), with a size range of 26.7 cm (10.5 in) to 61.2 cm (24.1 in). Under the Special Walleye Regulation for Area A in Eastern Manitoba, which protects walleye over 45 cm, 69.7% of these fish would be protected from harvest.



Walleye ages ranged from 3 years to 21 years with a mean age of 9.7. Walleye from the 2011 (age 12) and 2018 (age 5) cohorts were the most abundant in our samples, suggesting strong recruitment during those years.

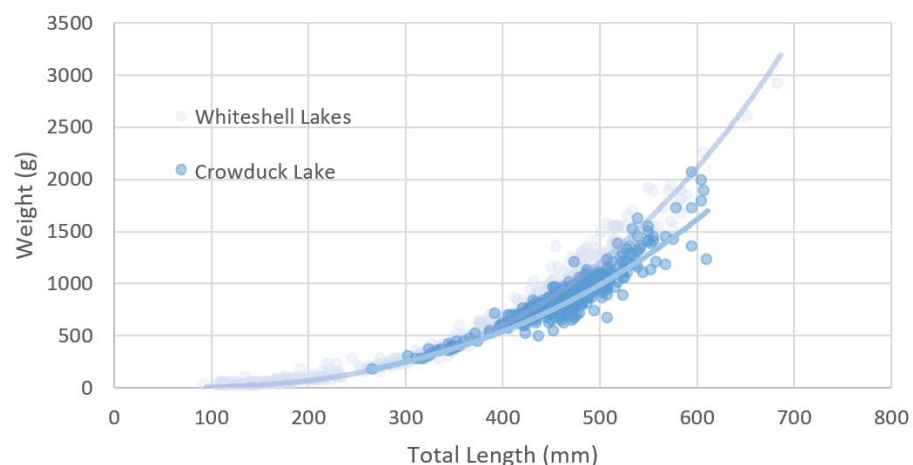


Walleye growth in Crowduck Lake is slow compared to other Whiteshell populations. Walleye in Crowduck Lake reached an average length of 45 cm by age 11, compared to an average age of 7 in the Whiteshell dataset. Walleye in the 40 cm to 45 cm length range were aged between 5 and 21 years old.



**Figure 5.** Length-at-age of walleye sampled in Crowduck Lake ( $n = 106$ ) compared to other Whiteshell lakes ( $n = 356$ ). The Area A size restriction is highlighted in grey.

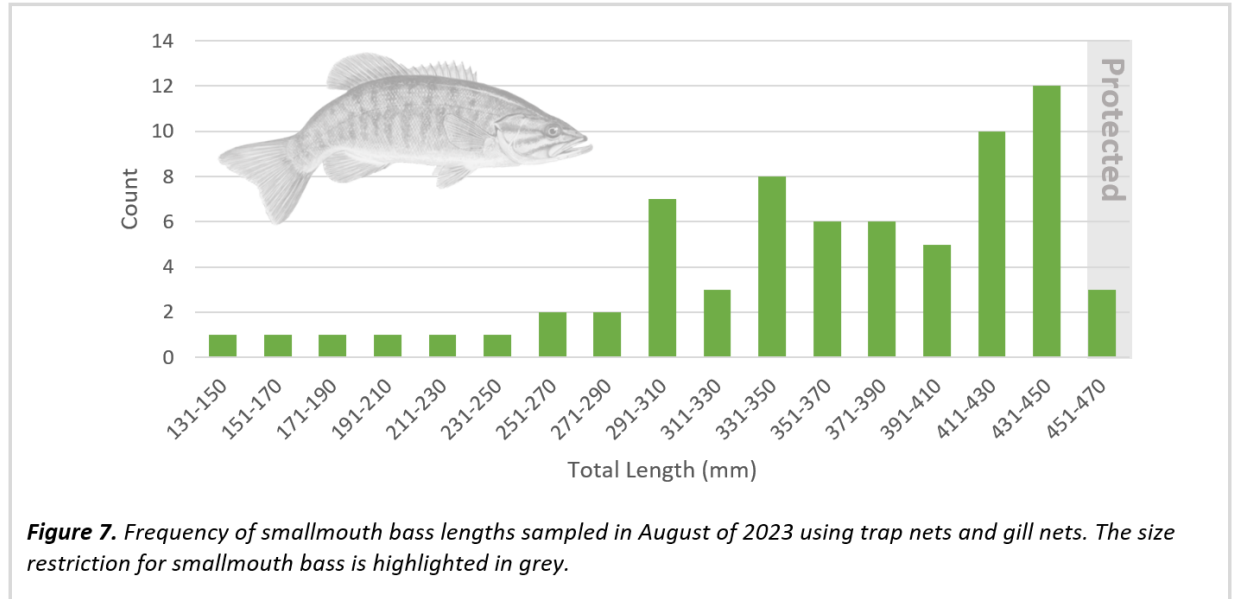
Body condition is lower in Crowduck Lake walleye than in surrounding waterbodies. Condition factor ( $K$ ) averaged  $0.97 (\pm 0.11; \text{Standard Deviation})$  in Crowduck Lake, compared to an average of  $1.13 (\pm 0.19)$  in other Whiteshell lakes. On average, a 45 cm walleye would weigh 746 g in Crowduck Lake and 871 g in other Whiteshell waterbodies.



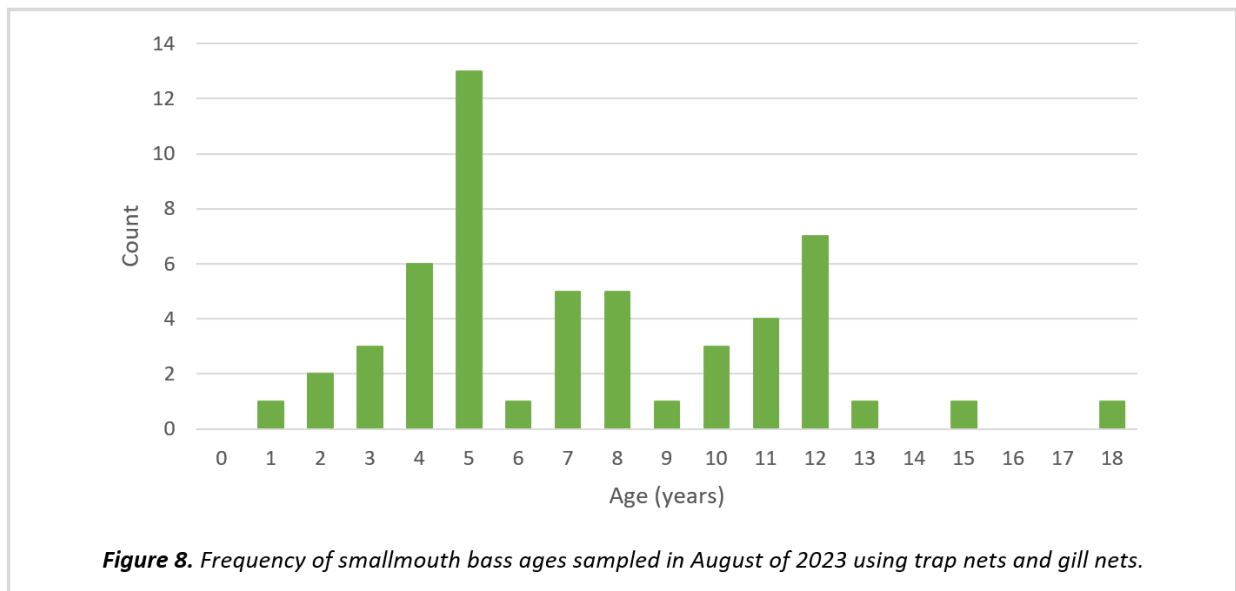
**Figure 6.** Weight-at-length of walleye sampled in Crowduck Lake ( $n = 386$ ) compared to other Whiteshell lakes ( $n = 510$ ).

### Smallmouth Bass

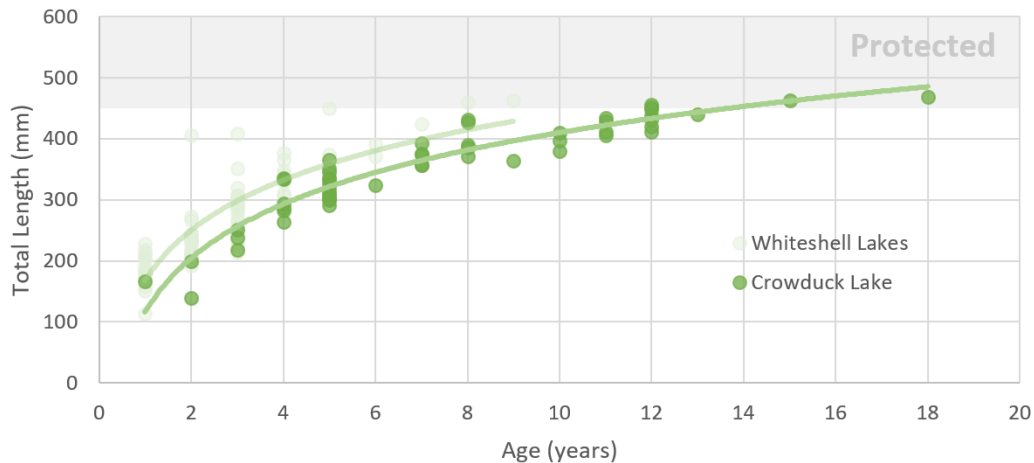
The average total length of smallmouth bass was 36.2 cm (14.3 in), with a size range of 14.1 cm (5.6 in) to 46.5 cm (18.3 in). Only 4.2% of the bass sampled would be protected from harvest (none over 45 cm).



Smallmouth bass ages ranged from 1 year to 18 years with a mean age of 7.4. Like walleye, smallmouth bass from the 2011 (age 12) and 2018 (age 5) cohorts had the highest representation in this dataset.

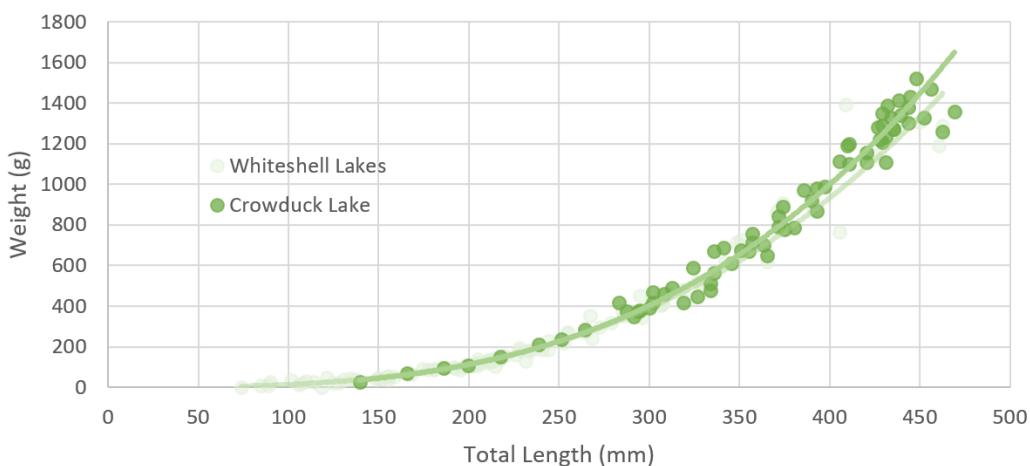


Smallmouth bass growth in Crowduck Lake is slow compared to other Whiteshell populations. Smallmouth bass reached an average length of 35 cm by age 7, compared to an average age of 5 in other Whiteshell datasets.



**Figure 9.** Length-at-age of smallmouth bass sampled in Crowduck Lake ( $n = 54$ ) compared to other Whiteshell lakes ( $n = 71$ ). The size restriction for smallmouth bass is highlighted in grey.

Despite slower growth rates, body condition is higher in Crowduck Lake smallmouth bass than in other Whiteshell populations. Condition factor ( $K$ ) averaged  $1.81 (\pm 0.17)$  in Crowduck Lake, compared to an average of  $1.74 (\pm 0.31)$  in other Whiteshell lakes. On average, a 35 cm smallmouth bass would weigh 656 g in Crowduck Lake and 624 g in other Whiteshell lakes.

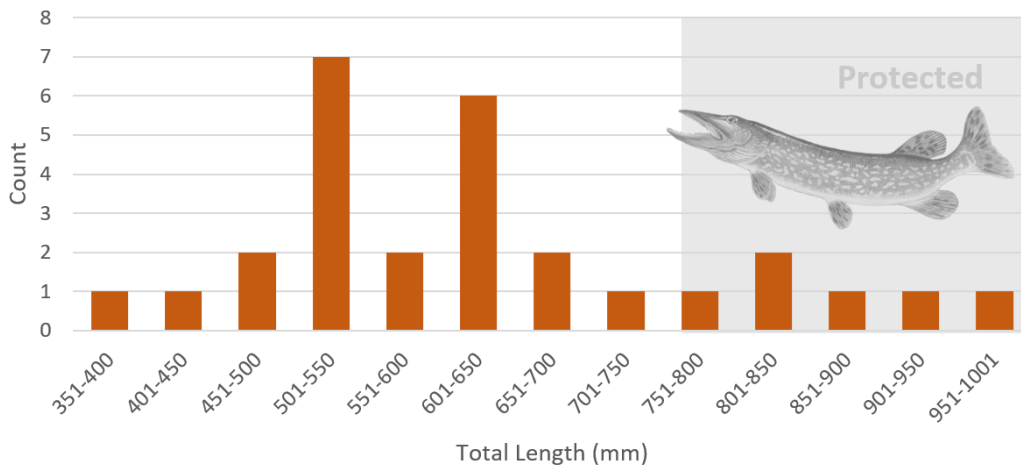


**Figure 10.** Weight-at-length of smallmouth bass sampled in Crowduck Lake ( $n = 72$ ) compared to other Whiteshell lakes ( $n = 96$ ).



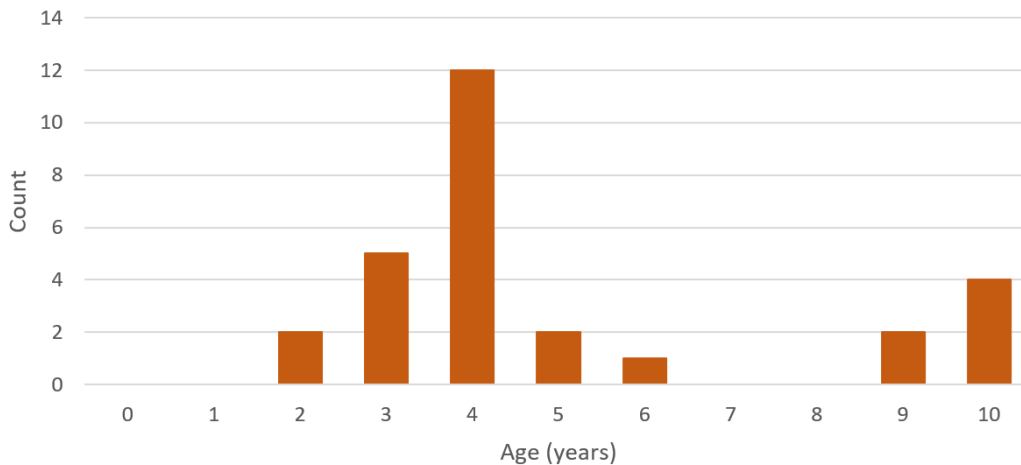
## Northern Pike

The average total length of northern pike was 62.6 cm (24.6 in), with a size range of 38.9 cm (15.3 in) to 98.0 cm (38.6 in). Under the current northern pike size restriction (none over 75 cm), 21.4% of these fish would be protected from harvest.



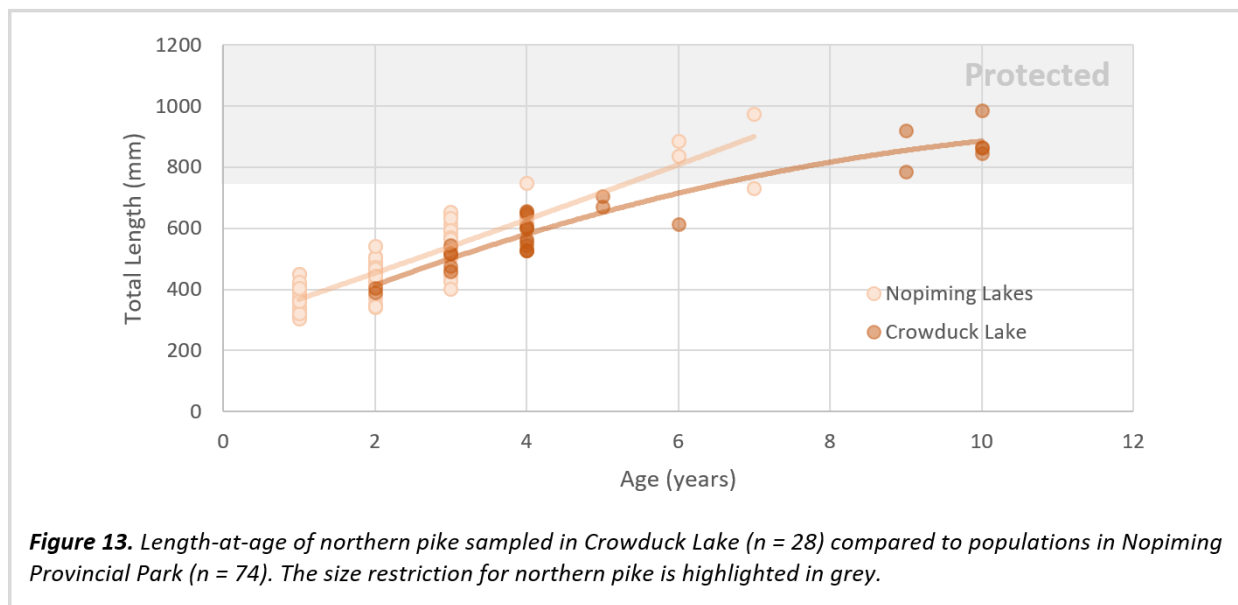
**Figure 11.** Frequency of northern pike lengths sampled in August of 2023 using trap nets and gill nets. The size restriction for northern pike is highlighted in grey.

Northern pike ages ranged from 2 year to 10 years with a mean age of 5.0. Fish aged 4 (2019 cohort) were the most prevalent in the dataset.

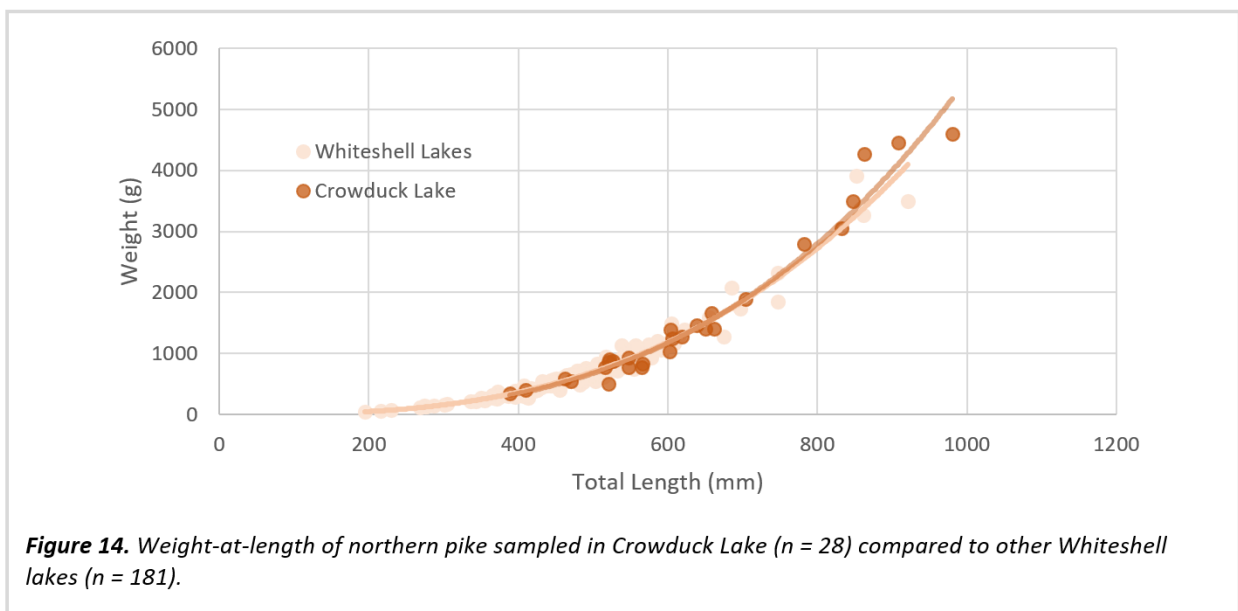


**Figure 12.** Frequency of northern pike ages sampled in August of 2023 using trap nets and gill nets.

Northern pike growth in Crowduck Lake is slow compared to fish in Nopiming Provincial Park (recent age data is not available for the Whiteshell). Northern pike in Crowduck Lake reached an average length of 65 cm by age 5, compared to an average age of 4 in the Nopiming dataset.



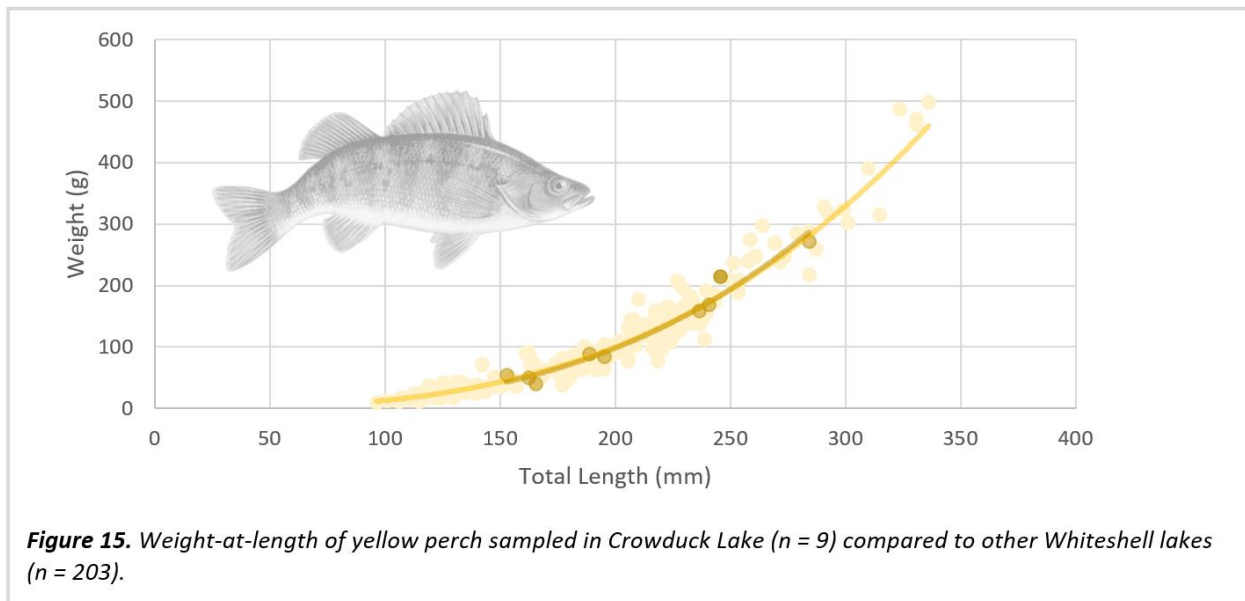
Body condition of northern pike is similar between Crowduck Lake and other Whiteshell populations. Condition factor ( $K$ ) averaged  $0.65 (\pm 0.08)$  in Crowduck Lake, compared to an average of  $0.68 (\pm 0.08)$  in other Whiteshell lakes. On average, a 65 cm northern pike would weigh 1496 g in Crowduck Lake and across other Whiteshell lakes.



## Other Species

### Yellow Perch

Seventeen yellow perch were caught during sampling, of which one was caught in a trap net, eight were caught in gill nets, and eight were caught in minnow traps. Yellow perch caught in the trap net and gill nets ranged from 15.4 cm (6.1 in) to 27.9 cm (11.0 in) long (mean = 20.5 cm) and 2 to 5 years old (mean = 3.2). Body condition was consistent with other Whiteshell lakes.



### Cisco

Two ciscoes were caught during sampling. The first cisco, caught in 10.7 m (35 ft) of water, was a two-year-old, mature female with a total length of 32.6 cm (12.8 in) and a weight of 362 g. The second cisco, caught in 8 m (26 ft) of water, was an eleven-year-old, mature female with a total length of 49.9 cm (19.6 in) and a weight of 1540 g.

### White Sucker

Two white suckers were sampled during the Crowduck Lake survey. One white sucker, a mature female, was six years old, 45.5 cm (17.9 in) long and weighed 1160 g. The other fish, a mature male, was four years old, 36.0 cm (14.2 in) long and weighed 538 g.

## Other Observations

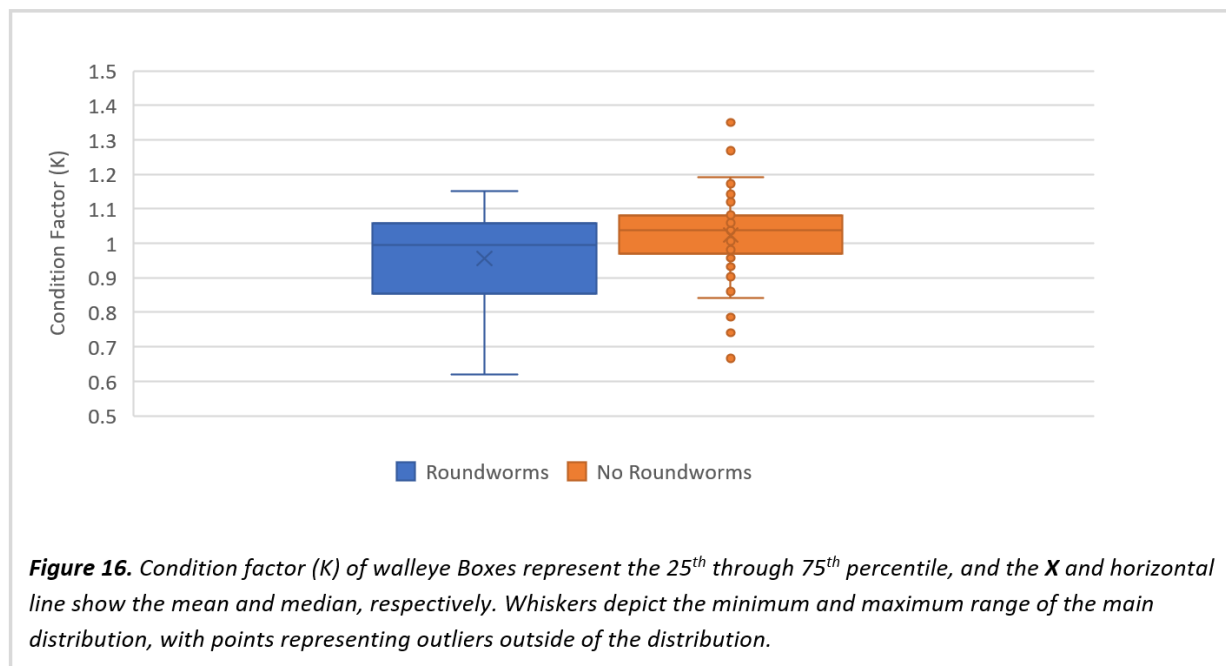
### Forage Base

Stomach contents were not intentionally sampled, but observations were recorded for seven walleye, three smallmouth bass, one pike, and two yellow perch. Walleye were foraging on yellow perch (57.1%), smallmouth bass (14.3%), leeches (14.3%), and midge larvae (14.3%). Smallmouth bass ate crayfish (66.6%) and yellow perch (33.3%), and the northern pike had been eating smallmouth bass. Johnny darters were observed in the stomach of one perch, and another perch was feeding on caddisfly larvae.

### Parasites

Some walleye in Crowduck Lake are experiencing high parasitic loads. Although this survey did not extensively assess for parasites, the presence of a parasitic roundworm, *Contracaecum sp.*, was observed in the stomach lining of 16% of walleye and 2% of smallmouth bass sampled. Walleye infected with roundworms (mean  $K = 0.96 \pm 0.15$ ) had a lower body condition than walleye without roundworms (mean  $K = 1.02 \pm 0.10$ ). Using these condition factors, a 45 cm walleye would be expected to weigh 783 g without (observed) roundworms and 731 g with roundworms. The life cycle of this roundworm involves aquatic invertebrates, fish, and birds. *Contracaecum sp.* can infect humans, but this risk is eliminated by ensuring that fish are fully cooked.

Another parasite, *Neascus sp.* (black spot disease), was observed in walleye (1%), northern pike (4%), and yellow perch (11%). The life cycle of this flatworm involves aquatic invertebrates such as snails, fish, and birds. As with *Contracaecum sp.*, black spot disease does not pose a risk to human health if fish are thoroughly cooked.



## Historical Comparisons

### Species Abundance

Species composition has changed drastically over the decades. Walleye have become the dominant species in Crowduck Lake followed by smallmouth bass. Northern pike abundance has declined since walleye were introduced. Yellow perch are still present but comprise a smaller percentage of catches than they have in previous decades. Ciscoes became scarce in the 1990s, and lake whitefish have not been captured in fisheries surveys since 2001. White suckers have also seen a dramatic decline in abundance since 2005. Overall, declines of these species appear to be due to predation by or being outcompeted by walleye.

**Table 2.** Species composition in Crowduck Lake surveys, shown as percentage of total catch, sorted by sample year. For capture methods, "GN" = gill nets, "TN" = trap nets, "EF" = electrofishing, and "MT" = minnow traps.

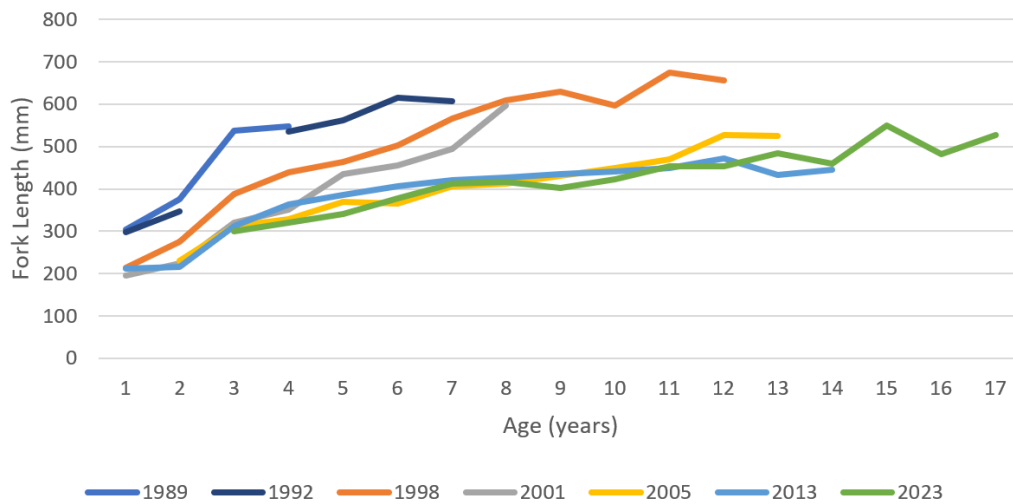
| Year | Walleye | Smallmouth Bass | Northern Pike | Yellow Perch | Cisco | Lake Whitefish | White Sucker | Capture Method |
|------|---------|-----------------|---------------|--------------|-------|----------------|--------------|----------------|
| 1941 | 0       | 0               | 12.5          | 0            | 0     | 12.5           | 75           | GN             |
| 1969 | 0       | 2.7             | 21.7          | 22           | 17.9  | 3              | 32.7         | GN             |
| 1978 | 0.3     | 3.2             | 10.8          | 16.4         | 47.9  | 2.1            | 19.4         | GN             |
| 1989 | 10.8    | 2.1             | 4.4           | 27           | 37.1  | 0.6            | 18           | GN             |
| 1992 | 17.9    | 4.1             | 6.4           | 33.4         | 19    | 0.5            | 18.7         | GN             |
| 1998 | 76.6    | 1.6             | 1.3           | 0            | 0     | 1.3            | 19.1         | GN             |
| 2001 | 59.5    | 3.3             | 3.3           | 7.4          | 0     | 0.3            | 26.2         | GN             |
| 2005 | 88.3    | 1.7             | 3.4           | 3.9          | 0     | 0              | 2.8          | GN             |
| 2013 | 31.3    | 39.7            | 1.3           | 26           | 0     | 0              | 1.7          | TN, EF         |
| 2023 | 76.1    | 14.2            | 5.5           | 3.4          | 0.4   | 0              | 0.4          | GN, TN, MT     |

### Walleye Life History

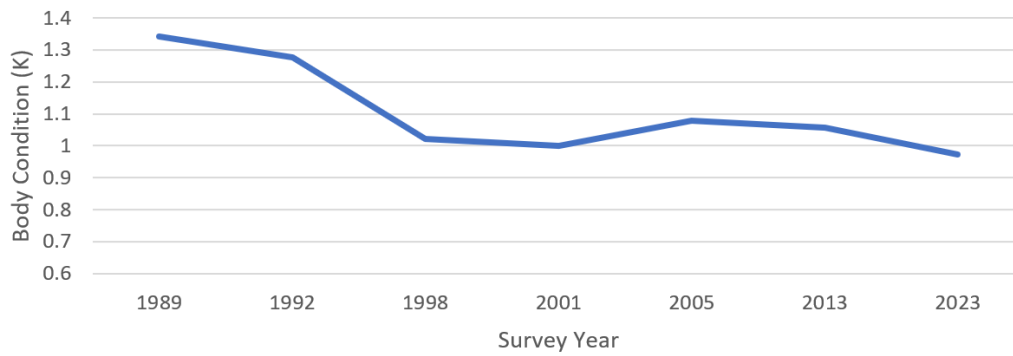
Walleye growth has slowed significantly since the 1990s and early 2000s. Walleye experienced exceptional growth and high body conditions when first introduced, but now exhibit below average growth and condition relative to other Whiteshell lakes (Figure 17, Figure 18). This decrease in growth rate and body condition coincides with the decline of cisco and whitefish abundance (Table 2). Growth rates appear to have stabilized since 2005.

Walleye also reached spawning maturity at a later age and at shorter lengths than in previous decades (Figure 19). In 1989, fifty percent of male and female walleye were sexually mature by age two (mean fork length = 376 mm) and three (mean fork length 538 mm), respectively. This figure increased to age five for both males and females by 2005 and is the same today (mean fork length = 340 mm).

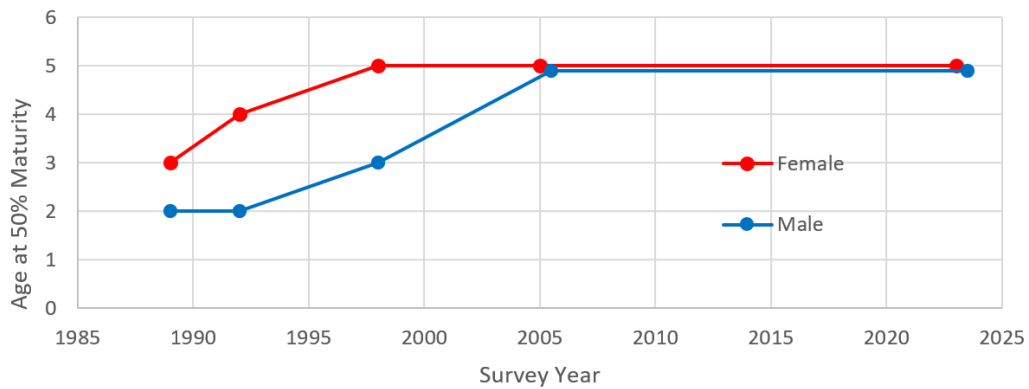




**Figure 17.** Mean length-at-age of walleye sampled in Crowduck Lake, separated by survey year.



**Figure 18.** Trendline of mean body condition (K) of walleye over time in Crowduck Lake.



**Figure 19.** Trend in age at 50% maturity of male and female walleye sampled in Crowduck Lake.

## **Conclusion**

Crowduck Lake is a fishery dominated by walleye. Walleye densities remain high, while growth and body condition have declined below the Whiteshell average. These declines coincide with the disappearance of ciscoes, lake whitefish, and white suckers. The walleye population has a high incidence of parasites, which may negatively affect body condition. Nearly 70% of walleye sampled in this survey exceeded the maximum size limit and would be protected from recreational harvest. Overall, the implementation of a two walleye limit has had little or no effect on walleye density, growth, or body condition.

Smallmouth bass are abundant and have good body conditions, though growth is slower than the Whiteshell average. The size structure of smallmouth bass is skewed towards larger fish, with some fish graduating to trophy status. Most smallmouth bass collected in this survey would be eligible for harvest.

Northern pike have declined in numbers and act as secondary predators after walleye and smallmouth bass. Cisco and white sucker numbers remain depressed, potentially due to predation by walleye. The status of lake whitefish is unknown. Small-bodied fish diversity and abundance appears to be low. However, the minnow traps used in this assessment only sampled baitfish in shallow, littoral habitats and therefore provided a limited representation of the overall forage base. Yellow perch and juvenile sportfish appear to be the primary forage base for predators in Crowduck Lake.

## **Acknowledgements**

This project benefitted greatly from a collaboration with Bill Kolansky and the staff at Crow Duck Lake Camp, who provided project support and local knowledge relevant to the production of this report and completion of surveys.