

High Lake, Whiteshell Provincial Park, Manitoba

2024 Fisheries Assessment Report



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Introduction

High Lake is a backcountry waterbody located near Falcon Lake in Whiteshell Provincial Park (Figure 1). It has a surface area of 8.0 km², an average depth of 12 m, and a maximum depth of 30 m. High Lake is accessible by portage from High Lake Bay at the east end of Falcon Lake. It was stocked with Lake Trout (*Salvelinus namaycush*) until 1970 (see Appendices for a complete stocking history), and the population is now self-sustaining. High Lake also contains a targetable Lake Whitefish (*Coregonus clupeaformis*) population as well as Northern Pike (*Esox lucius*), Burbot (*Lota lota*), White Suckers (*Catostomus commersonii*), and Yellow Perch (*Perca flavescens*). Master Angler submissions are infrequent, but trophy-class Lake Trout and Lake Whitefish have been documented in the lake (Figure 2).

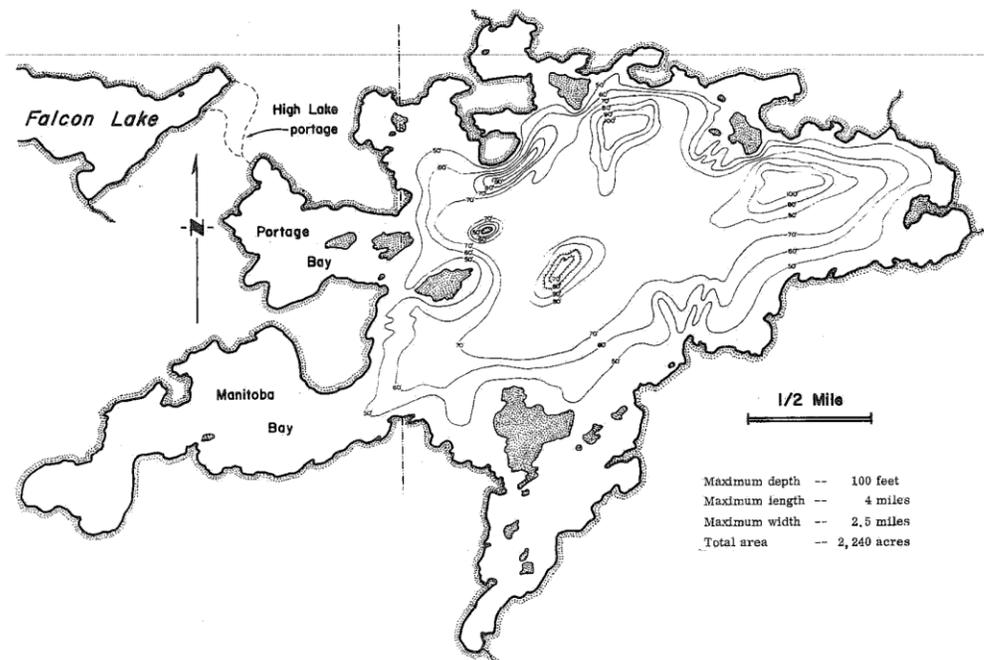


Figure 1. Bathymetry and location of High Lake, Manitoba.

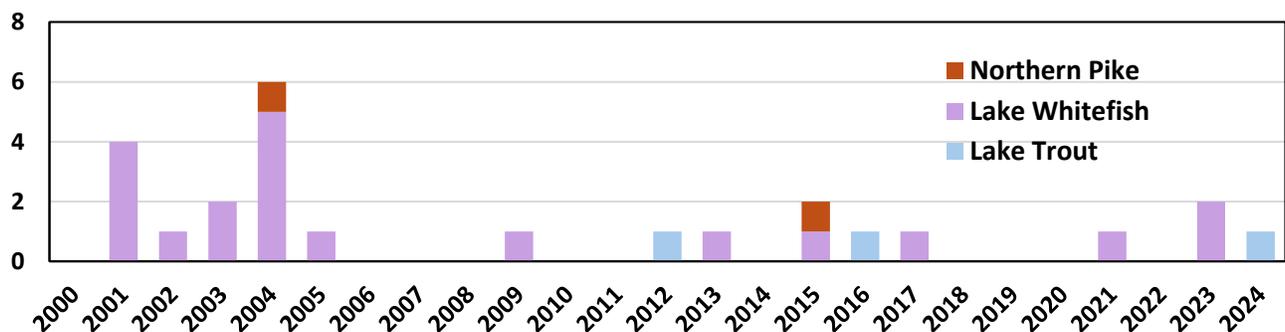


Figure 2. Master Angler submissions for High Lake between 2000 and 2024. Data are publicly available on Travel Manitoba's Master Angler webpage.

Methods

High Lake was surveyed by University of Winnipeg graduate students from July 6 to July 8, 2021, using the Province of Ontario's Summer Profundal index Netting (SPIN) protocol (Sandstrom and Lester 2009). Fish were captured using 64 m long by 1.8 m deep monofilament gillnets consisting of 8 m panels of 57 mm, 64 mm, 70 mm, 76 mm, 89 mm, 102 mm, 114 mm, 127 mm mesh arranged in random order. Net sets were supplemented with rod-and-reel angling.

Nets were set below the thermocline depth, which was determined using a dissolved oxygen (DO) and temperature depth profile collected in-field with a YSI Pro20 meter (YSI Inc., Yellow Springs, OH, USA). SPIN nets were set on the lake bottom at two-hour intervals.

All fish were measured for fork length, total length, and weight. Lake Trout, Lake Whitefish, and Northern Pike were sacrificed to determine sex and maturity, and otoliths were collected from Lake Trout for ageing.

Results

A total of 300 fish were sampled during the program, with 278 fish being captured across 21 net sets and an additional 22 fish caught with supplemental angling. Lake Whitefish were the most prevalent species with Lake Trout, Northern Pike, White Suckers, and Yellow Perch rounding out the catch (Figure 3). Of the five Eastern Region waterbodies sampled using SPIN protocols in 2021, High Lake ranked third in Lake Trout density (0.6 fish/net) and first in Lake Whitefish density (11.7 fish/net).

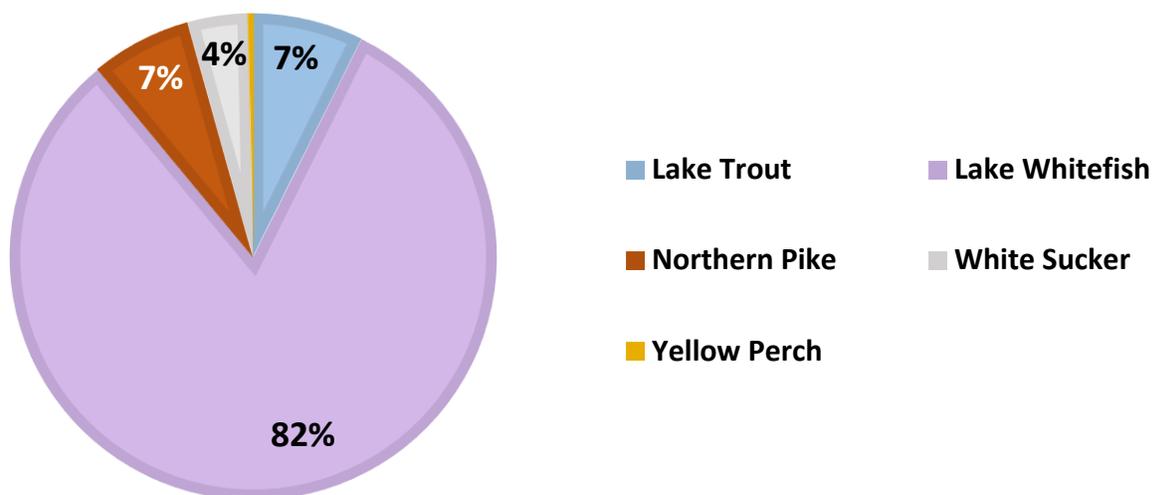


Figure 3. Composition of fish species caught in High Lake during a 2021 fisheries assessment.

Lake Trout

Twelve Lake Trout were caught in SPIN nets (mean depth 5.3 m, range 4.8 m to 6.2 m), and ten additional trout were caught by rod-and-reel at unspecified depths. Lake Trout averaged 51.8 cm in total length (range 30.5 cm to 83.0 cm; Figure 4) and 1608 g in weight (range 190 g to 4310 g); the largest Lake Trout (83.0 cm total length) was 6 cm short of Master Angler status. Body condition was acceptable but on the low end of healthy relative to other North American populations (Hansen *et al.* 2021; Figure 5). Stomach contents consisted of Yellow Perch, Ciscoes (*Coregonus artedii*), sculpins, and benthic invertebrates.

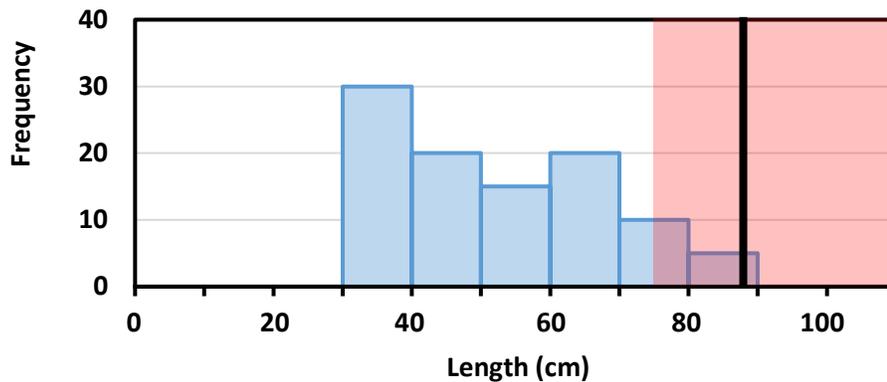


Figure 4. Size class distributions of Lake Trout caught in High Lake. The vertical black bar denotes the benchmark for a trophy fish under Travel Manitoba’s Master Angler program. Pink shading represents fish over 65 cm, which are protected from harvest as of 2024.

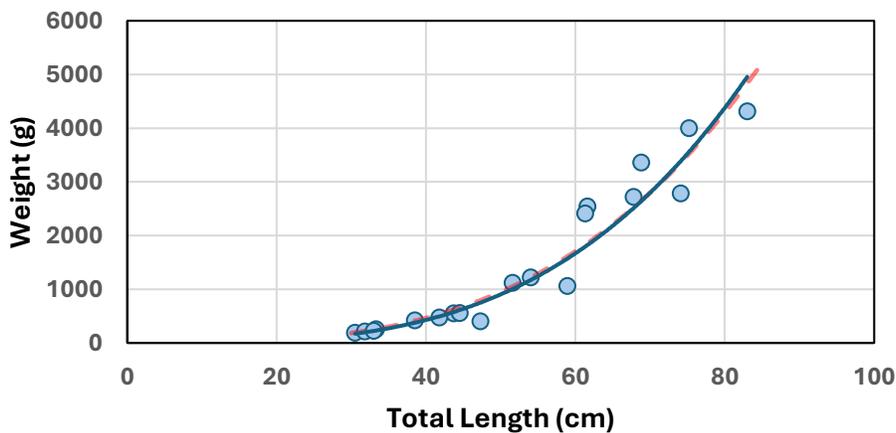


Figure 5. Weight-at-length of Lake Trout caught in High Lake. The red dashed line represents the minimum expected weight of a healthy Lake Trout using a standard weight (W_s) equation (Hansen *et al.* 2021).

Twenty Lake Trout were sampled for sex, maturity, and age data. Ages ranged from 5 years to 28 years, with a mean age of 9.8 and a median age of 6 (Figure 6). Twelve fish were female (7 immature, 5 mature) and eight were male (3 immature, 5 mature). At least 50% of fish from each sex achieved sexual maturity upon reaching 50 cm in total length or 8 years of age (Figure 7).

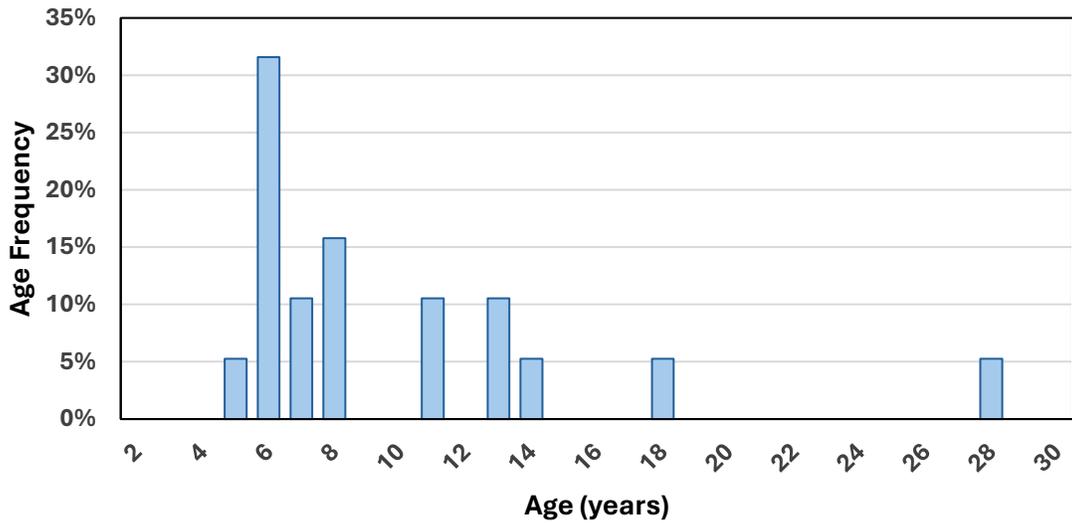


Figure 6. Lake Trout age class frequency from the 2021 High Lake fisheries survey.

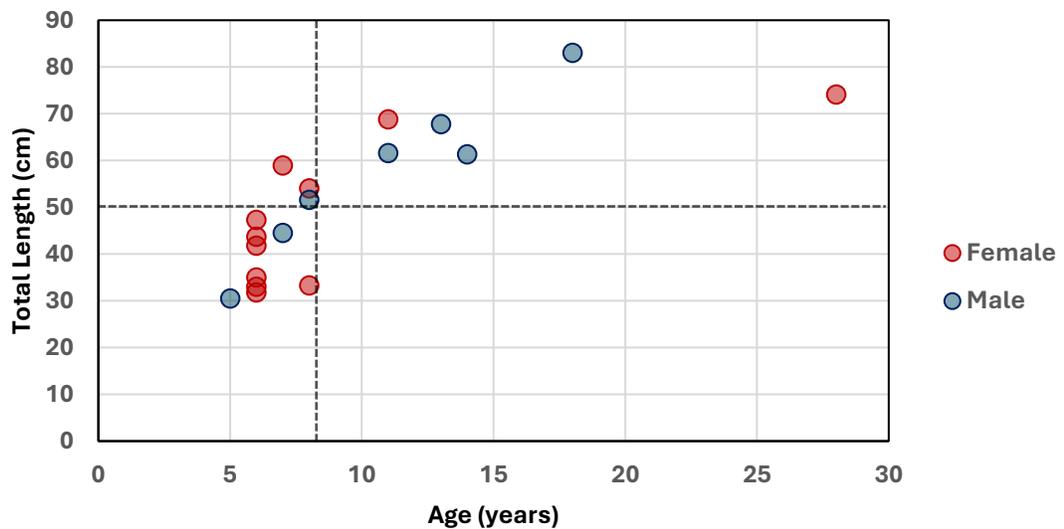


Figure 7. Length-at-age of Lake Trout caught in High Lake, grouped by sex. Dashed lines represent the age and length thresholds at which 50% or more fish from each sex achieved sexual maturity based on frequency distributions.

Lake Whitefish

A total of 245 Lake Whitefish were captured during the survey, of which two were caught by angling. Lake Whitefish were caught at an average depth of 7.0 m, with set depths ranging from 4.4 m to 21.6 m. Fish averaged 37.3 cm in total length (range 23.4 cm to 68.8 cm; Figure 8) and 495 g (range 100 g to 2740 g). Body condition was within a healthy range but was low relative to other whitefish populations in North America (Rennie and Verdon 2008; Figure 9). Two Lake Whitefish caught during the survey would qualify for Master Angler status, with the largest fish measuring within 4 cm of the Manitoba record.

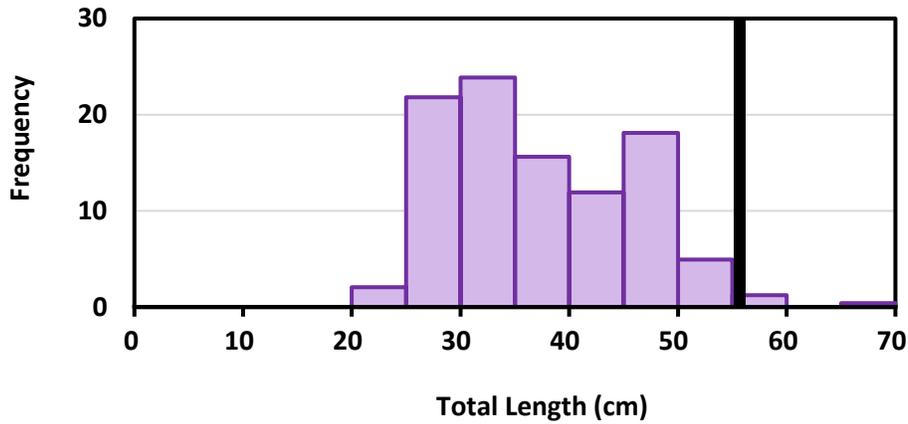


Figure 8. Size class distributions of Lake Whitefish caught in High Lake. The vertical black bar denotes the benchmark for a trophy fish under Travel Manitoba’s Master Angler program.

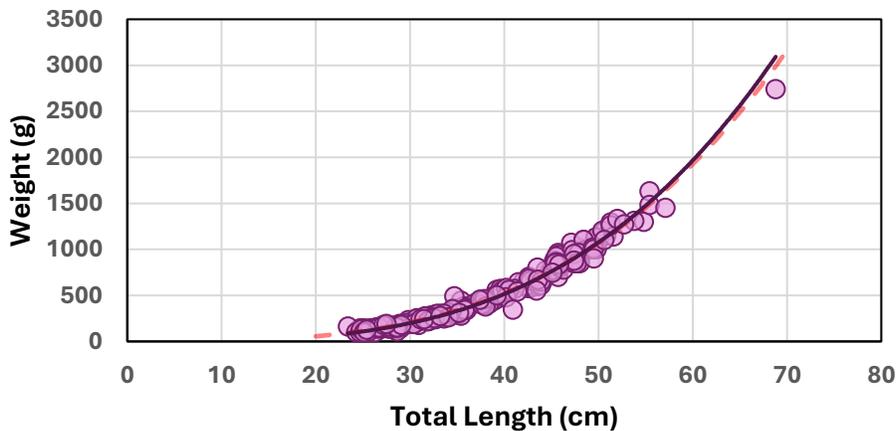


Figure 9. Weight-at-length of Lake Whitefish caught in High Lake. The red dashed line represents the minimum expected weight of a healthy Lake Whitefish using a standard weight (W_s) equation (Rennie and Verdon 2008).

Northern Pike

Ten Northern Pike were captured in SPIN nets at an average depth of 6.0 m (range 2.3 m to 21.6 m). Ten additional fish were caught by angling but were not measured. Fish caught in nets averaged 69.0 cm long (range 61.8 cm to 76.7 cm; Figure 10) and 2058 g (range 1580 g to 2670 g). Body condition was good and typical of the species (Anderson and Neumann 1996; Figure 11).

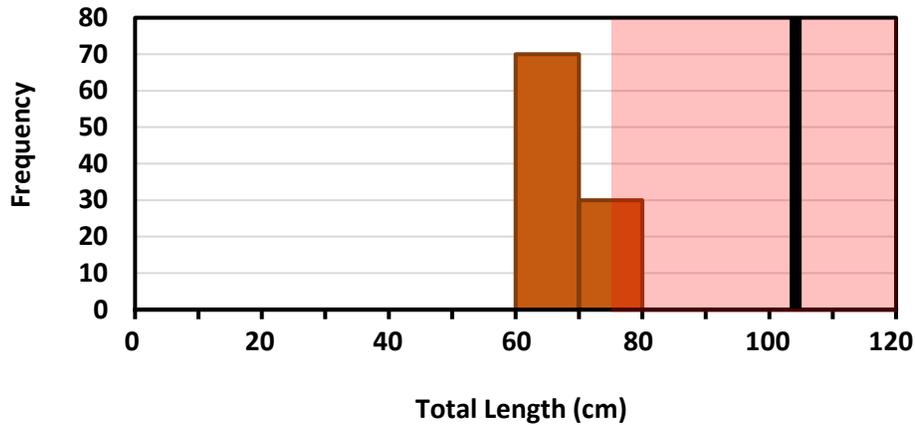


Figure 10. Size class distributions of Northern Pike caught in High Lake. The vertical black bar denotes the benchmark for a trophy fish under Travel Manitoba’s Master Angler program. Pink shading represents fish over 75 cm, which are protected from harvest as of 2024.

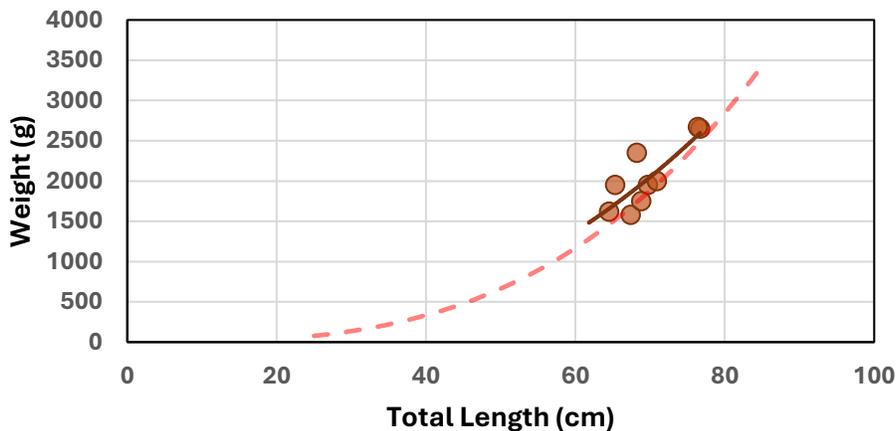


Figure 10. Weight-at-length of Northern Pike caught in High Lake. The red dashed line represents the minimum expected weight of a healthy Northern Pike using a standard weight (W_s) equation (Anderson and Neumann 1996).

Conclusion

High Lake is an excellent Lake Trout and Lake Whitefish fishery with good numbers and trophy potential. Body condition was not spectacular, but growth rates for these species are among the highest in the Eastern Region. One of the Lake Whitefish captured during this study was among the largest ever recorded in Manitoba, and it is possible that the next Provincial record is currently swimming in High Lake. Angling pressure in High Lake is relatively low due to its remoteness and limited accessibility, and anglers who are willing to put in the effort to access it will be rewarded with a quality fishing opportunity.

References

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- Sandstrom S.J., & Lester N. 2009. Summer profundal index netting protocol; a lake trout assessment tool. Ontario Ministry of Natural Resources. Peterborough, Ontario. Version 2009.1. 22 p. + appendices. <https://www.ontario.ca/page/summer-profundal-index-netting-manual#section-0>

Appendices

Appendix A. Complete Provincial stocking history for High Lake, Manitoba as of 2024.

<i>Year</i>	<i>Species</i>	<i>Number</i>	<i>Size</i>
1970	Lake Trout	3,000	>1 year
1970	Splake	2,000	>1 year
1969	Lake Trout	3,000	>1 year
1969	Splake	3,000	>1 year
1968	Lake Trout	2,000	>1 year
1968	Splake	2,000	>1 year
1967	Lake Trout	2,000	>1 year
1966	Lake Trout	1,500	>1 year
1965	Lake Trout	2,500	>1 year
1963	Lake Trout	2,500	>1 year
1962	Lake Trout	50,000	Fingerling
1961	Lake Trout	28,000	Fingerling
1960	Lake Trout	50,000	Fingerling
1959	Lake Trout	25,000	Fingerling
1958	Lake Trout	80,000	Fingerling
1957	Lake Trout	50,000	Fingerling
1956	Lake Trout	120,000	Fingerling
1955	Lake Trout	90,000	Fingerling
1954	Lake Trout	53,000	Fingerling
1953	Lake Trout	120,000	Fingerling
1952	Lake Trout	340,000	Fry
1952	Brown Trout	2,600	Fingerling
1951	Lake Trout	63,500	Fingerling
1950	Lake Trout	93,000	Fingerling
1949	Lake Trout	48,000	Fingerling
1948	Lake Trout	20,000	Fingerling
1948	Rainbow Trout	36,557	Fingerling
1947	Lake Trout	10,200	Fingerling