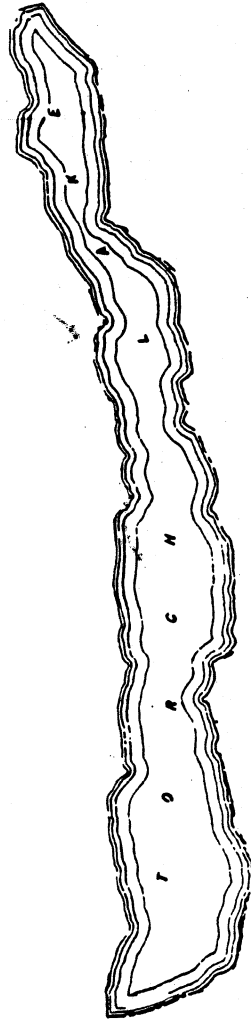


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# **A HISTORY OF FISH AND FISHERIES TORCH LAKE**



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INSTITUTE FOR WATER QUALITY RESEARCH

TORCH LAKE PROJECT

HISTORY OF FISH & FISHERIES

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BY

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## INTRODUCTION

Torch Lake, located among the glacial hills of Antrim County, Michigan, is the second largest inland lake in the state. Torch Lake is very deep, and is ranked first in water volume of Michigan's inland lakes. See Table 1.

In physical characteristics, water quality, and biological community, Torch Lake is more like nearby Grand Traverse Bay than the other lakes of the Chain of Lakes. The water is low in nutrients, there are few aquatic plants, and the fish community is characterized by lake trout, cisco, lake whitefish, deepwater sculpin, and other species associated with oligotrophic cold water lakes. See Table 2.

The purpose of this report is to review the existing scientific information on the Torch Lake fish community, and describe the past and present fishery of the lake. General biological information on the species described in this report are presented in "Fishes of the Grand Traverse Region" by Price and Kelly, 1976.

### Evolution of the Native Fish Fauna

The composition of the Torch Lake fish community prior to 1800 was the result of geological events and subsequent biological dispersion and colonization.

After the last glaciers melted about 10,000 years ago, fishes and other aquatic organisms had to reach the newly-created lakes from unglaciated "refuge areas" to the south. Most fishes found in Torch Lake colonized the upper Great Lakes from the Mississippi and Ohio River basins. In earlier times there was a channel at the southern end of Lake Michigan through which fishes could enter the Great Lakes from the Mississippi River drainage.

Torch Lake was once an arm of Grand Traverse Bay, which undoubtedly explains their similar fish faunas. The connection between the Bay and Torch Lake was restricted about 4,000 years ago during the Nipissing lake stage when a barrier beach formed in the area between Eastport and Torch Lake Village. About 3,200 years ago the level of Lake Michigan lowered to about 580 feet above sea level, from the previous Lake Algoma level of 595 feet. The levels of Torch and Elk Lakes were also lowered at this time, but the lake levels were held several feet above the level of Lake Michigan by a sill at Elk Rapids. The levels of Elk and Torch Lakes were raised again in 1851 by the completion of the dam at Elk Rapids.

The surface of Torch Lake now stands at about 590 feet above sea level, ten feet above the surface of Lake Michigan. After completion of the dam, fish access to Torch Lake from Lake Michigan was blocked.

#### American Brook Lamprey

Of the five lamprey species in Michigan, the American brook lamprey is the most common in this area. It was reported by the University of Michigan biologists in 1941 at Wilkinson Creek (Hubbs, et al. 1941). I have observed these lampreys spawning in Grass Creek (tributary to Lake Bellaire) in June of 1983 and 1984.

#### Chestnut Lamprey

The chestnut lamprey is a small stream-dwelling parasitic species. It is of little consequence due to its scarcity and small size. The chestnut lamprey is not found in the Chain of Lakes above the Elk Rapids dam.

#### Sea Lamprey

The most destructive lamprey is the sea lamprey, an invader from the Atlantic Ocean. This fish devastated the lake trout population in the Great Lakes, but fortunately it has not established a population in the Chain of Lakes. This is due to the dam at Elk Rapids acting as a barrier to upstream migration.

There have been a scattering of reports of sea lamprey in the Chain of Lakes however. In 1950 sea lamprey were reported from Elk and Torch Lakes, and a scarred lake trout was reported from Elk Lake. Lamprey were reported ascending the dam spillway at Elk Rapids (Notes, Institute for Fisheries Research [IFR]).

It is doubtful that lamprey could traverse the dam, and no recent sightings have been made (Sullivan and Morman, letter, 1985). It is interesting that there were many complaints in the past regarding the Elk Rapids dam blocking passage of game fish into the Chain of Lakes (Greeley 1931). The dam has since saved the Chain of Lakes from the destructive effects of the sea lamprey, alewife and carp.

#### Lake Sturgeon

Lake Sturgeon were reported from Torch Lake in the past (Eschmeyer 1931) but there are probably few if any sturgeon left in the lake. The sturgeon's preferred spawning habitat, rapids with rock and gravel bottom is not locally available. It is possible that the Bellaire dam blocked sturgeon spawning runs upstream to the Chain of Lakes headwaters.

### Longnose Gar

The longnose gar is a warm water fish nor normally found in cold, deep water habitats. There are several historical reports of gar from Torch Lake (IFR 1958, 1970). However, these gar were taken near the Clam River and Wilkinson Creek, which probably accounts for their presence. The gar undoubtedly is a rare species in Torch Lake.

### Salmon Family

The salmon family includes the true trouts (genus Salmo--brook, brown, and rainbow trout and the Atlantic salmon), chars (genus Salvelinus--lake and brook trout), and Pacific salmon (genus Onchorynchus--coho, chinook andn kokanee salmon). Also included in this family is the subfamily Coregoninae, which includes the whitefish and ciscos.

### Lake Trout

The lake trout is the premier fish of Torch Lake. It is sought after by anglers both summer and winter and accounts for the greatest weight of fish landed from the lake.

There have been various reports through the years of the lake trout population either decreasing or increasing. Biologists using gillnets have reported widely varying catch per unit effort (CPE) data also. (CPE standardizes catches for a given amount of gear used, although differences in weather, season, depth, type of gill net and other factors are not controlled.) Lake trout are much more common in Torch Lake than in Elk Lake, where gillnet CPE's are much lower. See Table 3.

Lake trout in Torch Lake eat primarily lake herring (cisco). Sanderson (1970) reported 95 percent cisco in the trout's diet. The IFT in 1972 found 58 percent cisco, 28 percent unidentified remains, 7 percent yellow perch, and 3.5 percent smelt and darters in trout stomachs. Sculpins, common food of the lake trout in Lake Michigan, are rarely eaten by Torch Lake trout, due to the relative abundance of ciscos.

The most recent Michigan Department of Natural Resources survey (Alward 1975) found lake trout to be growing and maturing faster in Torch Lake than in Lake Michigan. Recent data from Grand Traverse Bay (Ebner 1984) shows growth slightly faster in Grand Traverse Bay, but there is much variation in the data. See Table 4.

Most Torch Lake trout females were sexually mature at age V, whereas most Lake Michigan trout were another year older before reaching maturity. Males usually mature 1-2 years earlier.

Lake trout of Ages VI, VII, and VIII are common in Torch Lake, and Miller's 1964-65 study found fish of Ages IX, X, and XI.

Although lake trout are native to Torch Lake, hatchery raised lake trout have been planted since 1895. Plantings were somewhat irregular in early years. In the period 1975-81, plants averaged 68,000 yearling lake trout. No lake trout were planted in 1983 and 1984 due to a shortage of hatchery reared fish and an emphasis on rehabilitating the Great Lakes lake trout population. See Table 5.

Because planted fish were not fin clipped (as they are when planted in Lake Michigan), there is no way to determine what percentages of the Torch Lake lake trout population are native and hatchery fish. Miller (1966) estimated a third of the population to be hatchery fish although plantings prior to his study averaged only 9,000 fish per year, including 1960 when no lake trout were planted. Natural reproduction and survival must be good however, as the 1970 and 1972 gill net CPE's were fairly high, in spite of low levels of plantings in the preceding years.

Jacob (1959) found concentrations of spawning lake trout north of Sand Point and at Peterson's Reef in the north end of the lake.

Alward (1976) attempted to relate year class strength to stocking rate but found little or no correlation. It will be interesting to monitor the 1983 and 1984 year classes (when no plants were made) to see if their numbers are noticeably lower than previous year's classes.

In order to establish the effectiveness of stocking, fish must be marked and annual sampling must be made.

Good information on the lake trout sport fishery is lacking. Creel census information summarized by Laarman (1976) indicates lake trout comprised 74.4 percent of the sport catch in the years 1935-45, 27.8 percent in 1947-52, and 39.1 percent in 1956-64. The number of fish landed or the catch per angler effort is not given.

Notes at the Institute for Fisheries Research in Ann Arbor offer some insight into the fishery in 1958: One strike for 4-5 hours of fishing; 200-300 lake trout seen in half a day at Deepwater Point through an ice hole; 85 seen in half a day at south end of Torch Lake. An estimated 5,000 pounds of lake trout were caught through the ice in 1956.

The predominance of lake trout in the north end of Torch Lake is confirmed by Sanderson (1970). Sanderson also noted reports of a recent lake trout decline. This must have been the consensus of local opinion, because a petition to plant more lake trout was presented to the Michigan Department of Natural Resources in 1969. This perceived decline runs counter to the relatively high gillnet CPE's of the same period. Angler success and relative abundance indicated by netting are not always directly correlated.

### Brook Trout

Brook trout have been reported from the mouth of Spencer Creek (Eschmeyer 1931) and from unspecified areas by Bollman (1888) and Koelz and VanOosten (1923). Brook trout are not usually found in large lakes (although lake dwelling "coaster" brook trout do exist). They probably inhabit any tributary streams with suitable cold water habitat (summer water temperatures below 65°F). Brook trout made up only 1.5 percent of the Torch Lake creek census in 1935-45 and have not appeared on creel census data since then (Laarman 1976).

### Brown Trout

Brown trout are an introduced species and were brought from Europe in the late 1800's. There are no records of brown trout plantings into Torch Lake, but there have been introductions in other parts of the Chain of Lakes. Browns were first reported from Torch Lake in 1930 (Eschmeyer 1931), and have appeared in most studies since then; the largest catches were reported by the IFR in November 1970. Seven brown trout were taken off Wilkenson Creek and 11 taken off Spencer Creek by gillnets for a CPE of 48.0. Other brown trout CPE's averaged 0.2 (fish per 1,000 feet of net).

The creek census data shows brown trout only in the period 1955-64 at a low 0.3 percent.

Brown trout are not important members of the Torch Lake fish community.

### Rainbow/Steelhead Trout

Rainbow/steelhead trout are native to the Pacific coast. They were introduced to Michigan in the 1870's. These early plantings were steelhead, a race of rainbow trout that ascend streams to spawn in the spring. Plantings of rainbow in Torch Lake occurred in 1933-34, 1941, 1956 and 1971. See Table 5. Rainbows have been collected in most fisheries studies. Greeley (1931) reported a run of steelhead in Alden (Spencer) Creek and adult steelhead in Torch Lake, although none were reported by Eschmeyer (1931).

The CPE for rainbows was very high, 18.0 fish per 1,000 feet of net in 1970, but was only 0.2 in 1958 and 1972. No rainbows were reported by Alward (1976).

Rainbows also made up a very small part of the creel census, less than one percent in 1935-45 and 1956-64. They were not reported in the creel census data of 1947-52.

### Atlantic Salmon

The Atlantic salmon is an anadromous species native to the Atlantic Ocean, and was once present in Lake Ontario (exterminated there by 1890). As a game fish, it is renowned on both sides of the Atlantic, and it has often been introduced beyond its original range in the hopes of establishing new populations. Few of these attempts have been successful, however.

Between 1882 and 1888, 88,100 Atlantic salmon fry were planted in Torch Lake. There are no confirmed reports of any Atlantic salmon ever being caught.

In 1931 Greeley investigated the Chain of Lakes for possible introduction of Atlantic salmon. He recommended against the introduction for several reasons: 1) The Rapid River was found to be the only suitable stream for spawning and rearing Atlantic salmon (they spend the first two years of life in their natal stream) and there was a good fishery of brook trout already in the stream. That fishery would have to be closed down to protect the young Atlantic salmon. 2) The dam at Antrim Pond made conditions unfavorable for rearing salmon, as water levels below the dam fluctuated and downstream passage through the dam was difficult. 3) Torch Lake already had a good population of lake trout.

### Kokanee Salmon

Kokanee salmon fingerlings were planted in Torch Lake in 1965 and 1966. On September 28, 1967 four Kokanee were reported by a Conservation Officer, and on the same day three males and a female (7.8 inches long) were taken in Wilkinson Creek. Kokanee were seen in Wilkinson Creek the following September also; they were about 14 inches long and averaged one pound each. Apparently the population did not survive however, and none have been reported lately.

Similar plantings in Higgins Lake were successful, as the MDNR captured 357 kokanee there in 1974.

The kokanee is a pelagic, mid-water, plankton-feeding species and occupies an ecological niche similar to the lake herring.

### Chinook Salmon

A Mr. Bingham of Torch Lake reported a planting of 60,000 chinook salmon from Washington or Oregon about 1917 to 1919 (Greeley 1931). Although there were subsequent reports of fishermen catching adult chinooks, Greeley doubted these reports and suggested that the "salmon" were in fact steelhead.

No chinook or coho salmon were found in Torch Lake. When the Elk Rapids dam was recently refitted for hydroelectric generation, the state requirement for fish ladder installation was waived, so salmon and other Lake Michigan exotic species could not enter the Chain of Lakes.

### Lake Whitefish

Whitefish are bottom dwellers and feed primarily on the amphipod, Pontoporeia, and the shrimp, Mysis. Whitefish are the most important commercial species in Lake Michigan.

They are relatively common in Torch Lake with gillnet CPE's of 7.15 in Elk Lake in 1975.

Alward (1976) reports most whitefish sexually mature at 18 inches, or VII. Age distribution of whitefish is presented in Table 6. In 1955 a 24 pound whitefish was found dead on the shore of Torch Lake.

The creel census (Laarman 1976) indicated moderate fishing for whitefish from 1935 to 1952 and a great deal of activity in the period 1956 to 1964, when whitefish made up 41.4 percent of the total sport catch. See Table 7.

In 1955 good whitefish ice fishing was reported, with 40-50 strikes per day and about 20 fish landed at one location.

Whitefish were once widely planted in Michigan, but it was later determined that plantings did little to improve fishing. No whitefish were planted in Torch Lake after 1928. Apparently, habitat conditions are adequate to maintain a healthy population.

### Cisco/Lake Herring

The cisco, or lake herring (not related to the salt-water herring) has received much attention in Torch Lake. At one time the Torch Lake cisco held status as a separate subspecies Caregonus artedii greeleyi (Koelz). The many subspecies named by Koelz are no longer recognized, but the plasticity in form of the cisco from place to place continues to confound fishery scientists. These fish apparently develop slightly different physical features in different isolated populations, although they could still interbreed if the geographical barriers were removed.

A healthy and stable population of cisco resides in Torch Lake. Most surveys, beginning with Bollmann in 1888, have reported good catches of cisco. Gillnet CPE's were 6.4 in 1931,

6.0 in 1958, 14.0 in 1970, 11.0 in 1972, and 18.7 in 1975 (Laarman 1976, Alward 1976). Laarman (1976) noted the growth rate for Torch Lake cisco was slightly slower than the state average in 1958 and 1966 but equal to the state average in 1972.

Alward (1976) and Sanderson (1970) present data for cisco age and growth in Torch Lake. See Table 8.

Ciscos are usually found below the summer thermocline, preferring the colder water of the hypolimnion. Koster (1968) in his study of Torch Lake ciscos found most ciscos just above the thermocline in about 30 feet of water. Koster also suggested that cisco schools swim in a general clockwise movement along the shores of Torch Lake.

Ciscos feed on both plankton and bottom organisms. Mayflies are the most important food for Torch Lake ciscos in the summer months. Ostracods and midges were also found in cisco stomachs by Koster.

Ciscos provide an important food source for lake trout, burbot, and rainbow trout. Sanderson (1970) concludes that the Torch Lake cisco population was adequate for lake trout growth. He speculated that the recent decline in the Elk Lake cisco population was related to the planting of rainbow trout.

#### Rainbow Smelt

Originally native to streams and lakes of the northern Atlantic seaboard, the rainbow smelt were introduced to the Great Lakes and other inland lakes to provide more forage for predator species. Six million smelt eggs, taken from the Green Lake hatchery in Maine, were planted in Torch Lake in 1912. It is not known if the present smelt population in the Chain of Lakes is a result of that introduction. It is likely that additional smelt have been introduced into the drainage basin from Lake Michigan by fishermen.

Eschmeyer (1931) did not find smelt in Torch Lake and in fact recommended against their introduction until more was known about their predaceous habits. Only Borst (1963) reported smelt from Torch Lake. Smelt are common in nearby Lake Bellaire. The few smelt occasionally found in Torch Lake are probably downstream migrants from the Lake Bellaire population.

Although smelt provide good sport in Great Lakes tributaries in spring, Torch Lake is probably better off without them. Healthy populations of cisco, emerald shiners, and perch, all native to Torch Lake, provide a more stable forage base for lake trout than smelt. Smelt populations have been known to expand to a great abundance and then crash to almost extinction. This

happened in Lake Michigan in 1942 to 1946 (due to disease) and in Lake Bellaire in 1977 (due to a rapid rise in water temperature).

#### Northern Pike (Esox lucius) and Muskellunge (E. masquinongy)

Torch Lake was once officially designated as a "pike lake" by the Michigan Department of Conservation, although pike and muskellunge have always been rare. Pike and muskellunge prefer warm water habitats and need marshy areas to spawn. These fish are more common in other waters of the Chain of Lakes.

Eschmeyer (1931) reported that muskellunge were occasionally taken, and that spearing at night with the help of lights was practiced on Torch River in the years prior to his study.

Netting by the IFR in July and August 1958 found a few pike and musky. Early creel census data showed pike to be 0.8 to 2.1 percent of the catch (1935 to 1952) and muskellunge to be 1.5 percent of the catch (1935 to 1945). These species were not reported in the sports catch from 1956 to 1964 (Laarman 1976).

#### Yellow Perch

Yellow perch are fairly common in Torch Lake and have been reported in fishery surveys since 1888. Gillnet CPE's (Table 9) were fairly good with the exceptions of 1970 and 1975. Growth rates of perch in 1958 and 1972 were only slightly less than the statewide average (Laarman 1976). This is significant considering that Torch Lake is not ideal for perch habitat.

Probably the limiting factor to the perch population is the lack of weed beds for spawning and shelter. Torch Lake is relatively nutrient poor, it has a long fetch in the N-S direction of prevailing winds, and it has probably not reached geological equilibrium with the new shoreline created by the higher lake level (after the dam at Elk Rapids). These three factors limit development of weed beds, except in embayments, and in turn limit perch production.

The creel census (Table 7) indicates a decreasing importance of the perch fishery, although other factors besides perch abundance may influence these data.

Almost a million perch fingerlings were planted in Torch Lake from 1933 to 1939. It is doubtful that this had any significant impact due to the habitat limitations discussed above.

### Walleye

The walleye, a member of the perch family, is common in the other lakes of the Chain of Lakes, notably Lake Bellaire, but it has never been reported from Torch Lake, despite planting efforts in 1902 and the 1930's (Table 5). Walleyes prefer shallower, warmer bodies of water.

### Logperch and Darters

Three other perch family members are present in Torch Lake: the logperch, johnny darter and Iowa darter. These small, bottom-dwelling fishes feed on crustaceans and aquatic insects and are in turn fed upon by perch, bass and trout. Of the three, logperch are probably the most abundant and the Iowa darters the least abundant.

### Sunfish Family

Of the six species of sunfish reported from Torch Lake, only smallmouth bass and rockbass occur in any significant numbers. The bluegill, pumpkinseed, black crappie, and largemouth bass are considered warm water species and were found in Torch Lake only because of adjacent bodies of favorable habitats (Clam Lake and Lake Skegemog).

Sunfish are nest building species, and reproduction may be limited by the lack of calm water habitat suitable for nest building along the wave-swept shores of Torch Lake (Eschmyer 1931).

Rockbass and smallmouth bass enter the fisherman's creel on a regular basis (Table 7), although they are not as important as lake trout, whitefish and perch.

Bluegills and smallmouth bass were once planted in Torch Lake (Table 7) but these plants probably had little effect on long-term population sizes.

### Burbot

Burbot, also known as lawyer, inhabit the deep cold waters of Torch Lake, the same habitat as the lake trout and whitefish. Often considered a "nuisance" or "obnoxious" fish, burbot are actually good to eat, although the fillets are quite small in relation to the entire fish.

Burbot have a diet similar to the trout, but their numbers are few and food competition with lake trout in Torch Lake is probably insignificant. Burbot CPE's (Table 9) have never been above 1.3 fish per 1,000 feet of net.

### White Sucker

White suckers are consistently reported by fishery investigators, but always in relatively low numbers. Catch per unit effort has ranged from 0.6 to 4.4 fish per 1,000 feet of net (Table 9).

Suckers were once popular sport fish, usually taken during spring spawning runs by spearing or netting. They appeared on the creel census in only the 1935 to 1945 period, although a landowner's complaint in 1965 of trespassing and habitat destruction in Powell Creek was related to the sucker run.

A die-off of approximately 100 suckers was reported in June, 1961. This die-off was thought to be due to post-spawning stress.

The longnose sucker, found in Lake Michigan, has not been reported from the Chain of Lakes.

Two redhorse suckers were reported from Elk Lake by Lape and Curry (1967), but these may have been misidentified. No other reports of redhorse have been made from the Chain of Lakes or Grand Traverse Bay.

### Minnow Family

Ten species of minnows have been reported from Torch Lake. They are discussed separately below.

The emerald shiner is an open water species, once found in vast numbers in the Great Lakes, but now rare. Competition by smelt and alewives is thought to be the reason for the emerald shiner's decline. In Torch Lake emerald shiners were abundant according to Bollman in 1888 (although some think these fish were actually rosyface shiners). Emerald shiners were collected in 1923 by Koelz and Van Oosten and by Eschmeyer in 1931. Eschmeyer mentioned a report of large schools of small fish, probably emerald shiners, going up Clam River.

The present status of the emerald shiner in Torch Lake is not known. Beach seining along the shores, the usual method of catching minnows, would not be effective in assessing the emerald shiner population because they live offshore, except in the autumn when the young come inshore.

The sand shiner is probably the most abundant minnow in Torch Lake, except perhaps along the north shore. In 1931 seining produced an average of 210 sand shiners per acre, four times the next most abundant minnow (the rosyface shiner). Rodeheffer and Day (IFR 1958) caught 236 sand shiners with a 10-foot seine at the south end of Torch Lake near the swing bridge. They also found the sand shiner to be the dominant minnow along the east shore of Torch Lake.

After the sand shiner, the rosyface shiner ranked second in abundance of the inshore minnows in 1931. The rosyface shiner spawns in clear streams and the maintenance of high water quality and low siltation in tributary streams are of great importance to this species.

Bluntnose minnows were more common than rosyface shiners in 1958. It is possible that streams and nearshore conditions changed enough between 1931 and 1958 to favor the more versatile bluntnose minnow. Bollman (1888) also reported an abundance of bluntnose minnows.

The creek chub usually inhabits streams that are warmer and have less current than trout streams. Creek chubs have been collected from Torch Lake along the south half of the west shore (1931), near Wilkinson Creek (1941) and near Clam River (1958). They were also reported by Bollman (1888). They are rare and a relatively minor part of the Torch Lake minnow community.

Blacknose dace are usually found in trout streams. They have been reported from Torch Lake only in 1931, when 15 were collected along the lower west shore.

Longnose dace inhabit swift flowing streams or wave-swept shores. They were found in an unspecified location in 1923, at Wilkinson Creek in 1941, and along the east shore and near Torch River Bridge in 1958. They also have been collected along the east and west shores north of Clam River.

The redbelly dace is a warm water stream and pond species. It has only been found in Torch Lake in 1958, along the east shore, south of the Clam River mouth.

The common shiner is another minnow that is usually found in streams but sometimes occupies lake shores. Common shiners were reported along the west shore of Torch Lake in 1931. They are probably rare in Torch Lake.

Only one account of the blacknose shiner in Torch was found (UMMZ). This specimen was collected near the mouth of Clam River. This is not surprising as they prefer weedy areas. Blacknose shiners were very common in the MDNR survey of Lake Bellaire in 1957 and Clam Lake in 1958.

#### Central Mudminnow

Despite its name, the mudminnow is not a member of the minnow family. Mudminnows are usually found in small, warm water ponds and streams. They have been reported from Torch Lake at Alden (UMMZ) and near Clam River (Eschmeyer 1931).

### Brook Stickleback

Brook sticklebacks were collected by Rodeheffer and Day in 1958 at the south end of Torch Lake. No other reports of this fish in Torch Lake were found. It is quite common in nearby rivers and ponds.

The related ninespine stickleback, found in Lake Michigan, is not present in the Chain of Lakes.

### Trout Perch

Trout perch have been collected in Torch Lake only by Koelz and Van Oosten in 1923. They were found in Lake Bellaire as recently as 1976 by the MDNR and were found in stomachs of Elk Lake trout by Sanderson (1970). They are probably rare in the lake.

### Sculpin Family

Sometimes called muddlers or miller's thumbs, these small fish are well-camouflaged and are seldom seen. They are important however as sources of food for larger fish, primarily trout. Three of the four Michigan species occur in Torch Lake.

Torch Lake is the only inland lake in Michigan to have deep-water sculpins. The population must have been established in Torch Lake prior to the Nipissing barrier formation. Deepwater sculpin are an important food of lake trout in Lake Michigan. It is not as important to the trout in Torch Lake due to a good supply of ciscos; however, Bollman (1888) found fifteen deepwater sculpins in the stomachs of lake trout.

The mottled sculpin is found along lake shores and on stream bottoms. It is the most common sculpin in our area.

The slimy sculpin has only been reported by Hubbs, et al. in 1941 from the Wilkinson Creek area. It usually occupies colder water habitats than the mottled sculpin.

### Fishes Not Found in Torch Lake

Those species found in nearby bodies of water and missing from the Torch Lake community are interesting, too.

Fishes native to Grand Traverse Bay but not found in Torch Lake are bloater chub (and other chubs now extinct in Lake Michigan), round whitefish, longnose sucker, spottail shiner, ninespine stickleback and spoonhead sculpin.

Exotic species in Lake Michigan but not found in Torch Lake are sea lamprey, alewife, carp, coho, chinook and Atlantic salmon.

Fishes found in other parts of the Chain of Lakes but not found in Torch Lake are channel catfish; black, brown and yellow bullhead; longear sunfish; golden shiner; blackchin shiner; banded killifish; brook silversides and walleye.

There are several possible reasons for these differences in fish distribution. 1) Fishes arriving in Lake Michigan from the south after the Nipissing barrier beach was formed were denied easy access to Torch Lake; 2) Species once present in Torch Lake are no longer found there; 3) The cold water habitat predominant in Torch Lake is not favorable to warm water species found elsewhere in the Chain of Lakes; 4) The Elk Rapids dam has prevented late arriving exotic species (sea lamprey, carp, coho, chinook salmon, alewife) access to the Chain of Lakes.

#### Summary

Torch Lake contains 39 species of fish. Of these, three are exotic species, which were brought to the region by man.

The dominant predator and most important sport fish is the lake trout. A healthy population exists in the lake but the importance of lake trout stocking is not clear. The age structure of future lake trout populations should be studied to determine if recent years with no plantings have affected the population. Lake herring, which also occur in abundance, are the principle food of the lake trout.

Whitefish and yellow perch are the next most important game fishes. There is a small fishery for pan fish, smallmouth bass, pike, and rainbow trout.

The limiting factor to populations of forage species (minnows and young of other species) seem to be the lack of protected, shallow water for spawning and shelter. Local improvements may be possible with the installation of artificial fish shelters or spawning slabs (for minnows), but the overall impact on lake-wide fishing might be negligible.

Torch Lake is a deep, cold, oligotrophic lake, and by its nature will not produce as many pounds of fish per acre as other warmer, shallower lakes. The very good water quality (clarity) and the aesthetic beauty of Torch Lake help compensate for the lack of piscine productivity.

Table 1.- Torch Lake Physical Data

		Source
Surface Area	18,770 acres	1
Shoreline Length	40 miles	2
	41.3 miles	3
Length	18.0 miles	3
Width	2.4 miles	3
Depth, Maximum	285 feet	2
	"	4
	"	3
	Average	111 feet
Percent less than 15ft.	10%	5
Percent 15 to 30 ft.	15%	5
Percent deeper than 30ft.	75%	5
Drainage Area	278 sq. miles	4
Surface Area	589-590 ft. above sea level	2,6

Sources:

1. Laarman 1976
2. Mapping Unlimited 1967
3. Miller 1966
4. Miller and Thompson 1970
5. Taube 1960
6. U. S. Geological Survey, 1957

Table 2. - Torch Lake Fish Fauna

The following species have been reported from Torch Lake (including first order tributaries) in the past 100 years.

SPECIES NAME

American brook lamprey, Lampetra appendix

Lake Sturgeon, Acipenser fulvescens

Longnose gar, Lepisosteus osseus

Brook trout, Salvelinus fontinalis

Lake trout, Salvelinus namaycush

Brown trout, Salmo trutta\*

Atlantic salmon, Salmo salar\*#

Rainbow/steelhead trout, Salmo gairdneri\*

Kokanee salmon, Onchorynchus nerka\*#

Lake whitefish, Coregonus clupeaformis

Lake herring/cisco, Coregonus artedii

Rainbow smelt, Osmerus mordax\*

Central mudminnow, Umbra limi

N. redbelly dace, Phoxinus eos

Blacknose dace, Rhinichthys atratulus

Longnose dace, Rhinichthys cataractae

Bluntnose minnow, Pimephales notatus

Creek chub, Semotilus atromaculatus

Common shiner, Notropis cornutus

Rosyface shiner, Notropis rubellus

Emerald shiner, Notropis atherinoides

Sand shiner, Notropis stramineus p. 11

# No longer present in Torch Lake. See text.

\* Exotic species.

Table 2. - Continued

White sucker, Catostomus commersoni

Northern pike, Esox lucius

Muskellunge, Esox masquinongy

Burbot, Lota lota

Brook stickleback, Culaea inconstans

Trout-perch, Percopsis omiscomaycus

Bluegill, Lepomis macrochirus

Pumpkinseed, Lepomis gibbosus

Black crappie, Pomoxis nigromaculatus

Rock bass, Ambloplites rupestris

Smallmouth bass, Micropterus dolomieu

Largemouth bass, Micropterus salmoides

Yellow perch, Perca flavescens

Walleye, Stizostedion vitreum#

Logperch, Percina caprodes

Johnny darter, Etheostoma nigrum

Iowa darter, Etheostoma exile

Deepwater sculpin, Myoxocephalus quadricornus

Slimy sculpin, Cottus cornatus

Mottled sculpin, Cottus bairdi

Table 3.- Catch per unit effort (CPE) as number of lake trout caught per 1000 feet of gillnet.

Location:	Torch Lake	Torch L.	Torch L.	Torch L.	Torch L.
Date:	1931	1958	1970	1972	1975
CPE:	1.5	0.7	20.0	8.1	20.3

Location:	N. Lk. Mich.	Elk L.	Elk L.	Elk L.
Date:	1975	1956	1971	1975
CPE:	17.6	0.2	0.4	2.23

Source: Alward 1976  
Laarman 1976

Table 4.- Torch Lake lake trout age and growth.

	Fall 1964 Spring 1965 (Miller 1966)	Oct. 1972 (IFR 1972)	Oct. 1975 (Alward 1976)	1981-1983 Grand Traverse B. (Ebener 1984)
<u>Age Group</u>	<u>Length</u>			
II	12.5"	12.1"	10.7"	-
III	-	15.9	15.3	19.7"
IV	11.0	19.9	18.1	23.1
V	18.8	25.5	22.8	25.0
VI	24.0	27.0	25.0	26.0
VII	25.2	31.7	29.2	27.6
VIII	27.8	-	32.6	28.1
IX	29.0	-	-	29.4
X	30.5	-	-	31.2
XI	30.2	-	-	31.5

Table 5.- Fish Planted in Torch Lake.

Key: E=Eggs, Fr=Fry, F=Fingerlings, FF=Fall Fingerlings,  
Y=Yearlings, SL=Sublegal, L=Legal size, \_"=Length  
in inches, \_mo.=age in months.

1882-1888	Atlantic salmon-88,100 Fr
1887-1892	Lake whitefish-6,250,000 Fr
1895-1914	Lake trout-68,000 Fr
1907	Walleye-240,000 Fr
1911-1913	Smallmouth bass-10,00 Fr & F
1912	Rainbow smelt-6,000,000 E
1925	Lake trout-40,000 Fr
1926	Lake trout-120,000 Fr
1927	Lake trout-120,000 Fr Whitefish-1,375,000 Fr
1928	Whitefish-750,000 Fr
1933	Lake trout-5,000-8 mo. Rainbow trout-1,930 adult, 5,000 7 mo. Perch-75,000 6 mo.
1934	Lake trout-30,000-2mo., 7,000-6 mo. Rainbow trout 2,000 adult, 20,000-4 mo. Walleye-1,200,000 Fr Bluegill-15,000-4 mo.
1935	Lake trout-80,000-5 mo. Walleye-510,000 Fr Perch-775,000-6 mo.
1936	Lake trout-24,000-3mo., 25,000-4 mo. Walleye-1,410,000 Fr
1937	Lake trout-56,000-5 mo. Walleye-925,000 Fr
1938	Walleye-1,000,000 Fr Perch-72,000-6 mo.
1939	Lake trout-50,000-4 mo. Walleye-500,000 Fr Perch-56,000-6 mo.
1940	Lake trout-80,000-4 mo.
1941	Lake trout-637 adult, 99,800-7 mo. Rainbow trout-17,100-7mo.
1942	Lake trout-75,000-5 mo.
1943	Lake trout-40,000-3 mo.
1944	Lake trout-25,000-7 mo.
1945	Lake trout-25,000-5 mo.
1946	Lake trout-25,000-6 mo.
1947	Lake trout-25,000 Fr
1950	Lake trout-5,500-5"
1953	Lake trout-10,000-7"
1955	Lake trout-20,000 L
1956	Lake trout-9,140 L Rainbow trout-10,000 SL

Table 5.-Continued

1957	Lake trout-12,426 SL
1958	Lake trout-15,000 L
1959	Lake trout-5,000 L
1961	Lake trout-7,500 L
1962	Lake trout-8,284 SL, 750 L
1963	Lake trout-5,593 L
1964	Lake trout-5,000 L
1965	Lake trout-5,000 SL
	Kokanee salmon-1,322,920 F
1966	Kokanee salmon-916,000 F
1967	Lake trout-13,199 F
1969	Lake trout-50,000 Y
1970	Lake trout-70,000 Y
1971	Lake trout-75,000 Y
	Rainbow trout-82,616 FF
1972	Lake trout-115,000 Y
1973	Lake trout-29,500 Y
1974	Lake trout-54,891 Y, 200,000 F
1975	Lake trout-110,000 Y
1976	Lake trout-60,000 Y
1977	Lake trout-80,900 Y
1978	Lake trout-50,000 Y
1979	Lake trout-70,000 Y
1980	Lake trout-50,000 Y
1981	Lake trout-50,000 Y
1982	Lake trout-70,000 Y

No fish planted in years not shown.

Table 6.-Age and Growth of Torch Lake Whitefish.

<u>Age Group</u>	<u>Length, inches:</u>		
	<u>Fall 1964, Spring 1965</u>	<u>Oct. 1972</u>	<u>Oct. 1975</u>
I	7.0	-	-
II	-	11.4	-
III	-	12.5	-
IV	11.0	14.4	14.8
V	11.9	15.8	15.5
VI	17.0	17.5	16.6
VII	-	-	18.2
VIII	22.5	-	18.5
IX	19.5	-	20.4
X	21.5	-	21.6
XI	21.5	-	23.3
XII	22.9	-	-

Reference: Miller, 1966

IFR, 1972

Alward, 1975

Modified from Alward, 1976

Table 7.-Summary of Creel Census, 1935-1964.

<u>Species</u>	<u>Percent of total catch</u>		
	<u>1935-1945</u>	<u>1947-1952</u>	<u>1956-1964</u>
Lake trout	74.4	27.8	39.1
Yellow perch	-	51.5	12.7
Lake whitefish	8.3	4.1	41.1
Rock bass	7.5	13.4	2.8
Smallmouth bass	4.5	-	1.1
Northern pike	0.8	2.1	-
Muskellunge	1.5	-	-
Rainbow trout	0.8	-	0.3
Brook trout	1.5	-	-
Cisco	-	-	2.3
Crappie	-	1.0	-
White sucker	0.8	-	-

Modified from: Laarman, 1976

Table 8.-Age and growth of Torch Lake cisco.

<u>Age Group</u>	<u>Length, inches:</u>					
	<u>July-Aug.</u> <u>1958</u>	<u>April</u> <u>1966</u>	<u>1968-</u> <u>1970</u>	<u>Nov.</u> <u>1970</u>	<u>Oct.</u> <u>1972</u>	<u>Oct.</u> <u>1975</u>
0	-	-	5.1	-	-	4.6
I	7.3	-	7.1	7.5	-	7.1
II	10.5	-	9.6	8.2	-	9.1
III	10.6	-	10.2	-	10.6	10.3
IV	11.8	10.2	10.9	-	11.7	12.2
V	12.2	11.0	12.3	11.8	12.7	13.5
VI	12.8	13.4	12.8	12.9	13.8	14.0
VII	13.8	-	13.2	-	14.2	15.1
VIII	-	-	13.1	-	-	15.2
IX	-	-	14.0	-	-	-
X	-	-	13.6	-	-	-

Reference: Alward 1976, Sanderson 1970

Table 9.-Catch per unit effort of Torch Lake fishes.

<u>Species</u>	Catch per 1000 feet of gillnet:				
	<u>1931</u>	<u>1958</u>	<u>1970</u>	<u>1972</u>	<u>1975</u>
Lake trout	1.5	0.7	20.0	8.1	8.1
Brn. trout	-	0.2	48.0	0.3	0.1
Rainbow t.	-	0.2	18.0	0.2	-
Whitefish	-	0.8	-	10.0	16.4
Perch	14.3	16.3	4.0	36.3	3.2
Rock bass	0.3	3.1	-	0.6	1.0
Smallmouth	-	0.3	-	-	0.1
No. pike	-	0.1	-	-	-
Burbot	0.6	1.0	-	1.3	0.7
Cisco	6.4	6.0	14.0	11.0	18.7
W. sucker	0.6	4.4	2.0	2.4	0.7
Gar	-	-	2.0	-	-

Modified from: Laarman 1976, Alward 1976

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