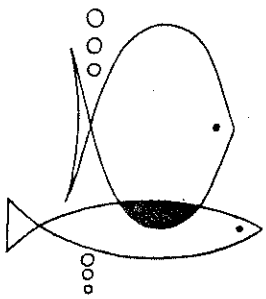
GAME FISH AND FISHING

IN ALGONQUIN PROVINCIAL PARK

AND THE PROJECTS UNDERTAKEN BY THE RESEARCH BRANCH TO PERPETUATE ANGLING



PARKS BRANCH
1955, revised 1958, 1965

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. RENE BRUNELLE
MINISTER

G.H.U. BAYLY
DEPUTY MINISTER

Since 1936 fisheries research and management have been going on in Algonquin Park. No doubt many of you who have read this will have had contact with some phase of this fisheries program. Perhaps this contact has been through creel census interviews, alternate closure of lakes, or tagged fish recoveries.

An overall picture of the different phases of the fisheries program in the Park is represented in the following pages, and shows how each phase aims at the final goal of all of our fisheries work, the wise use of our resources.

There are two important reasons for investigating fisheries problems in the Park. The first aims to solve purely local problems. In addition, the information gained through research and the principles tested in management may be applicable elsewhere in the Province. In fact, Algonquin Park has been selected as an outdoor laboratory for research and a testing ground for management.

You, the angler, have played an important part in this work and the Department of Lands and Forests gratefully acknowledges your co-operation, particularly in the creel census. We sincerely hope our combined efforts will be productive.

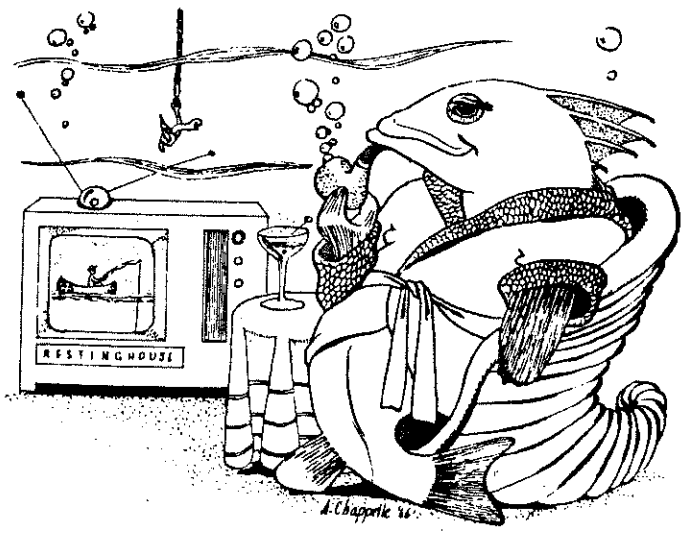
Minister of Lands and Forests.

GAME FISH AND FISHING
IN ALGONQUIN PROVINCIAL PARK

THE FISH AT HOME

It is easy to make the mistake of thinking that a fish leads an idyllic life – swimming about in a mass of water, moving when and where it pleases, unaffected by the weather and most of the other factors that complicate life for land animals. The truth is that an aquatic environment is a very complex one, directly influenced by such things as temperature, light, depth, oxygen supply, currents, food, ice, wind and protective cover. Predation and competition for living space are just as much of a living problem as in a dry-land environment, with the added disadvantage that space is strictly limited to the size of the body of water involved because the fish cannot get away.

Some of the effects of water on the surrounding land are evident to anyone, but the physical, chemical and biological effects of the land on the water, although less evident, are just as importtant to the fish and other aquatic organisms. The character of the water is largely determined by the type of country in which it lies, that is whether the bottom and shores are rocky, sandy, or marshy, what kind of rock, how quickly the area is drained, and so on. By examining the water it is possible to say what kinds of fish would thrive there, or by examining the fish, what kind of water they had lived in. Some species of minnows frequent warm, weedy backwaters and others such as the trout live in the clear, cold barren waters of the depths.

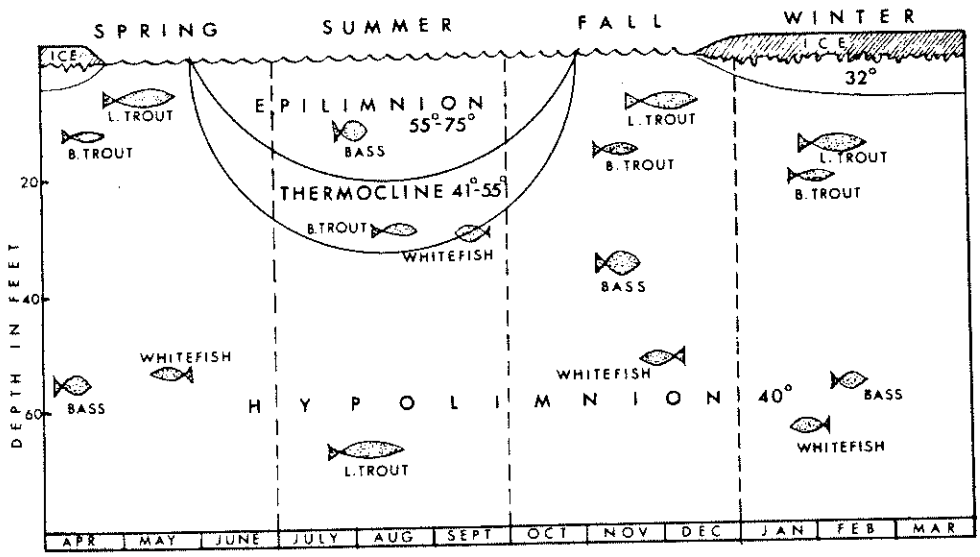


The changing seasons of our climate, with their wide range of temperatures, bring about profound changes in the lakes, which influence the distribution and habits of fish. In the spring lake waters are well stirred, uniformly cold, and well charged with oxygen. It is during this period of "Spring overturn" when the water is well mixed, that insects hatch, food is abundant, fish move freely in to shallow water, and trout fishing is at its best. But as the days warm in June the surface water warms and the trout begin to move into deeper waters. The surface waters continue to warm throughout June, July and August and in late June an interesting phenomenon called thermal stratification has taken place. At the top is a layer of warm water called the epilimnion, which is well mixed with nutrients and oxygen, and which, by midsummer will be 20 to 30 feet deep. Below this is another layer, known as the thermocline, in which the temperature changes very quickly, as much as a degree per foot of depth. The thermocline may be fairly narrow, particularly in late summer when the warm water is at its greatest depth. Below the thermocline is a uniformly cold layer, called the hypolimnion, which is virtually sealed off from the surface by the thermocline. It receives no additions to its food or oxygen during thermal stratification and decay at the bottom can deplete the oxygen supply to a level below that required for trout survival.

The thermal layers mix very little and, in fact, will rock back and forth rather than mix after heavy winds. This action is known as a seiche.

Fish are profoundly affected by the changes in water temperature. Warm water fishes, including the minnows, still frequent the shallow waters. Others, like the perch and brook trout, which may require somewhat cooler water, move into the thermocline. Fish, such as the lake trout, which prefer very cold water move down to the hypolimnion, where temperatures are suitable but decreasing oxygen in late summer may pose a problem. If the lake is shallow, the hypolimnion may become very small or disappear altogether, removing the only location where these cold water fish can exist.

Cooler weather and high winds in



Changes in water temperature and its effect upon fish throughout the year.

late September cool the surface waters and eventually cause the stratification to mix and break up. The lake once more has the same temperature throughout (39-43 degrees F.) and oxygen is plentiful at all depths. This fall overturn allows the cold water fish to again move into shallower waters, where they can feed and in some instances spawn. Surface waters gradually cool to 32 degrees in late November and most lakes are covered with ice by mid-December.

During the winter the water, with the exception of the layer close to the ice, is uniformly cold and the ice cover seals off the lake from winds and fresh oxygen supplies. In winter, particularly if there is a long period of ice cover, the deeper waters may again become low in oxygen. Eventually the warm sunny days of late April gradually melt the ice and by the first week in May the whole cycle begins anew.

GENERAL FISH DISTRIBUTION

The last glacier, which was almost 5,000 feet thick over the Park region, melted away about 8,000 years ago, leaving waterways similar to those we now know, but without fish. As the ice melted, however, the cold meltwaters were invaded by fish living in waters around the glacier. This is the reason why, today, cold water fish, such as lake and brook trout, ling, and whitefish are found throughout the Park. But examination of the checklist and distribution list of Algonquin Park fishes at the end of this bulletin will show many fish missing that apparently should be here. For several years now data have been collected concerning the distribution of fish in Algonquin Park.

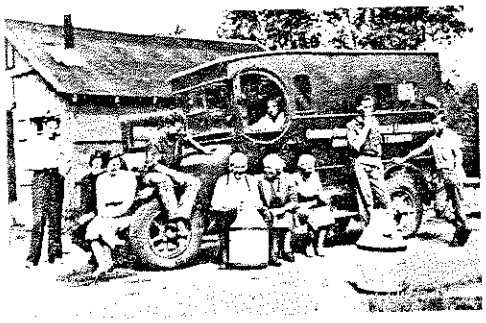
The absence of warm water species, such as pike, muskellunge, walleye and bass, in the headwater drainages is one important feature of the park fishery. They are found in the lower portions of the Petawawa and Bonnechere watersheds and they have been gradually extending their range further along these watersheds into the Park. Bass were introduced into many of the Park lakes as early as 1899, especially in many of the lakes close to the old Grand Trunk Railway line through the southern portion of the Park.

With this general background of living conditions in a lake and general fish distribution let us now outline what has been learned about the fish and fisheries in Algonquin Park.

THE CREEL CENSUS

TO OBTAIN THE FACTS

When a fisheries programme was initiated in Algonquin Park in 1936, there was little or no information about the fisheries of the area. The first task was fact finding. One way of doing this was through a creel census; the collection of information from the anglers' catches. By this means data were obtained on the kinds of fish present in the various lakes, their ease of capture, and their size.



Fisheries Research — in Algonquin Park since 1936.

LAKE TROUT

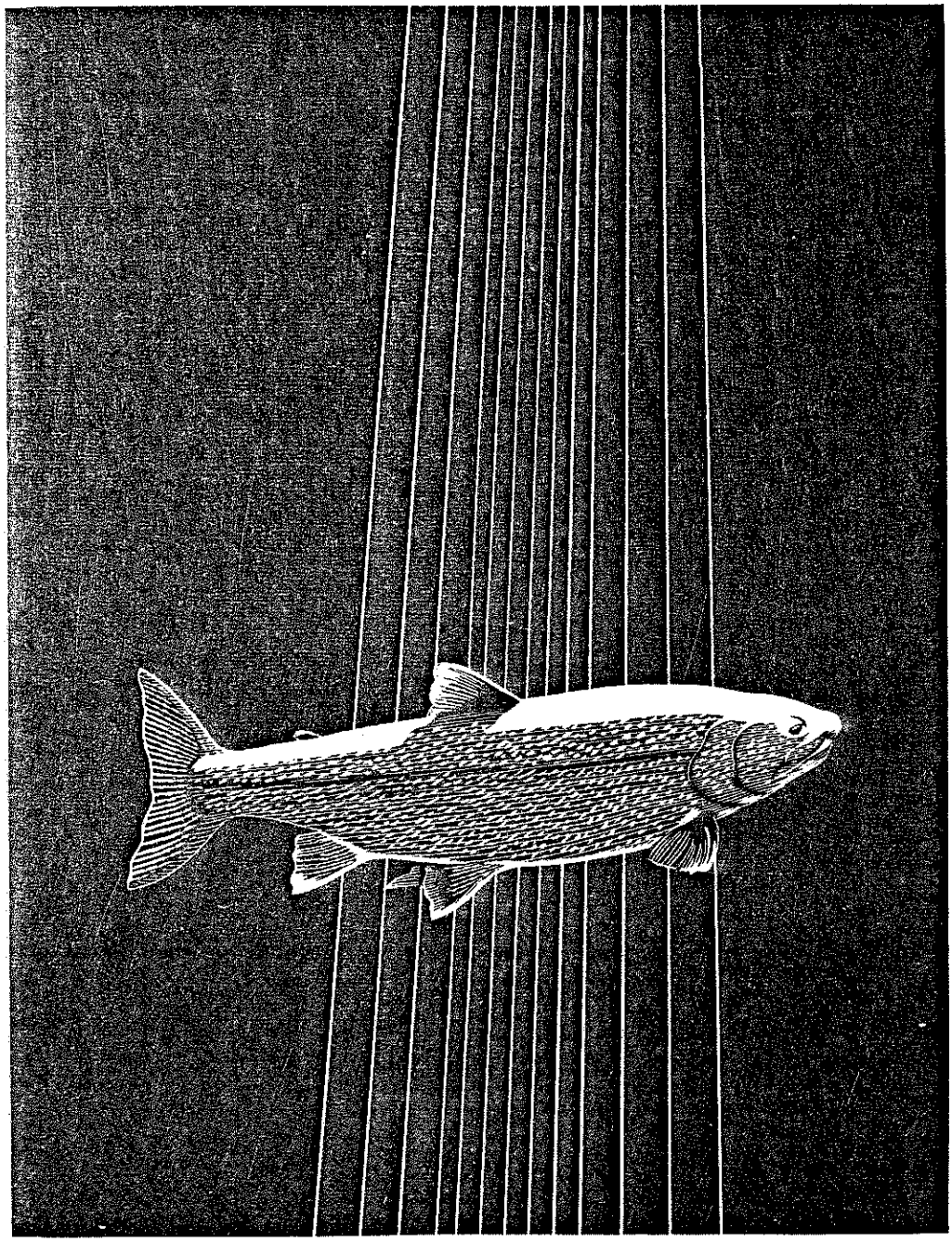
What information did the creel census give in Algonquin Park? It showed that the lake trout is the commonest species, occurring in all of the larger lakes and in some lakes as small as 50 acres. The quality of angling varies from those lakes where the angler might expect to catch three or four trout per hour to those where he might consider himself fortunate to take one every two hours. In Lake Opeongo, the largest (23 square miles) and most heavily fished lake in the Park, approximately 1000 lake trout are usually taken every year. As an indication of the natural sparsity of lake trout population, it might be pointed out that this represents less than one pound of fish per acre of lake, a normal figure for many Algonquin Lakes on a sustained basis.

Catch records also showed that the size composition of the lake trout catches varied considerably in different lakes. In lakes such as Canisbay, Louisa, Source, and Delano, the average length of each year's catch is 14 to 15 inches, and the average weight, one and one-half to two pounds. The most fish are caught in those lakes where the average length of the catch is 16 inches and the trout mature at a small size.

BROOK TROUT

Brook or Speckled trout occur in about half as many lakes in the Park as do lake trout. They are confined largely to lakes, as summer temperatures become too high in most streams. Like the lake trout, in summer they migrate to deeper water, where they are more difficult to catch. Most of the speckled trout fishing is in May and June. Dickson, Lavieille, Redrock, Proulx, Big Crow, Welcome, Harry and Stringer Lakes are some of the better brook trout lakes on the south side of Algonquin Park. The total catch in Dickson Lake may reach 800 in some years, while 350 to 650 brook trout have been taken from Redrock Lake each year it has been open since 1936. Fishing quality varies between one to two trout per hour of fishing for many of these lakes. The average length for the season's catch being 12 to 15 inches, the size range of these fish in lakes exceeds that of most stream trout.

The more accessible of the brook trout lakes are fished intensively. Tagging experiments have indicated that 75 per cent of the mature stock may be removed from Redrock Lake in a year. As the season advances in these lakes

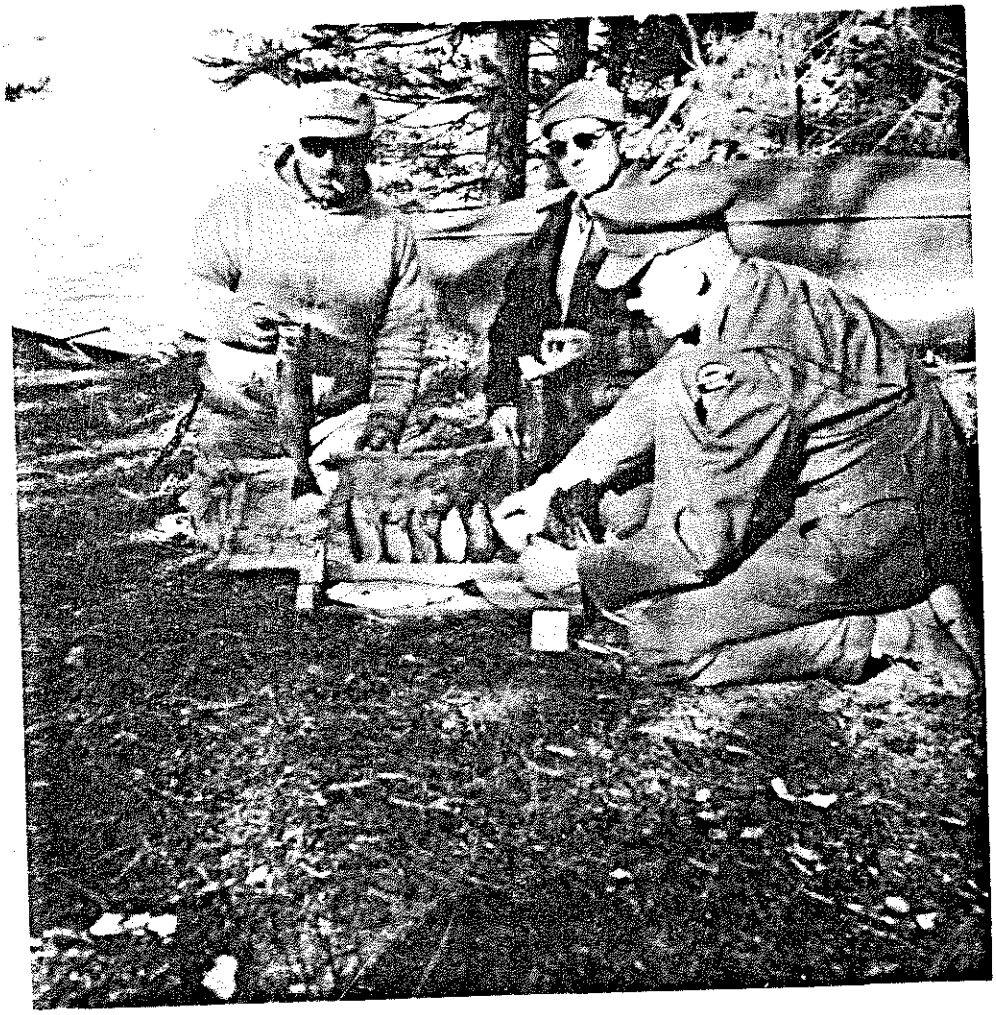


LAKE TROUT

there is a steady decline in the quality of the fishing and the size of the fish caught. In Redrock Lake in 1953 three-quarters of the total catch of 535 brook trout were taken in the first nine days of the season. Not only does the early worm get the fish; it also gets the biggest.

BASS

The Algonquin Park lakes are typically trout waters, that is, deep and cold. Bass found there are largely the result of introductions. At present, there are about 20 lakes in the southern half of the Park which support bass fisheries. The most important of these is Lake Opeongo, where from 200 to 1500 bass have been taken each year. The quality of fishing in this lake has been indicated by one bass for every three hours' fishing time.



Measuring and sampling an angler's catch.

BIOLOGICAL DATA

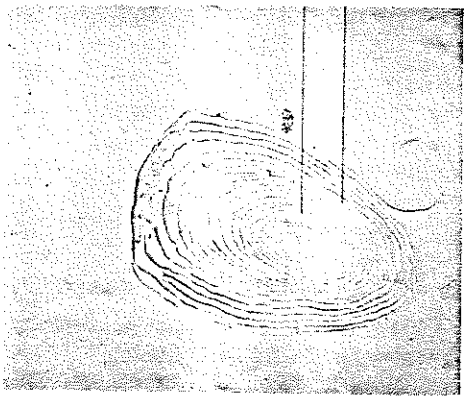
TO INTERPRET THE FACTS

The creel census returns provided some of the 'whats' about the Algonquin Park fisheries, but few of the 'whys.' When catch statistics were being obtained, other information of a more biological nature was also collected. Such data as weights, stomach contents, the scales and the state of the reproductive organs, supplemented the catch records and provided a more complete picture of the fisheries.

FISH CAN BE AGED

The microscopic examination of a scale reveals concentric rings which are formed as the fish grows. Superficially, the pattern resembles a finger print. Fish grow at different rates in summer and winter, and this is apparent in the scale pattern. As will be seen, such information is particularly valuable to fishery biologists.

Age determinations, for example, provide information on rate of growth. Lake trout grow at different rates in different lakes in the Park, regardless of the size of the lake or its location. In Lake Louisa a seven-year-old lake trout is 14 to 15 inches long, while in Redrock, a lake half the size, a seven-year-old lake trout is 17 to 18 inches long. Similar and even greater contrasts are evident between other Algonquin Park lakes. Here, then, is an explanation of the great variation in the size of lake trout in different lakes as seen in the creel census records. The unhappy angler complaining about all the young fish in his catch is, in reality, catching slow-growing adults.

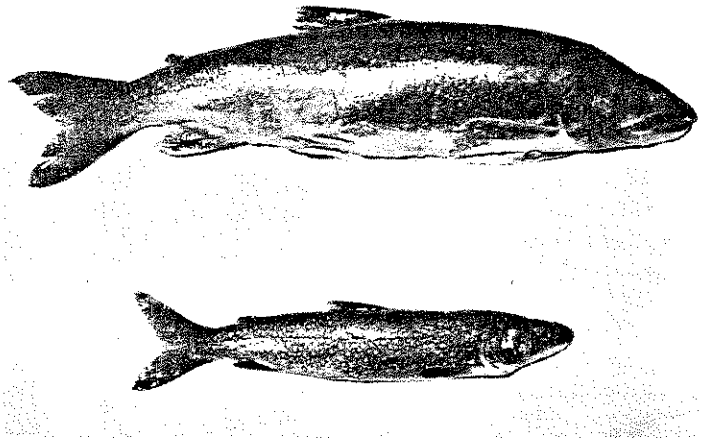


Microphoto of 3 year old brook trout scale. Black lines point to broken circles that indicate one year of growth.

FOOD AFFECTS GROWTH

This, however, is still not the root of the matter. Why the difference in growth? To answer this question field parties were set up on two lakes where typically fast growing and slow growing trout occurred. As a result of this investigation it was found that there was an intimate relationship between the depth distribution of the lake trout, their feeding habits and growth. In Lake Louisa, where the trout grow slowly, the lake trout in summer have no available fish food in deep water and are forced to eat microscopic plant and animal organisms called plankton. In Redrock Lake, on the other hand, the lake trout could avail themselves of the perch population during the summer months. As a result there is a faster growth in Redrock Lake and larger fish in the angler's creel.

It may be of interest that numbers of these slow-growing plankton feeders have been tagged and transferred to a lake where there is an abundance of fish food and they have responded to the transfer by marked increases in



These fish, caught in different lakes are seven years old. The smaller one had few forage fish in its diet.

their growth and weight.

Lake trout are generally first caught at five years of age although the seven and eight year old fish usually make up the major part of the catch. The study of the reproductive organs shows that lake trout first mature at five years of age. Due to the difference in growth rates this may be between 10 and 16 inches in length. From this, the difficulty of imposing legal lengths to protect immature stock can be appreciated. The heavy gear used in the summer fishery does, however, regulate the size of lake trout to some extent. A winter fishery, using different methods, takes very much smaller fish.

YEAR CLASSES

Another important piece of information gained from age studies is the age composition of the season's catch. Different age groups make up this catch. The fish that are of one age are called a year class and are the product of one year's spawning. An eight-year-old fish, for example in the 1953 catch was spawned in 1944 and belongs to the 1944 year class.

That there are great variations in the strength of year classes was suspected from the fluctuations in angling quality, even before age studies had been undertaken. Estimates of the size of these year classes have been made by adding up the number of fish in each year class in the total catch each year. If this is done every year, from the time the fish are first large enough to catch until they disappear from the fishery, the total contribution of a year class can be estimated. In Happy Isle and Merchants Lakes for example, year classes have varied between 60 and 600 fish. Obviously fishing is better when the strong year classes enter the fishery. In Lake Opeongo, where the most detailed analysis of a lake trout fishery has been made the 1933-36 year class contributions have been between 1,100 and 1,400 fish each. There is no evidence of very strong year classes in Opeongo as in the smaller lakes and the angling quality has not undergone such marked fluctuations in recent times.

BROOK TROUT GROWTH

Similar data have been collected for brook trout and there is now a considerably greater fund of knowledge of this species as it occurs in lakes. Growth studies have shown that brook trout in lakes grow much more rapidly than they do in streams. In Dickson Lake, for example, a two year old fish

is between 9 and 12 inches, a three year old a little over 14, and a four year old about 16 inches long. Brook trout rarely reach six years of age in Algonquin or other Ontario waters.

In most of the Park lakes the brook trout first enter the fishery at two years of age and two and three year old fish usually make up the bulk of the catch. They first mature at three years of age at a length of about 13 inches.

BROOK TROUT YEAR CLASSES

Similar data to those on lake trout concerning contribution of year classes to the fishery were calculated for brook trout. The data, thus far, on the lakes under study indicate much the same story. The year classes in Redrock Lake from 1944 through 1947 showed the following fluctuations in strength; 350, 569, 185 and 224 fish respectively.

BASS YEAR CLASSES

Cache and Opeongo Lakes have provided the most continuous and complete data on bass. The former has been intensively fished for many years and the bass are heavily exploited. The quality of the fishing in this lake has therefore, been closely related to the strength of the entering year class. In 1946 the year class scheduled to enter the fishery was a failure and the bass fishery in Cache Lake collapsed completely. In Lake Opeongo on the other hand, fishing pressure, although increasing, has not been as great and many bass survive for several years after reaching 10 inches in length. This has meant a larger average size and more stable fishery since it is at least in part dependent on the strength of several rather than one year class. In 1955 a very strong year class was produced which dominated the fishery from 1960 through 1961 and in 1962 made up 20% of the fish taken from Lake Opeongo.

BASS PRODUCTION

To shed light on the reasons for the generally low production of bass in the lakes of the Park area an intensive study of the population in Lake Opeongo was begun in 1955.

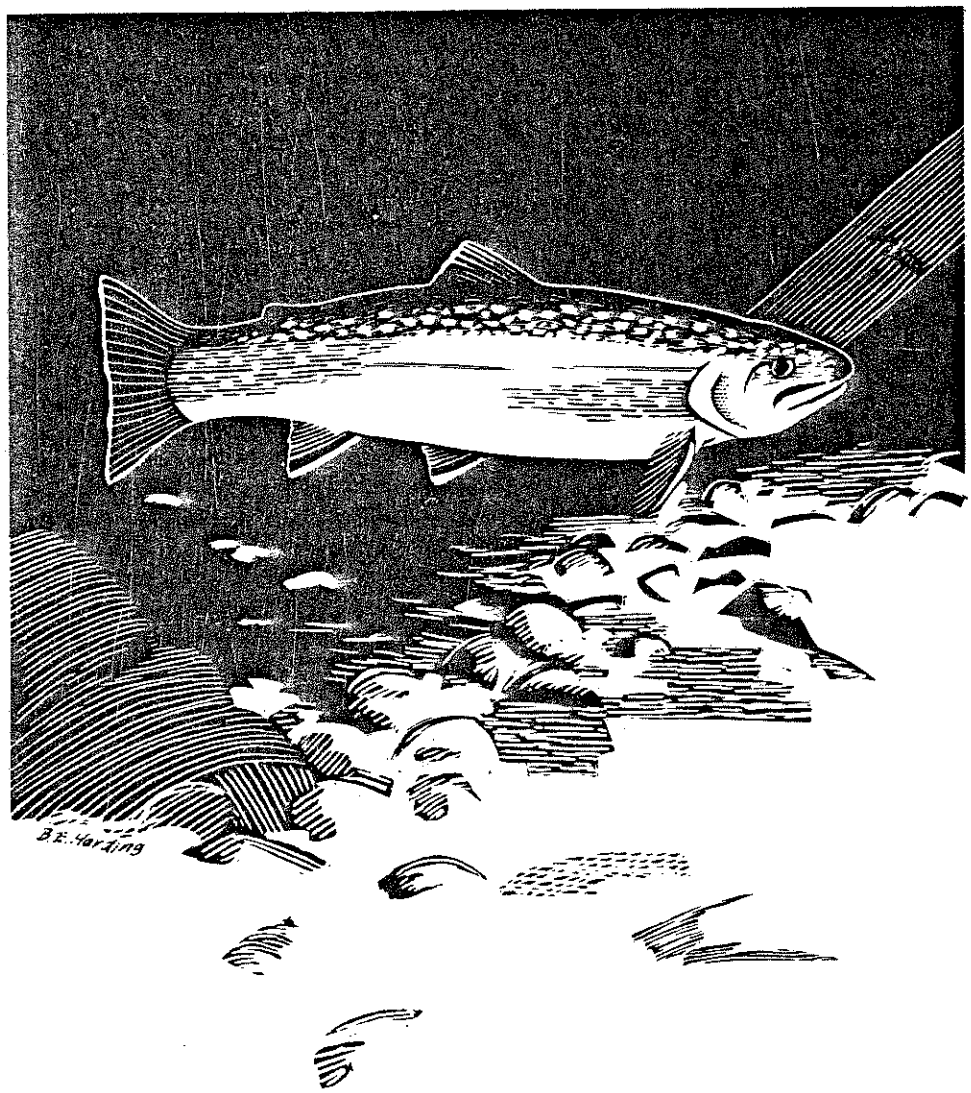
An analysis of the creel census data showed that there is a strong correlation between year class strength, that is the number of fish produced from a year's spawning, and air temperatures in the summer of hatching. Present field investigations are attempting to learn how this temperature factor specifically operates in affecting year class strength. Under study are such things as the direct affect of temperature on the eggs and young bass, and indirect effects, such as the spread of fungus infection, desertion by the guarding male, and the effects of wind.

With knowledge of existing meteorological conditions it may be possible to make rough predictions of year class strength and the numbers of fish that will be available to the angler when the bass enter the fishery in three or four years' time.

Algonquin Park lakes approach the northern limit of the natural bass distribution and it is likely we should expect fluctuations in production due to the relatively low and variable summer temperatures.

SPAWNING HABITS

Research has been carried out on the life histories of the lake trout and speckled trout and there is now a knowledge of such things as the movements, depth distribution, feeding habits, growth, and reproduction of these two species. In recent years most of these studies have been mainly concemed with the reproduction and early life histories of the trouts. These may be the critical points in the life history of many fish and it may well be at this time that the success or failure of year classes and of the sports fisher-



BROOK TROUT

ies in Algonquin Park are decided.

Although information regarding the behaviour and habits of the trout at spawning time is of no immediate practical value, these activities are of interest to the fisherman and may be outlined briefly.

Both lake and brook trout are fall spawners, the former spawning in late October on exposed rocky shoals in one to eight feet of water. Most of the spawning activity is at night. The brook trout, on the other hand, spawn several weeks later on sand and gravel beds, one to four feet deep, and where there is usually spring seepage coming in from the bottom. They spawn in the daytime. These differences in the time and place of spawning of the lake and brook trout explain, in part at least, why the two species have never hybridized in nature. Both species, but particularly the brook trout, exhibit a definite courtship behaviour. One of the finest sights a fisherman can hope to see is hundreds of two and three pound, brightly coloured brook trout milling around on a spawning bed on a bright November day. The lake trout broadcast their eggs indiscriminately and these filter among the rocks, while the brook trout laboriously prepare nests or redds of gravel in which the eggs are deposited and subsequently buried. As an indication of the number of eggs involved, a two pound lake trout produces approximately 2,000 eggs, a four pounder 3,500 eggs and a ten pound fish 6,000 eggs. Eggs of both species slowly develop under the ice, the lake trout hatching in late February or March and those of the brook trout in February.

EGG SURVIVAL

Of more immediate practical value from the view-point of eventual management are such things as knowledge of the necessary conditions for successful spawning, predation on eggs and adults, and the egg survival during the long period of incubation.

An attempt is being made to estimate the number of male and female brook trout on the beds of Dickson Lake each year by periodic counts to determine if there is any relationship between size of spawning stock and year class strength.

Environmental conditions however may be the decisive factor in how many fish enter the fishery. Detailed studies of brook trout spawning beds in a number of lakes have shown that there is a variation in the seepage on the beds. Seepage water, being warmer than the lake water in winter, speeds up the development of eggs, but it is also low in oxygen and may retard their development. These variations in the amount of seepage from bed to bed and year to year on one bed may be important to egg survival.

In studying egg density and survival for both trout, various containers have been set out in the beds before spawning and lifted at various times during the incubation period. In one year about 70 per cent of the brook trout eggs taken from the cylinders buried in Dickson Lake were living at hatching time. As many as 276 lake trout eggs have been taken from a small water pail buried in a lake trout spawning bed. Survival of lake trout eggs in these pails averaged about 50 per cent. It may well be that the great fluctuations in year class success in the trout populations in many Algonquin Park lakes are determined in this incubation period.

MANAGEMENT

TO USE THE FACTS

In the foregoing pages has been briefly outlined some of what has been learned of the Algonquin Park fisheries. In the following pages there is an attempt to show what has been done with this information.

FISH PLANTING

Fish planting is the first thing that comes to mind when fishing has apparently deteriorated. In many cases it has been highly successful but as the following lines point out it has not been a panacea for all fishery problems. There is no doubt, however, that in Algonquin Park Lakes where the crop of fish, particularly lake trout, is limited, fish planting may serve a very useful purpose. Much research is attempting to find how best to use the hatchery product.

BROOK TROUT PLANTINGS

Hundreds of thousands of brook trout plantings were made in Algonquin Park lakes for many years with no apparent improvement in brook trout fishing in these lakes. There has been considerable success in recent years using the small lakes where no game fish previously existed for brook trout fisheries. In lakes where there is good creel census coverage the planted fish are marked by clipping a fin so that the success of the planting may be determined.

Present studies are aimed at making best use of the brook trout lakes and the hatchery fish by determining the size and number of fish to plant, how often and when to plant, and the value of different planting techniques. The poisoning of lakes to remove undesirable, competing species before planting is a part of this study. Brewer Lake on Hwy. 60 was one of the lakes chosen for the poison study. It was poisoned in 1962 to remove coarse and undesirable species, such as suckers and perch, that compete for food or nutrients and in some cases feed directly upon the young sport fishes.

Another experimental programme of stocking 6-8" yearling brook trout in a few easily accessible lakes near the campgrounds was instituted in 1961. It is hoped that this type of stocking can provide immediate fishing on a "put-and-take" basis for the campers, most of whom are not equipped with heavy tackle or are not able to travel very far. The stockings are purposely heavy, far beyond the normal capacity of the lakes, to maintain good fishing, even during the warm summer months.

LAKE TROUT PLANTINGS

Extensive lake trout plantings have also been made over the years, particularly in those more heavily fished lakes accessible by road.

Lake Opeongo, the most heavily fished lake, has received the most generous plantings. Tens of thousands of trout were planted there in the years between 1948 and 1959. Up to 1962 less than 25 of these hatchery fish have been reported caught in Lake Opeongo. Various planting techniques have been attempted to improve this survival rate. At present the importance of stock source is being considered. Evidence from Algonquin Park and other areas suggests water quality may be a factor. At present an experiment is being carried out wherein the survival of lake trout, collected as eggs from hard water and soft water lakes and raised in hard and soft water hatcheries, will be compared by planting these lots in Lake Opeongo as marked yearling fish.

BASS PLANTINGS

Two sources have also been used for plantings of bass, – young hatchery fish and adult fish transferred from another lake. It sometimes happens that, due to overcrowding or other unfavourable conditions in a lake, bass may grow very slowly. The transfer of adult bass from the crowded lake to another is a standard fisheries practice, thinning out the denser population and encouraging better growth in the one lake and replenishing the depleted lake. Provoking Lake is a case in point. In most Park lakes bass reach 10 inches in length at three or four years of age, but in Provoking Lake they do not reach this length until their fifth year.

In 1948 almost 500 bass were transferred from Provoking Lake to Lake of Two Rivers. Before transfer few 10 inch fish reached the angler's creel in Provoking Lake. In recent years, however, anglers have reported good catches of 10 to 12 inch bass in Provoking Lake. Similar transfers have been made to Cache, Whitefish and Rock Lakes from other sources.

Plantings of hatchery bass on an experimental basis were initiated in 1962 in several of the Park lakes. It is hoped that these plantings will help to determine whether hatchery fish contribute to the angler's creel in a lake that is already sustaining a bass population and whether such plantings will reinforce what normally would have been a poor year class. Gordon Lake, which is one of the lakes being utilized in this experiment, has been known to produce good catches of bass for many years.

TROUT HYBRIDS

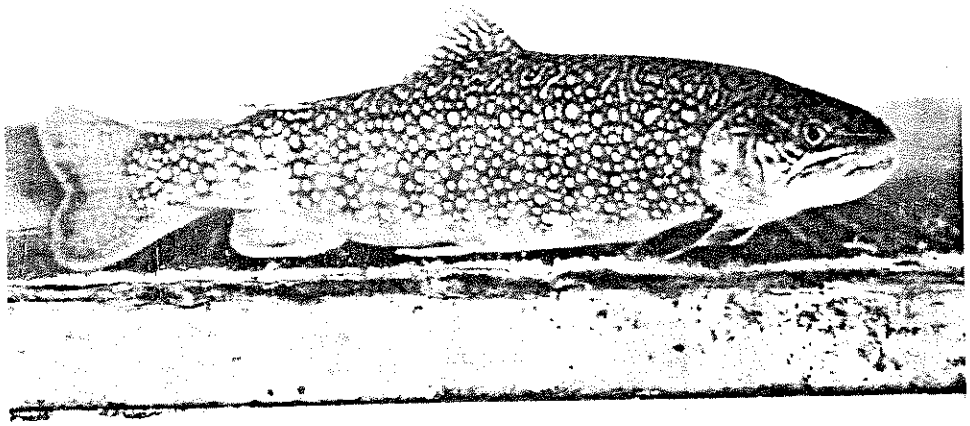
A different arrival on the fisheries scene has been the hybrid between lake trout and brook trout, called the splake or wendigo. Although one thinks of this fish as new it is really not. As far back as the 1890's hundreds of thousands of hybrids were planted in Pennsylvania. It was not until the 1940's, however, that there was a revival of interest in the hybrid trout.

Plantings of the hybrid trout have been made in a number of Algonquin Park lakes since 1954. Among these are Opeongo, Redrock, Sproule, Brewer, Jack, Scott, Found and Little Minnow Lakes. These introductions have been particularly successful in smaller deep lakes.

The average angler, unless quite observant, may not realize he has caught a hybrid. In appearance the hybrid has some of the characteristics of both parents in varying degrees. The spots are usually pinkish, although many fish have little or no colour. The tail is generally intermediate between the deeply forked tail of the lake trout and the square tail of the brook trout. For those of you who really wish to be certain whether your fish is a hybrid trout, brook trout or lake trout there is a way. Opening up the fish you will find worm-like projections on the front part of the intestine just behind the gut. These are called pyloric caeca and function in digestion. Lake trout have 110-190 of these, brook trout 20-50 and hybrid trout usually 70-80. A character such as this is much more valuable than external appearance.

An intensive study of their life history and habits has been made. Their depth distribution in lakes in the summer months is similar to that of the brook trout, that is, they live in the layer of water between the warm surface layer and the deep cold layer. In the smaller lakes this is generally in depths of 20 to 35 feet. Their food habits are similar to those of the brook trout as they feed extensively on invertebrate forms of crayfish and insects.

One of the most remarkable features of the hybrid is its rapid growth. Hybrids planted as yearlings (about four inches long) in May in Jack Lake had reached lengths of over 12 inches by



Splake (Wendigo) – A brook trout with a forked tail, or a lake trout with coloured spots?

October of the same year. They averaged one and one-half inches longer compared with brook trout of the same age that had been planted in the small lakes, four to five inches longer than native brook trout and five to ten inches longer than lake trout. Hybrid trout plantings in May of 1954 had reached lengths of over 20 inches and weights of nearly five pounds by the spring of 1958.

Hybrid trout spawn. In their reproduction they again show some of the characteristics of both the lake trout and brook trout. In the lake where most of the observations were made the hybrids spawned on rocky shoals much like the lake trout. In another lake they spawned among the brook trout on sandy-gravelly shoals. They, however, tended to pair and guard a nest site like the brook trout. Time of spawning overlapped both that of lake trout and brook trout, that is in late October and early November. Whereas lake trout are largely night-time spawners and brook trout day-time, individual hybrid trout were on the beds 24 hours a day. The spawning males exhibited colours rivalling those gaudy hues of the brook trout. Eggs successfully hatched by late April, after an incubation period of about six months. Young hybrid trout have been taken in at least one lake indicating a successful reproductive cycle.

The hybrid trout is an excellent game fish, although here, too, it reveals its split personality. Some fight much more like brook trout, while others fight deep and doggedly like lake trout. The hybrid has a very marked schooling behaviour and this profoundly affects your fishing luck. Anglers may be rewarded by large catches in a short period as a school moves into shallow water to feed and then fishing may be unsuccessful for several hours.

Because of the rapid growth of the trout hybrid and its excellent angling qualities, a programme of heavy stocking was undertaken in Lake-of-Two-

Rivers, Whitefish, Rock and Galeairy Lakes in 1962. These four lakes are important components of the fishery for campers, and in recent years they have not been too productive. It is hoped that the hybrid's rapid growth, coupled with the heavy stocking, will produce greater success for anglers.

It is clear, however, from plantings made in a wide range of lakes that hybrid trout do best in the deeper, cold, lake-trout lakes. They do not do as well as the brook trout in the shallower, boggy, more marginal waters of Algonquin Park.

Kamloops trout, a close relative of the rainbow, were introduced into Lake of Two Rivers in 1954 and, although catches have been few, appear to have become established.

Alpine char, a northern relative of the brook trout, were planted in Westward Lake in 1955 and some are caught each year.

As some of you are fly fishermen and Algonquin Park fish generally are not too responsive to this type of fishing, some experiments are going on with the grayling. This attractive arctic species is particularly adaptable to fly fishing and some 200 adults were introduced into Found Lake in 1960. This is a short-lived species and they are no longer there. It is hoped, however, to introduce more of these in Algonquin Park lakes in future.

FORAGE FISH

Plantings of a quite different nature and for different reasons have been made in Smoke and Opeongo Lakes. Cisco, or freshwater herring, were transferred from the St. Mary's River at Huntsville to these lakes as a food for lake trout. This species has become well established in Lake Opeongo and has become one of the most important items in the lake trout diet in this lake. Its introduction has resulted in faster growth and fatter trout.

LAKE CLOSURE PLAN

Before the angler can plan a fishing trip to an Algonquin Park lake his first consideration is whether that lake is open or not. Why are some lakes closed in certain years? In brief, this is the principle. If a lake is heavily fished year after year it is possible the spawning stock will become so decimated that the future of the fishery is endangered. It will be remembered that 75 per cent of the mature brook trout may be removed from Redrock Lake in some years. Now if, on the other hand, the lake is closed one year, all the fish just too small to catch in the open year can grow, reach maturity, and spawn in the closed year. In other words, by closing a lake in alternate years, a portion of each year class can spawn at least once. Perpetuity of the fishery seems assured. In theory, at least, this practice should be beneficial to brook trout which grow considerably faster than do lake trout.

On this basis, many of the lakes in the Park were closed for a year. The appraisal of the closure plan is not too encouraging as year class contributions from the closed years for lake trout do not appear to be any greater than those in the open. In other words, the number of spawning fish may not be the critical factor in year class strength and your fishing luck. Similarly with the brook trout, year class strength does not appear to be stronger in closed years than in open years.

The fact that the quality of the fishing in lakes such as Redrock and Proulx has remained at a high level in spite of the intensive fishing may indicate that the alternate closure is effective in an, as yet, unknown manner. Most certainly the closure has put considerably larger fish in the angler's creel than would have been the case if the lakes had been fished in consecutive years.

At present the closure plan is on a

LAKE CLOSURES – ALGONQUIN PARK 1965 to 1970

Lakes	1965	1966	1967	1968	1969	1970
Merchants	OP	OP	CL	OP	OP	CL
Happy Isle	OP	CL	OP	OP	CL	OP
Lavieille	CL	OP	OP	CL	OP	OP
Redrock	OP	CL	OP	OP	CL	OP
Dickson	OP	OP	CL	OP	OP	CL

two-year-open and a one-year-closed basis instead of the alternate open-closed system that has been in effect in the past. This is done to allow measurements of population size in two consecutive years which was not possible before. In other words it may be now possible to get some measure of fishing mortality and natural mortality in trout populations.

If death of fish due to causes other than angling is significant it may be in the long run harmful to a fishery to close it for a year. It is hoped the closure plan instituted in 1961 will provide this valuable information.

In certain years, for experimental purposes, some lakes are closed to fishing. These change occasionally, and anglers are advised to check each year for the latest lake closure information.

LAKE FERTILIZATION

Fundamentally, many of the lakes in our rocky north are relatively barren and unproductive. As such, their fish-carrying capacity must be limited. Is it possible to increase the productivity of these lakes and, in turn, the numbers of fish, by the addition of fertilizers? To investigate this problem on an experimental basis a series of test lakes in Algonquin Park were enriched by commercial fertilizer in the years 1947 to 1950.

Fertilization should work in the following manner. First, the addition of the basic nutrients should increase the production of the microscopic plants of algae, called phytoplankton, which in turn, is utilized by minute creatures called zooplankton. Striking proof of the effect of fertilization at these levels is the green blooms which cover the lake after fertilization. The increased plankton production, in turn, encourages increased production of bottom-living insect forms and small fish which use these minute organisms as food supply. In turn, larger forage fish, and finally, the game fish themselves react to the fertilization. It is apparent that the fertilizer is reaching the fish through this chain of events in some of the test lakes as there has been an increase in growth and numbers, particularly of the perch and suckers. Lake trout in one fertilized lake showed increased growth, although they appeared to be less abundant.

Unfortunately, there may be undesirable effects of fertilization. By encouraging the production of plant and animal organism in some of the lakes there has been a sharp decrease in the amount of oxygen in the deeper waters. This has persisted for at least 10 years in some of the lakes. The experiment indicated fertilization may be of limited value in lakes that stratify and some modification of the technique may be required.

ARTIFICIAL SPAWNING BEDS

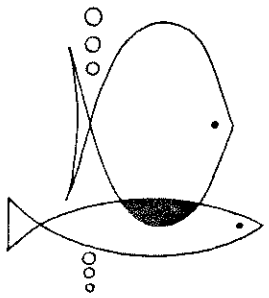
Artificial spawning beds for trout may be useful in certain situations. Many of the small brook trout lakes have to be regularly restocked as there are no spawning areas in them at present. Some experiments have been carried out with artificial beds for this species in these situations. One of the problems is introducing the spring seepage which brook trout seem to require.

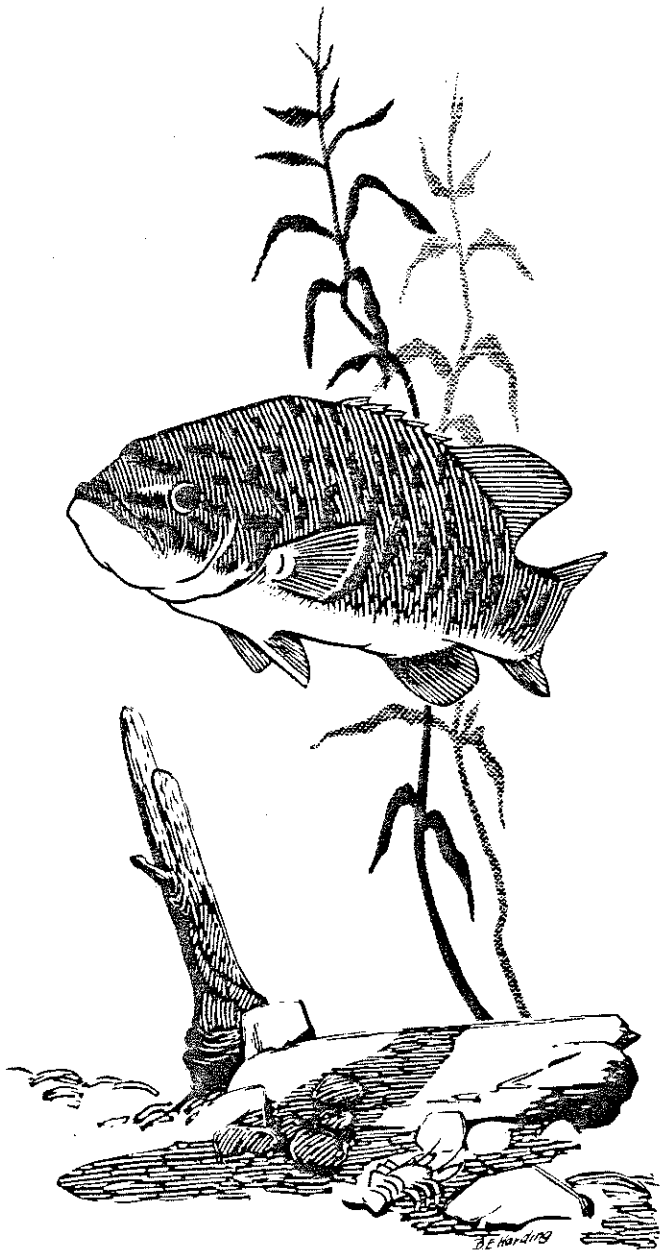
Some lake trout lakes in the headwaters of the Madawaska River drainage are subject to water level drawdowns in the fall for hydro purposes. This, if it occurs after spawning, may expose large areas of potential spawning beds or expose the eggs. Three large spawning areas were built in deeper waters in Shirley Lake in 1955 to offset the effect of drawdowns. These areas are being used by the lake trout for spawning and have increased the available spawning grounds many fold.

Because there was some delay by the lake trout in Shirley Lake, in using some of the new beds it was thought a homing behaviour in this species might be involved. As a result a study of lake trout homing behaviour at spawning time was undertaken in Lake Louisa. Large numbers of coloured tags were placed on the trout - a different colour for each spawning bed - at spawning time. Over a period of years it was found that of the 100 trout seen all but 5 were on the beds where they were tagged even though some of these beds were only a few hundred yards apart. This is strong evidence that lake trout return to the same beds every year.

WINTER FISHING

It has already been indicated that lake trout production is low in Algonquin Park lakes, and is at best, one-pound-per-acre on a continuing basis. A winter fishery is very effective, particularly in smaller lakes. The catch in some of these lakes in the days of winter fishing was several fold greater than that in summer. There is little doubt that in such lakes a summer and winter fishery together would seriously affect these trout populations. In addition, the winter fishery takes much smaller fish and heavily exploits immature stock. In two of the lakes studied, four to five times as many small fish (under 12 inches) were taken by the winter fishery as the summer. It is for the above reasons that it was felt advisable to close Algonquin Park lakes to winter fishing.



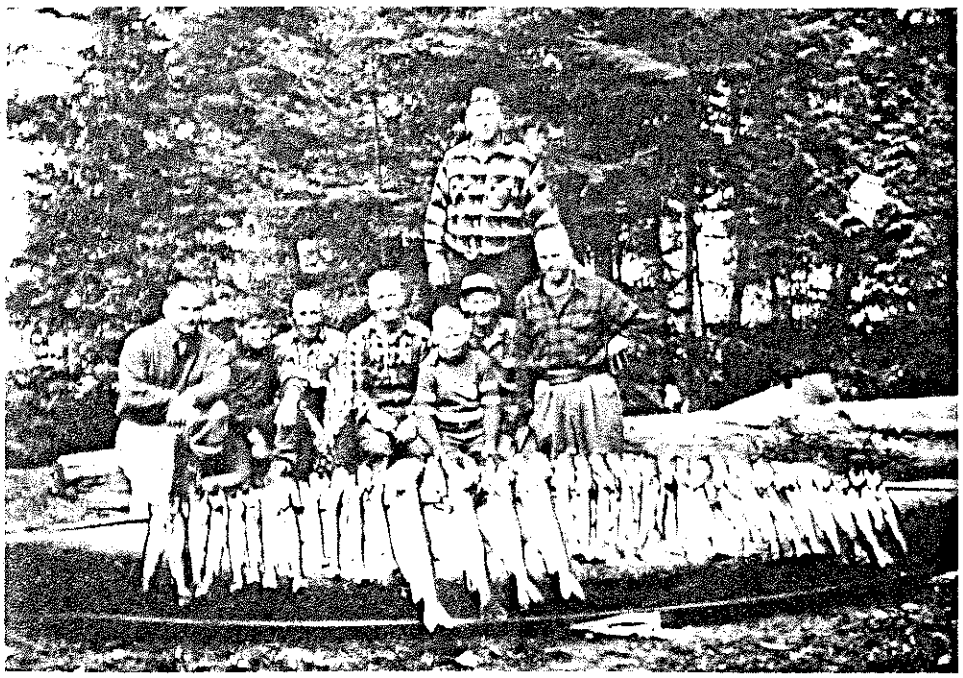


SMALLMOUTH BASS

"THE GOOD OLD DAYS"

No doubt many anglers remember the "good old days" when they could go out and get a catch of trout whenever or wherever they wanted. Certainly fishing isn't what it used to be in some Algonquin Park lakes. Fish are a crop. The size of this crop in Algonquin Park is limited for a number of reasons, some of which have already been stated. This crop may more than meet the needs of 10 people - it may not provide enough for 50. This has been the story in many easily accessible lakes. Basically there are two approaches that can be made. First the share of each person in the crop can be reduced. One way of doing this is by regulating the size of the take. That is, for example, by creel limits, control of winter fishing, etc. A second broad approach is to attempt to increase the size of the crop. Much of this booklet has been concerned with this aspect of fisheries. Such things as fertilization, restocking, artificial spawning beds, lake closures, and so on have been mentioned. These have had only limited success to date. Fish planting may offer one of the best hopes in this line but there is still much to be learned about the successful use of the hatchery product.

There is still a great deal of top notch trout fishing in Algonquin Park. The further you penetrate the area the better it gets, as good as any in the "good old days", as good as any in Ontario. It is in the heavily fished lakes that trout fishing quickly deteriorates. It is here where a management programme based on a background of research is required.

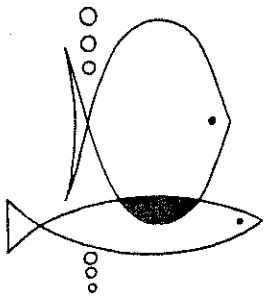


A trip to remember

IN CONCLUSION

This has been an outline of fisheries research and management in Algonquin park. Not touched on here is a great deal of fundamental research which has been, and is being carried out. Much of this, although eventually directed at the final goal of conserving our fishery resources, does not directly affect the Algonquin Park angler in his everyday activities.

Research has provided the basic facts which the administrator requires for management. That the management of the Park fisheries has had only moderate success to date is perhaps because not enough of these fundamental facts have been discovered. As has been previously observed, however, management, because of the exigencies of time, must often proceed via short cuts and on a trial and error basis.



CHECK–LIST OF THE FISHES OF ALGONQUIN PROVINCIAL PARK

This list includes all the fishes which have been recorded and substantiated with specimens from Algonquin Provincial Park. The scientific names have been supplied because of the variation in common names depending upon the locality. The order and names follow the Check-List of Freshwater Fishes of Canada (Scott, 1958). Species marked "I" have been introduced; "N" indicates species which have been recorded for the northern portion of the Park; and "R" indicates species which have not yet been recorded but which include the Park within their geographic distribution.

STURGEON FAMILY

Lake Sturgeon *R*	*Acipenser fulvescens*

SALMON FAMILY

Atlantic Salmon *I*	*Salmo salar*
Brown Trout *I*	*Salmo trutta*
Rainbow Trout *I*	*Salmo gairdneri*
Brook or Speckled Trout	*Salvelinus fontinalis*
Lake Trout	*Salvelinus namaycush*
Splake *I*	*S. fontinalis x S. namaycush*
Alpine char *I*	*Salvelinus alpinus*

WHITEFISH FAMILY

Round Whitefish	*Prosopium cylindraceum*
Lake Whitefish	*Coregonus clupeaformis*
Lake Herring	*Leucichthys artedii*
Shortjaw Cisco	*Leucichthys zenithicus*

PIKE FAMILY

Northern Pike *N*	*Esox lucius*
Muskellunge *N*	*Esox masquinongy*

MUDMINNOW FAMILY

Central Mudminnow *R*	*Umbra limi*

SUCKER FAMILY

Northern Redhorse *N*	*Moxostoma aureolum*
White Sucker	*Catostomus commersoni*
Longnose Sucker	*Catostomus catostomus*

MINNOW FAMILY

Golden Shiner	*Notemigonus crysoleucas*
Creek Chub	*Semotilus atromaculatus*
Fallfish *N*	*Semotilus corporalis*
Northern Pearl Dace	*Margariscus margarita nachtriebi*
Northern Redbelly Dace	*Chrosomus eos*
Finescale Dace	*Pfrille neogaea*
Lake Chub	*Couesius plumbeus*
Longnose Dace *R*	*Rhinichthys cataractae*
Emerald Shiner *R*	*Notropis atherinoides*
Common Shiner	*Notropis cornutus*
Blacknose Shiner	*Notropis heterolepis*
Spottail Shiner *R*	*Notropis hudsonius*
Rosyface Shiner *R*	*Notropis rubellus*
Mimic Shiner *R*	*Notropis volucellus*
Brassy Minnow	*Hybognathus hankinsoni*
Fathead Minnow	*Pimephales promelas*

CATFISH FAMILY

Brown Bullhead	*Ictalurus nebulosus*
Channel Catfish *N*	*Ictalurus punctatus*

FRESHWATER EEL FAMILY

American Eel	*Anguilla rostrata*

COD FAMILY

Burbot	*Lota lota*

TROUTPERCH FAMILY

Trout-perch	*Percopsis omiscomaycus*

SUNFISH FAMILY

Smallmouth Bass	*Micropterus dolomieui*
Pumpkinseed	*Lepomis gibbosus*
Rock Bass	*Ambloplites rupestris*

PERCH FAMILY

Yellow Walleye *N*	*Stizostedion vitreum*
Sauger *R*	*Stizostedion canadense*
Yellow Perch	*Perca flavescens*
Logperch *N*	*Percina caprodes*
Johnny Darter	*Etheostoma nigrum*
Iowa Darter	*Etheostoma exile*

SCULPIN FAMILY

Slimy Sculpin	*Cottus cognatus*
Spoonhead Muddler	*Cottus vicci*

STICKLEBACK FAMILY

Ninespine Stickleback	*Pungitius pungitius*
Brook Stickleback	*Eucalia inconstans*

WHERE TO FIND THEM ...

This list not only tells you where they may be found but also indicates the general fishing success in each lake. Success can vary considerably, particularly in brook trout lakes, according to time of year, stocking etcetera.

**** - Excellent Fishing

*** - Good Fishing

** - Fair Fishing

* - Poor Fishing

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Alluring	****	*				
Amable DuFond R.		***				
Animoosh		****				
Aura Lee		****				
Aylen River		****				
Barron		**				
Basin						***
Big Crow	****	****				
Biggar	****	***				
Big Porcupine	***	***				
Big Trout	****	***				
Billy		***				
Bird		****				
Black Bear	**					
Black Fox		****				
Blue	****					
Bluff		****				
Bob		***				
Bonnechere	****	*				
Boot	****	****				
Booth	****	***		****		

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Bridle				****		
Bruce	**					
Brule	***					
Bud		**				
Bug		****				
Baldwin		***				
Burnt Island	****					
Burnt root (Portal)	****					
Butt	****	*				
Cache	***			***		
Calumet	***	*				
Canisbay	****			***		
Canoe	**			**		
Carl Wilson	***	*				
Casey		****				
Cat		****				
Catfish	****	****				
Cauchon	***	****				
Cedar	****	*			**	
Charles		****				
Chicaree	****					
Clarke		**		***		
Club		****				
Clydegale		***				
Costello	**					
Cradle	***					
Crotch	*			****		
Crow River		****				
Cuckoo		**				

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Daisy	****	***				
David		****				
Delano	***					
Dickson	***	****				
Drummer		**				
Erables	***					
Ermine		***				
Eustache	***	***				
Farm	*			***		
Faya		**				
Fog		***				
Found		**	**			
Foys	***	***				
Frank		****				
Fraser	****					
Galeairy	*	*	*	****		
Ghost		****				
Gilmour	***	*				
Godda	***	****				
Gordon				****		
Gouin lock	*	**				
Grand	***	*		***		
Grant				***		
Grape				***		
Greenleaf	***			****		
Groundhog		**				
Hambone	**	***				
Happy Isle	****					
Harness	****					

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Head	***					
Heron				****		
Hilliard	***					
Hilly		***				
Hiram	****					
Hogan	****	****				
Harry		****				
Iris	*	***				
Jack			****			
Joe	*					
Kakasamic		***				
Karkishoo	*	***				
Kearney	*					
Kenneth	****					
Kioshkokwi	****	*				
Kitty				***		
Langford		****				
Lamuir	****	*				
Laurie	**	**			**	
Lavieille	****	****				
Lawrence	***					
Linda	*			****		
Little Cauchon	***	***				
Little Coon	*	*				
Little Crooked		****				
Little Crow	*	****				
Little Dickson	****	****				
Little Doe	**					
Little Island	****	***				

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Little Joe		*		***		
Little Minnow		***	***			
Little Otterslide	****					
Little Trout	****	***				
Loft		**				
Longer	****	***				
Lome	****	*				
Louisa	****					
Loxely		****				
Luckless		****				
Lynx	****	***				
MacIntosh	****	**				
Maple	****	***				
Margaret		****				
Mamot		****				
McCarthy Cr.		***		**		
McCaskill	*	***				
McCauley Cr.		**				
McCraney	****	**				
McGarvey	****					
Meda		**				
Menona		**				
Merchant	****	***				
Mink	***	***				
Misty	****	*				
Mole		*		*		
Mouse		****				
Mud Cr.		***				
Murdock		****				

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Mykiss		***				
Namegos	***	***				
Nama Kootchie	****	*				
Nepawin	***	****				
North Branch		***				
North Grace	***	****				
N. Madawaska R.		***		***		
Opeongo	****		*	****		
Oram		***				
Otterslide	***					
Owl	***					
Oxtongue River		***				
Peck		****				
Pen	****	*				
Perley	****					
Petawawa River		***		***	****	**
Phillips		**				
Pinetree	****					
Pog				**		
Polly				****		
Potter	***	**				
Prottler	***	***		*		
Proulx	*	****				
Provoking				****		
Queer		***				
Rabbittail	****	*				
Rabbittail Cr.				**		
Radiant	****	****			*	
Ragged	****	*		****		

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Rain	****			****		
Rainbow		****				
Raja		***				
Raven	****					
Raveneau		***				
Redrock	***	****				
Robin		***				
Robinson		***				
Rock	***			*		
Rod and Gun		****				
Rosebary	****					
Rosepond		***				
Rouge		***				
Round Island	****					
St. Andrews	***	*				
St. Anthony		****				
Sawyer	****	*		****		
Scott		***	***			
Sec	*	*		****		
Shall	*			****		
Shippagew	**					
Shirley	****					
Shirley Cr.		**				
Siscowet	***					
Smoke	****			****		
Source	****	*				
Speckled Trout		**		*		
Sproule			***			
Stringer		****				

**** - Excellent *** - Good ** - Fair * - Poor

LAKE	*Lake Trout*	*Brook Trout*	*Splake*	*Smallmouth Bass*	*Walleye*	*Pike*
Sunbeam		*				
Sundassa		*				
Swan	****					
Sylvia (S)	****					
Tanamakoon	***			****		
Tepee	**	*		*		
Three Mile	****	*				
Tim	***	**				
Tim River		****				
Timber Wolf	****					
Traverse				**	****	*
Two Rivers	***			***		
Wabun		**				
Waskigomog	****	*				
Welcome		****				
Wendigoes	***	**				
West Harry		****				
Westward		***				
Whiskey Jack		***				
White Birch	**	**				
Whitefish	***			**		
White Gull	****	*				
White Partridge	****	*				
W. Partridge Cr.		****				
White Trout	***	**				
Wilkes	****	***				
Wilkins	****					
Wright	*			*		