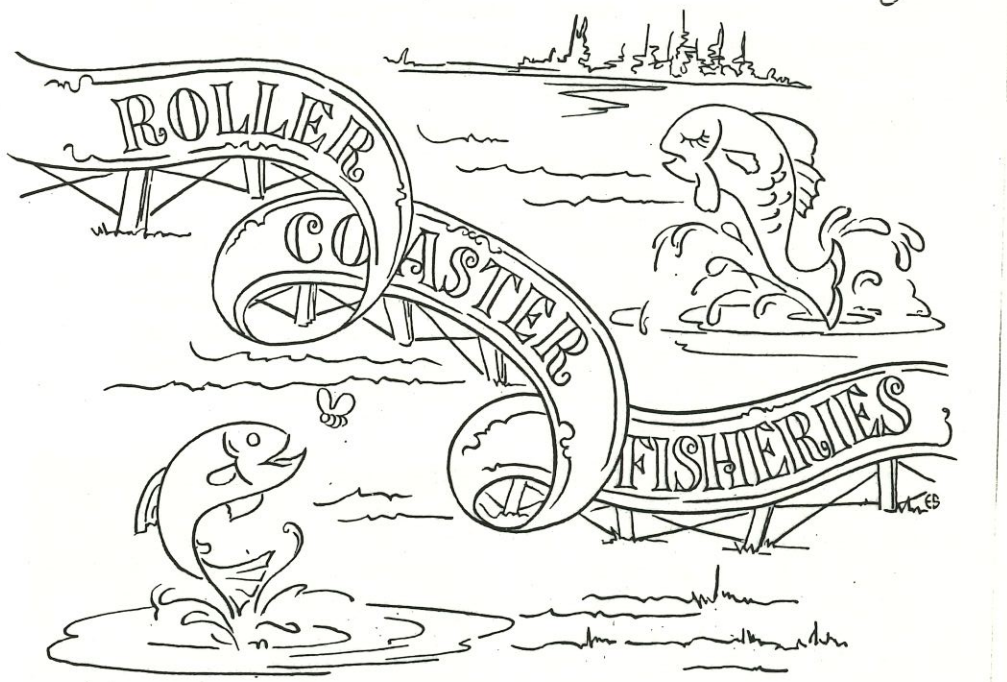


by N. V. Martin

THE amazing variability in the yield of fisheries has perplexed fishermen for hundreds of years, whether it be the thousands of tons of cod in the stormy North Atlantic or the pounds of trout resisting the cajoleries of the angler on a quiet Ontario stream.

In both cases the problem fundamentally resolves itself into one of several things. First, changes in the catch in a given body of water may be related to changes in the actual abundance of the fish in that body of water. These are usually long-term fluctuations covering a period of a year or more. Changes in fishing success may also result from movements and migrations of the fish in a body of water, making them temporarily unavailable to the fisherman. Such are usually short-term and may involve a period of a day or perhaps a season. Then there is the most perplexing case, and the one about which least is known—the fish are present, are in abundance, but cannot be induced to take the

anglers' lures. There are other reasons for fluctuating fishing success, but those just described probably cover most situations. What follows is a discussion of the first of these circumstances.

It is one of the basic phenomena of nature that populations of animals fluctuate in size, particularly in northern latitudes. Some of these are periodic, as in Arctic animals, while others are apparently quite irregular. Fish, too, undergo such fluctuations whether they be in the vast expanse of the ocean or in a hundred-acre lake.

Chief of the factors concerned in the fluctuations of fisheries is the year class. By definition, a year class includes all the fish of one age, and is, therefore, the fruit of one year's spawning. It has long been known that year classes vary in size or strength, and that they have by nature of these variations a profound influence on the yield of fisheries.

One of the few known cases of regular changes in abundance in fishes occurs in the Pacific salmons. In the sockeye salmon runs in the Fraser River in British Columbia, for instance, there is a peak of abundance every fourth year. This happens because these salmon reach maturity in their fourth year, spawn and die. Other salmons have different cycles.

But by far the most common are the irregular fluctuations. In the sea these may be tremendous, some year classes being 50 to 60 times as abundant as others. The yield of many marine fisheries is intimately associated with the irregularity in the strength of year classes.

Closer to home, but just as spectacular, is the case of the Lake Erie cisco or freshwater herring. From 1925 to the early forties this fishery was virtually non-existent, although it had been of great importance in earlier years. Suddenly, in 1945, the commercial catch shot up to figures comparable to the best years of the fishery. A study of the age composition of this catch showed that it was predominantly made up of one-year-old fish, belonging to the 1943 year class. In 1946, this year class made up 97 per cent of the catch, and again, in 1947, just over 90 per cent.

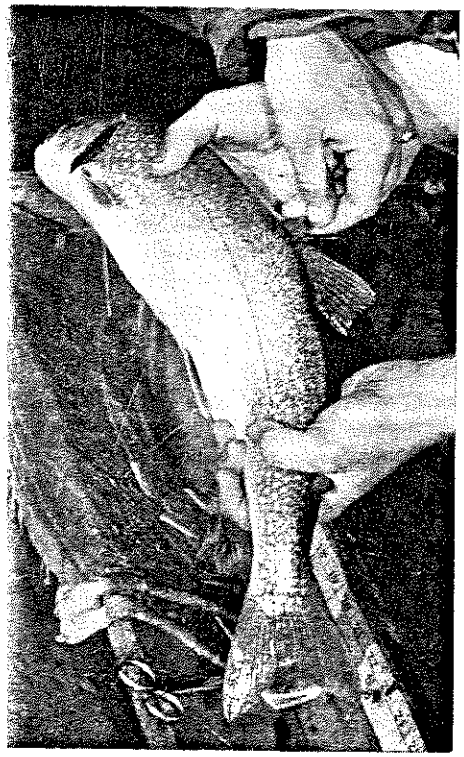
The same thing can happen in sports fisheries, although, of course, on a smaller scale than in marine and commercial fisheries. Data collected from Algonquin Park lakes since 1937 show that the lake trout, speckled trout, and bass fisheries of this area are very dependent on the success or failure of year classes. It has been possible in some of these lakes to make estimates of the actual

sizes of the year classes from the age composition of the anglers' catches. For example, in Happy Isle, a 1500-acre lake in the centre of the Park, the 1940, 1941, 1942, 1943, 1944, and 1945 year classes provided 95, 122, 113, 300, 199, and 500 lake trout respectively to the fishery. It is evident that the last three year classes are particularly strong and, as a result, there has been excellent fishing in this lake the past few years, while it had only been mediocre for a number of preceding years.

Similar variations have been evident in the speckled trout and bass fisheries in the same area, and have greatly influenced the quality of the fishing. An intensive bass fishery in Cache Lake relies largely on the strength of the year class reaching legal length. If this year class is weak, poor fishing is the result. In 1946 this year class was a failure, and the Cache Lake bass fishery collapsed. Only 12 bass were reported caught that year as compared with a total catch of 300 to 800 bass in most other years. In other Algonquin Park bass lakes, fishing pressure is not so great, and the fishery is dependent on several year classes. This results in a more stable fishery.

The effect of strong year classes is demonstrated also in South Bay, an extension of Lake Huron into Manitoulin Island. Previous to 1948 lake trout fishing had been poor in the Bay and adjoining Lake Huron. From 1948 to 1950 the 1944 year class provided attractive fishing, being 5 to 10 times stronger than other year classes in the fishery. Unfortun-

R. D. ROBINSON



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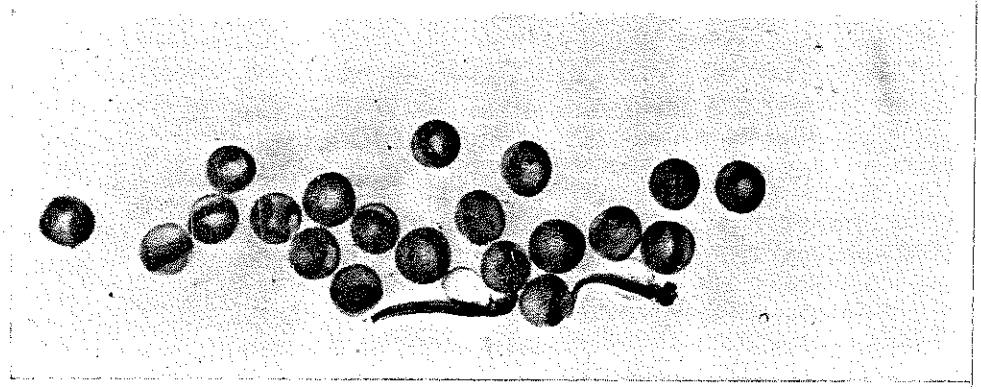
Biologists tag and release lake trout. When anglers co-operate and return tags the biologists can delermine the growth rate in the waters from which the fish were taken.



H. C. TESTER

Trout hatching. Embryo fish may be seen in the eggs. Two have freed themselves; are now fry. In clean waters with abundant food, similiar entities may one day equal the "lunker" on the next page.

ately, a good part of this year class succumbed to sea lamprey attacks.

The logical question that follows is, what causes these year class variations? Most marine investigators agree that year class strength is not related to the number of spawning fish. Small spawning stocks have often produced relatively large numbers of young. A similar conclusion was reached in Lake Erie as the 1943 year class originated in a year when the commercial catch was small.

In Algonquin Park, the closure of lakes every other year to increase the numbers of spawners has not, on the basis of present information, produced stronger year classes.

What then are the factors in year class variation? It is felt by many biologists that year class strength is decided in the very early life history of the fish, par-

K. M. ANDRESEN

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Looks like this young lady is landing a "keeper"—if speckled trout, it will be above seven inches in length. Law observance is a factor in maintaining good fish populations.

ticularly just following hatching. Hydrographic changes such as currents, temperature, and water levels may influence the survival of the young. Biological relationships as the amount of food available to the young or variations in the numbers of fish reaching the fisherman's creel. Unfortunately, it is difficult to assess the effects of factors such as these on the fish populations, chiefly because there are few effective ways of sampling fish at early stages of their life histories.

In this outline an attempt has been made to emphasize two things. First, that fisheries of all descriptions are extremely variable in their yields, and that this is a quite natural state of affairs. Secondly, that the fisherman should always keep in mind that such things do happen and that it may be unwise to judge a fishery on the luck of the moment. The temptation was great, no doubt, to condemn the Lake Erie cisco fishery before 1945 or the South Bay lake trout fishery prior to 1948.

So take heart, fishermen. If your favourite lake is a momentary frustration, remember—better days may be ahead.

This 32-lb. monster was taken near Bear Island, Timagami, a highly compatible lake for lake trout growth, apparently.

K. M. ANDRESEN