

**A RECENT INVADER OF THE UPPER GREAT LAKES
IS A SERIOUS NUISANCE TO RECREATION AND
FISHERIES OPERATIONS AND IS COM-
PETING WITH MORE VALU-
ABLE FISH FOR FOOD
AND LIVING SPACE**

FROM time to time during the past 75 years, fishes that were not native to the region have been found in the upper Great Lakes. Some invaded these waters by extending their ranges; others were introduced, either by accidentally escaping from connecting lakes or from an angler's bait bucket, or through a deliberate effort by man to plant some presumably desirable food or sport fish.

The "colonization" of the Great Lakes by these immigrant fishes has generally been documented, so that the approximate time and place of their arrival, their first spawnings, and their spread over the lakes can be traced with a reasonable degree of accuracy.

During the late nineteenth century, three foreign fishes became established in the Great Lakes within a few years' time. The first, and the one that has become most numerous in bays and shallow waters, was the carp. In 1877, they were introduced into Illinois; by 1880 they were widely distributed. Exactly when the first introduction occurred in Lake Michigan is not recorded, but reports on commercial fisheries of the Great Lakes for 1890 do not mention carp. During 1899, however, 25,000 pounds of carp were taken by commercial fishermen, in spite of there being only a limited market for this fish.

After the 1893 world's fair in Chicago, goldfish that had been planted in the la-

goons of the fair grounds escaped into Lake Michigan. They have since been abundant in many bays and lagoons that connect with the lake as well as in the harbors formed by breakwaters along the Illinois shores. Since then, goldfish have been re-introduced many, many times by anglers, who use them for bait.

Also following the world's fair, rainbow trout that had been on display in exhibition tanks were released in the lake, and for many years afterward were reported at intervals from the water supply cribs. Rainbows were introduced, as well, into many streams of Wisconsin and Michigan. In the waters of northern Lake Michigan and Lake Superior, rainbows now are fairly abundant locally and good spawning runs occur in several streams.

The invasion of the upper lakes by the sea lamprey in the early 1920's, its subsequent spread, and its devastating effect on the lake trout fisheries are well known. The introduction of the smelt into Crystal Lake, Michigan, its escape into Lake Michigan in 1923, and its occupation, by 1936, of all the upper lakes were the subject of a previous BULLETIN article (March, 1954). Because of their numbers and habits, both the sea lamprey and the smelt have had a profound effect on many species of native fishes and on the long-established lake food chains.

In addition to these major invasions,

at least twelve other species of fish have been introduced into the Great Lakes, either directly or through the connecting waters of the drainage system. None of these has become so conspicuously widespread or abundant as the five fishes named above.

However, to the growing list of foreign fishes that have successfully taken up residence in these lakes, we must now add the alewife. This is a fish of the herring family, which is closely related to the American shad. It is silvery in color, with a series of saw-like plates forming a sharp ventral surface. In the Great Lakes, the alewife reaches a size of only seven to ten inches.

Alewives have been abundant in Lake Ontario for at least 70 years. Just how they got into Lake Ontario—whether they were left there at the close of the last glacial depression of this area; whether they strayed in through the St. Lawrence River or were brought in accidentally by man—has not been determined. The only ocean fish known to migrate regularly through the St. Lawrence to Lake Ontario is the freshwater eel. In the early 1870's, however, shad were introduced into Lake Ontario, and there is a possibility that alewives were included in the shipment.

For the past 50 years, at least, they have been a conspicuous nuisance. Nearly every summer large numbers die and, drifting inshore, clutter the beaches—sometimes in such quantity that they form windrows. On occasion it has been necessary to haul them away, or bury them on the beach. The floating dead fish soon are covered with a light tan fungus (*Saprolegnia*) and are not only unsightly and unpleasant to run into while swimming, but also give the water a strong, fishy odor. I have cruised all afternoon in July along the north shore of Lake Ontario through dead and floating alewives. At any time, hundreds could be counted in a circle around our boat.

Since alewives are migratory, running upstream to spawn, they eventually arrived in Lake Erie. They were first recorded as having been found there in September, 1931. According to Dr. R. R. Miller of the University of Michigan, this was only to have been expected. Presumably their invasion

route was through the Welland Canal. Eighteen months later, in March, 1933, one was captured in northern Lake Huron, while another was found in April, 1935. Although they were now within a few miles of Mackinac Straits, they did not pass through, for none were noticed in Lake Michigan until 14 years later, in May, 1949. Perhaps they were prevented from establishing themselves by the lake trout and burbot that were abundant in Lake Michigan until about 1946. Once these fish populations were decimated by the sea lamprey, alewives could move in and survive.

Four years after being first noticed in Lake Michigan, they had spread to all parts of the lake. The first evidence of their spawning was observed in Green Bay during the summer of 1953. The first large specimen from near Chicago was brought to Chicago Natural History Museum in March, 1954. In October of 1956, the Museum received young that had hatched the previous summer. The following spring, large numbers of dead alewives were found floating in Burnham Park lagoon and in the harbor north of Shedd Aquarium. One evening near dusk in July of 1957, Mr. William Braker of the Shedd Aquarium and I saw hundreds of alewives, in schools of ten to twenty-five individuals, darting

The "Cisco," United States Fish and Wildlife Survey vessel, has been cruising the Upper Great Lakes for six years locating fish and studying the general productivity of the lakes. It is equipped with the latest in fishery research equipment, including an electronic fish-finder, modern hydrographic equipment, and research laboratory.

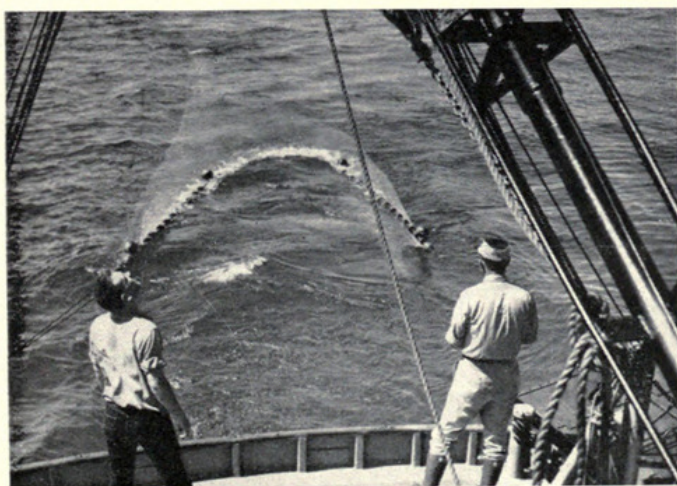


the harbor north of the Aquarium, in the lagoon, and on the 12th Street beach.

Alewives spend the summer in shallow water, wintering in offshore waters 72–150 feet deep. In the early spring, along with many other kinds of lake fish, they begin to migrate toward shore. The most reasonable theory to account for the death of such large numbers of alewives is that they are very slow to adjust to abrupt differences in temperature. If the inshore waters are too warm (60–68° F.) during the time of their inshore migration, there is great mortality. A day or two of calm water and bright sunshine may be enough to produce lethal conditions. Another possibility is that the springtime "bloom" of some particular plankton may cause death by poison-

ing, either when eaten by the alewife or merely through contact. Neither of these theories has been demonstrated. Certainly large numbers of alewives survive each year, and in some years apparently none are killed at all.

Alewives from Atlantic coastal streams and along the shore are considered excellent food, whether fresh, smoked or salted. When taken from the Great Lakes, these fish are not as large or fat as ocean fish, and very little use has been made of them. They are nothing but a pest to many gill-net fishermen, who find their herring and chub nets filled with valueless alewives. Although they can be sold as cheap food for mink and fox farms, or for fertilizer, the price is so low that it is not profitable to take them in gill nets or traps. In 1960, about half a million pounds of alewives were taken from Lake Michigan. This amount was worth only \$5,426, so it is evident why the alewives are considered valueless by commercial fishermen. As for their edibility, last June I met a boy with a bucket containing a dozen or so eight-inch alewives that he had caught with hook and line in Burnham Park Lagoon.

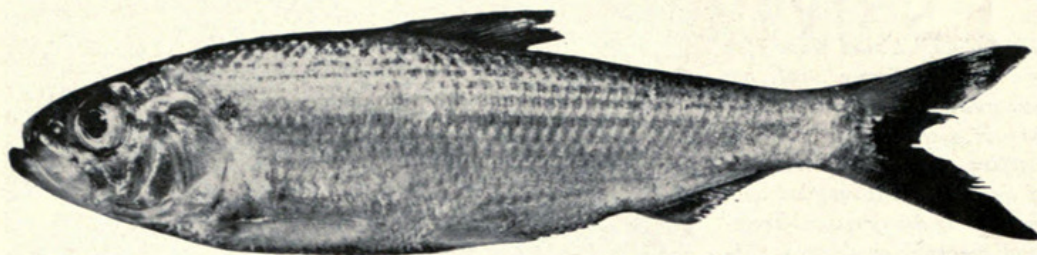


Left: After dragging the bottom for fish, the men haul in the "otter trawl" with their catch. In the foreground is a boom for lifting the net.

and chasing among the rocks north of the Planetarium promontory. We could not see well enough to determine whether or not they were spawning. A few days later many dead alewives were observed floating near shore. These had fungus infections but no apparent injuries. In the following year, no dead alewives were noticed, but in May of both 1959 and 1960 hundreds of dead were seen in

Right: The catch, almost entirely chubs netted at 40 fathoms, is poured onto the deck to be examined and sorted.





Asked what he intended to do with them, his natural reply was, "Eat them." I suggested that he might find them somewhat bony and dry, but he only nodded his head and said, "I'll save them 'til Friday." Unfortunately I was unable to obtain a report on how they tasted.

It has been predicted that alewives will become increasingly abundant in the upper lakes. If this happens, ways should be found to use them profitably. There is already some indication that, where alewives have increased (as in Saginaw Bay, Lake Huron), the numbers of lake herring have decreased. This

may be because the alewife and lake herring compete for food and space at some stage during their life cycle. Alewives feed chiefly on animal plankton (crustaceans) and insects. With this diet preference, they compete with the young of most other lake fishes and with not only the young but also the large whitefish, lake herring, and chubs. If large numbers of alewives die, and so become a nuisance to harbors and beaches, traps may have to be operated regularly in order to keep their numbers down. So far, the development of trawl fishing and the use of alewives as an industrial fish

for processing into fish meal or fertilizer appear to offer the best solution.

[After this article was set, we received the following urgent dispatch from Curator Woods.]

Grand Haven, Michigan

"Stop the presses! Flash! I have just eaten an alewife! And a good thing I did, too, because it turns out that my rather disparaging assumptions about its edibility are misleading.

"To go back a bit, I went out on Lake Michigan this morning for some trawling. The wind was so strong and the seas so high that we came back into port after one drag. Fortunately our catch consisted of a tubful of alewives, so I selected the biggest one (seven inches) and fried it. To my surprise, it was quite tasty."

[If any of our BULLETIN readers care to participate in this phase of the research, we'd be glad to have the results of their studies for purposes of comparison.]

MUSEUM NEWS

(Continued from page 2)

Alfred Lewis Kroeber 1876-1960

The Museum has suffered a great loss in the death of Dr. Alfred L. Kroeber, Research Associate in American Archaeology. He died in Paris on October 5 while returning from an anthropology meeting in Austria. He had been appointed Research Associate in the Department of Anthropology in 1926, and held this position until his death.

Dr. Kroeber was one of the great anthropologists of his time. His book, *Anthropology*, written in 1923, was the first general textbook in anthropology. He taught at the University of California in Berkeley from 1901 to 1946, and for many of these years served both as Chairman of the Department of Anthropology and Director of the Museum of Anthropology. After his retirement, he continued until the end of his life to teach—at Columbia, Harvard, Yale, Brandeis, and Chicago—and to write, edit, and take part in symposia and conferences.

Dr. Kroeber's association with the Museum began in 1925, when he conducted the First Marshall Field Archaeological Expedition to Peru. The follow-

ing year he headed the Second Marshall Field Archaeological Expedition to Peru. During these two expeditions he surveyed the whole of the Peruvian coast, carried out important excavations in the Lima, Cañete, and Nazca Valleys, and made surface collections from a large number of archaeological sites. His efforts nearly doubled the Museum's holdings in Peruvian archaeology and provided documented material that has been of prime importance for scientific study as well as display. As a result of this field work, Dr. Kroeber published two survey articles on Peruvian archaeology in the *American Anthropologist*, and prepared four monographs, which were published by the Museum, on the excavations and collections. A fifth monograph, on the excavations in Nazca, was nearly complete at the time of his death.

The passing of Alfred Kroeber marks the end of an era in American anthropology. He was not only a great figure but the last of the "universal" anthropologists in this country, his greatest achievements being in ethnology, linguistics, and folklore. He did more than any man to record and analyze the cultures and languages of the California

Indians, and at the end of his life he labored to help them press their claims against the United States for broken treaties. His greatest love was for the history of culture—both of the Americas and of the whole world. Here, he was interested not only in what happened, but in finding patterns or configurations of culture growth that might contribute to a universal culture history. Although he dealt skillfully and enthusiastically with the minutest particulars, he never lost sight of the general significance of what he was doing.

Dr. Kroeber's contributions to Chicago Natural History Museum were large and enduring. The Museum has lost a great colleague and a great friend.

DONALD COLLIER

Archie F. Wilson, Associate, Wood Anatomy, and former resident of Flossmoor, Illinois, died at his home in Summit, New Jersey, on 22 August, 1960. Mr. Wilson's long and valuable assistance in developing the Museum's reference collection of wood specimens was recognized in 1954 by his appointment to the honorary position of Associate in the Department of Botany.



Woods, Loren P. 1960. "The Alewife." *Bulletin* 31(11), 6–8.

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