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MINNOWS

by

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"Minnow" is the term commonly used to describe almost any small fish, but, to the ichthyologist, this name designates a definite family or group of fishes that are given the technical name of Cyprinidae. The scientific men place in the minnow family all fishes that are closely related, regardless of size, such as shiners, dace, chubs and the carp and goldfish. Young fish of any species of game fish are technically referred to as either fry or fingerlings. For example, bass, perch or trout between the time of hatching until the yolk sac is absorbed are called fry, while the term fingerling applies to fish from that stage to a length of three or four inches, or to fish under one year of age regardless of size.

The minnow family is one of the largest families of fresh water fishes. Approximately 2,000 species have been described from the northern hemisphere, about 250 species of these from North America and no less than 38 species from Michigan. Although the commonest minnows are of small size, some, such as the carp, which was introduced from the old world, and several western species, reach a length of over two feet. Three inches is the maximum size of some of our Michigan minnows, and the majority never exceed

eight inches in length. The horned dace, the largest native minnow in Michigan, has been known to reach a length of 12 inches.

Minnows can be distinguished from all other fishes by the following characteristics:

1. The jaws are without teeth.
2. The head is not covered with scales.
3. The fins do not contain any spiny rays.
4. The single dorsal (back) fin has less than 10 fin rays.

Mud-minnows, top-minnows, darters, sticklebacks, muddlers and skipjacks are all fishes of small size that are frequently confused with the true minnows, but are members of other families and can be told from the true minnows because they differ in one or more of the characters enumerated above.

Minnows are adapted to a wide variety of conditions but each species requires a more or less definite habitat during some stage in its life history. For example, some species such as the horned dace and common shiner require stream conditions for spawning and therefore cannot reproduce in ponds or lakes. Other species prefer or require large lakes, small lakes, bog lakes, large rivers or small creeks and do not thrive in habitats which fail to meet their requirements. An illustration of this is found in the lake emerald shiner or lake runner, as it is commonly called. This minnow is extremely abundant in the Great Lakes, where it is an important item in the diet of the game fishes. Efforts to establish this minnow in small inland lakes have been unsuccessful.

Minnows are generally carnivorous, feeding upon insects, waterfleas and other small aquatic animals. Some species, however, are omnivorous and feed largely on aquatic vegetation (mostly algae), or on the organic slime found on rocks and on the bottom, as well as on insects and waterfleas. None of the minnows is strictly herbivorous.

The importance of minnows is not generally appreciated, but the abundance and growth rate of the larger game fishes in many lakes and streams seems to depend upon a permanent stock of minnows or at least of small fish of some kind. Besides fish, the fish-eating birds, turtles and many other animals chiefly rely upon minnows for food. Predatory animals probably eat fewer game fish if an abundance of minnows is present. Although all minnows are edible, only the larger species are utilized as food by man, the carp being the only one of importance. Minnows are, nevertheless, an important link in the human food chain, for they convert minute forms of animal and plant life into foods for other forms of life which eventually serve as food for man.

Some of the most important forage and bait minnows found in Michigan lakes and streams are represented in the excellent photographs accompanying this article that were taken for the Institute for Fisheries Research by F. W. Ouradnik.

Most minnows are difficult to identify by anyone other than an expert because of their small size and great similarity. Many fishermen, if given the opportunity, have a preference as to the species of bait minnow that they use. In some localities they have no choice and must use whatever minnow is offered for sale. In certain parts of the Lower Peninsula, fishermen always ask for lake emerald shiners or common shiners. In other parts of the Lower Peninsula, horned dace and river chubs are regarded highly. In certain parts of the Upper Peninsula, mud minnows are considered especially desirable bait, while the majority of the fishermen in the Lower Peninsula will not use them.

During the past few years the Department of Conservation has found that the minnow population in many of our streams and lakes is in a serious state of depletion. The demand for minnows in regions where a great deal

of bait fishing is done has practically exterminated the minnows in these regions and has resulted in forcing bait dealers to travel great distances to obtain their supply. It is not uncommon for dealers to go as much as two to four hundred miles for a load of minnows. At present, many dealers depend upon the Great Lakes for their minnows. This depletion of our minnow resources besides working a hardship on minnow dealers, may well be detrimental to the game fish which normally feed upon them. This is partially due to the fact that when fewer minnows are present, game fish tend to eat their own and the young of other game fish to a greater extent. While this may be desirable in certain lakes, especially those containing stunted or slow-growing game fish populations, other waters may be seriously affected.

Experiments in stocking forage fish in lakes and streams in an effort to improve fishing have been conducted in Michigan for several years. Many lakes, previously without a stock of minnows, have been used for these experiments. Caution must be exercised in stocking minnows and a survey of the biological conditions in each lake or stream should be made by experts before any stocking is attempted. Many times the stocking of minnows has only resulted in furnishing the game fish with a meal or two. Conditions for spawning, shelter and other things must be present for the most desirable minnow chosen for any body of water. Fishing has been seriously threatened in many lakes and streams by the introduction of species that were not suitable. Fishermen have often released minnows not used as bait. In this manner goldfish, carp, and many other species of larger minnows have been introduced which may compete with game fishes for food and shelter without themselves being eaten by the game fish. Despite the fact that most game fish will eat minnows of various sizes, game fish also serve as forage for game fish. It has been found that

a lake without any minnows but containing bluegills and largemouthed bass yields large numbers of each species, the bluegills feeding largely upon small water organisms and to some extent on one another, and the bass feeding on bluegills and one another. So, because game fish in certain lakes are stunted or slow growing is no sign that minnows should be stocked; other factors are probably responsible. But it is generally agreed that pike lakes should contain minnows or at least yellow perch, which seem to take their place in the diet of pike.

The scarcity of minnows in many streams and lakes is due partially to the carelessness and indifference on the part of fishermen and minnow dealers. Many thousands of minnows are killed by careless handling and by the use of poor equipment. It is probably true that more minnows are killed in this fashion than are actually used in fishing. At times, when minnows are easily secured, fishermen and bait dealers are prone to take more than can safely be carried. This usually results in the loss of a large portion or all of the minnows.

In an effort to remedy this situation, a number of states have severely restricted or prohibited the taking of minnows for commercial purposes. At present the culture of minnows by bait dealers is being encouraged by the Michigan Department of Conservation. Many bait dealers during the past few years have already started to raise their own minnows. Many requests for information regarding the care and culture of minnows have been received by the Department. It may become necessary in the future to require that all minnow dealers have proper equipment for the transportation and holding of minnows. It may become necessary to close certain counties or perhaps the entire state to the taking of minnows. This procedure has already been successfully tried by several states. It would be extremely difficult to declare a closed season on minnows during their spawning seasons because the time of spawning varies and because of

the difficulties that would be encountered by the average person in distinguishing the many species. Similar problems would be encountered if size limits were imposed because many species would be protected while all of the adult fish of the larger species would be taken.

Some suggestions for the collection, transportation and holding of minnows

Most fishermen depend upon bait dealers for minnows, but many prefer to collect their own. Seines, glass or wire traps, and dip nets are commonly used for taking minnows. The seine is probably the most effective, but much care must be exercised to avoid excessive handling. The seine should never be tightly bagged or removed from the water when sorting out the desirable minnows because the crowding and the flopping of the fish while out of the water causes the loss of scales and protective mucous which may result in sore spots which are open for infection. If possible, a fine-meshed dip net or enamel dipper should be used to remove the fish from the net. Fish taken in glass traps are usually in better shape than those taken by other means, because handling is minimized. Wire traps cost little to make or to purchase and if lifted frequently when in use will result in less injury to the fish than when the fish remain in the trap for long periods.

Almost any sort of container can be used to transport fish. Overcrowding should be avoided. To be safe, at least one cubic foot of water should be allowed for fifty minnows, but this is only an estimate and much depends upon the size and condition of the fish and the temperature of the water and other factors. If an aerator or water pump is present, more minnows can be safely carried. The water should be kept cool and aerated, either by the addition of ice or by the addition of fresh water. If an

aerator or water pump is not available, an old dipper or tomato can punched full of holes makes a good aerator.

A supply of fresh water should be available if fish are to be held for more than a few days. A small pond, live box or stock tank provided with a continuous supply of fresh water is desirable for holding minnows. If a supply of fresh water is not available, an air or water pump should be used and the water should be changed every 24 hours. City water, if chlorinated, may cause some losses, but it is used by some dealers without difficulty. Lake or river water is satisfactory if free from pollution and if not subject to extremes of temperature. Well or spring water is usually cold and when used will result in fewer losses than most any other source of water supply.

Care should be taken to avoid sudden changes in the temperature of the water in which minnows are present. Before transferring minnows from one container to another, or before placing your minnow bucket in a lake, check the water temperature in both containers. Try to get the water temperature approximately equal before the fish are changed. This can usually be accomplished by the addition of small amounts of water until the temperatures become nearly equal. Approximately twenty minutes should be allowed for each five degrees change in temperature. Sudden changes in temperature in either direction will kill every fish.

As has been said above, it is more difficult to hold or transport minnows in warm water than in cold water, because warm water loses its oxygen supply more readily and is able to hold less of this vital gas than cold water. The addition of small quantities of ice or cold water may be necessary. The presence of insufficient oxygen can be recognized because the fish will all be at the surface of the water, many in obvious distress.

Minnow buckets, pails, cans, nets and other equipment should be thoroughly disinfected at frequent intervals. Twelve ounces of salt per gallon of water, or approximately one teaspoon of copper sulphate (blue vitrol) or potassium permanganate per gallon of water, are suitable sterilizing agents.

Infected or sick fish should be removed immediately and either destroyed or placed in a separate tank to avoid the spread of the disease. Diseased fish should be dipped once a day in any one of the disinfectants listed above until the fish shows signs of acute distress, when they should be removed to fresh water. If, after several treatments, the condition does not improve, it is best to destroy the fish. Weekly salt baths of about 3 ounces of salt per gallon of water often proves beneficial in correcting constipation and improving the appetite.

Fish held in tanks for more than a few days should be fed. No more food should be given than can be eaten in a single feeding. All surplus food should be removed because it soon sours and decays and pollutes the water, thereby inviting an epidemic of disease. Most minnows can be kept for a limited time by feeding bread, cracker crumbs, oatmeal or other cereals. It is better to use a balanced diet of meat and cereal, such as can be had by cooking finely ground meat scraps with oatmeal. Many of the balanced dog rations are suitable for feeding fish.

A few suggestions on minnow culture

It is possible for a person to make a success of raising minnows. Besides furnishing the dealer with an adequate supply of minnows of all sizes at all times, propagation conserves the natural food supply in lakes and streams. For raising minnows, a number of ponds would be required.

A section of stream would also be necessary if stream spawning species were to be handled. During the first year, large numbers of small fish could be raised, some of which could be sold in the fall and winter as perch and crappie bait. Several years would be required to build up a supply of larger minnows.

The initial expense in obtaining the property and building the ponds would be the largest item required of anyone wishing to raise minnows. Some experience in fish culture or in handling fish is desirable for all persons entering this field. Fish culture does not consist of merely stocking a pond with a number of adult breeder fish and reaping a harvest several months later. Disease, undernourishment, overfeeding and their consequences must be spotted immediately and a remedy prescribed. An epidemic of disease may kill off all of the fishes in one pond or tank, as it occasionally does even in our best regulated fish hatcheries.

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