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CULTURE AND CARE OF MINNOWS, SHINERS, AND BAIT FISH

Prepared in the Division of Fishery Biology

The term minnow is applied to a number of fishes which reach the adult breeding stage at a small size, most of them belonging to the family CYPRINIDAE, which may be called the "minnow family." This family includes the stone rollers (*Compostoma*), the silvery minnows (*Hyograthus*), dace or chub (*Semotilus*), golden shiner (*Notemigonus*), minnows (*Notropis*), the gold fish (*Carassius*), the carp (*Cyprinus*), and other.

The families PSECIIDAE and UBERIDAE also include a number of small species which are minnows; for example, the top minnows (*Gambusia* and *Heterandria*), the spring minnow (*Fundulus diaphanus*), the variegated minnows (*Cyprinodon variegatus*), swamp minnow (*Chologaster cornutus*), and the mud minnows (*Umbra pygmaea* and *Umbra limi*).

The widespread use of the term "minnow," is applied to the adults of a number of families of fishes and a greater number of genera, renders very difficult the formulation of specific directions for the culture of minnows. To add to the difficulty, persons unfamiliar with fish may term the young of many common food and game fishes "minnow." Detailed information on the characteristics, value and cultural methods for the most important species of the pond minnows are given in the publication of Markus (1939) listed at the end of this leaflet.

Each species of true or so-called minnows differs somewhat in its spawning habits and a knowledge of these conditions is a necessary prerequisite to their extensive propagation. According to spawning habits, minnows may be divided into two groups: pond spawners and stream spawners. The pond spawners may be further divided into two groups. One group gives no parental care to the eggs after they are deposited. The golden shiner is one example and spawns on submerged vegetation. Others in this group, of which the round shiner is a characteristic example, scatter their spawn over the pond bottom. The second group of pond spawners cares for the eggs during incubation. The blunt-nosed minnows for example, deposit their eggs en masse on the underside or ceiling of rocks, logs, and the leaves of pond lilies, or any of the larger aquatic vegetation.

Stream spawners are minnows that deposit their eggs in flowing water. The male usually finds a suitable site in advance of the spawning of the spawning season near a riffle and other spends some time in preparing a nest to meet spawning requirements by cleaning and excavating a small area, as is the custom of the horned dace. After spawning, little or no attention is given to the eggs by the parent fish. In some species the

males remain in the vicinity of the nest for apparently no other purpose than guard duty. Another group of the stream spawners prepare nests in slower flowing water and in the same manner characteristic of the sunfish group. The male remains over the nest during the incubation period. The common shiner has been known to take over nests abandoned by the sunfish.

Forbes and Richardson (1920) classified the habitat of the commoner cyprinoid minnows of the Illinois region. Of the total of 24 species listed, only five showed a marked preference for lowland lakes, and only one demonstrated a marked preference. Upland lakes had a greater attraction for only one species. By far the greater percentage was resident of small rivers and creeks in preference to large rivers. The natural inference, therefore, is that most minnows will undergo a marked change in environment when they are transferred to small stagnant ponds.

From the above facts, it may be inferred that the pond type of spawners would be best suited to intensive culture in small, artificial ponds. However, minnows like the horned dace may be reared in ponds by releasing the small fry in rearing ponds. The eggs have to be stripped from the females and fertilized by milt taken from the males in a similar manner to the customary artificial spawning of trout. The eggs after being fertilized are placed on hatching trays for incubation. The procedure has proven very productive,

A pond of an area of 0.034 acres produced 6,867 fingerling black-head minnows in one season. These fish spawn continually from the latter part of May to early August. The number of Adult fish producing the fore-going number of fingerlings was 91. In spawning, these fish seek to deposit their eggs beneath submerged objects to which the eggs adhere, and provision can be made for this type of spawning by floating boards on the surface or driving short pieces of board horizontally into the bank. The pond should be fertilized several times during the season to augment the natural food supply. In fact, the general requirements for successful pond culture, an ample growth of aquatic vegetation, frequent fertilization, etc., must be met to an unusual degree, since the minnows and shiners are the original consumers of the food material thus produced.

An allied form, likewise a common inhabitant of sluggish waters, is the golden shiner. Experiments at Fairport, Iowa, demonstrated that the species lends itself readily to intensive culture in small ponds. A brood stock of approximately 50 shiners in a pond whose area slightly exceeded 2,500 square feet yielded about 2,000 fingerlings. If the pond contains aquatic vegetation, no further special provision for the spawning need be made during the summer. In general, it is apparent that the sluggish-water types of bait and forage minnows can be reared to advantage in ponds too small to be of use

for food or game fishes. Observance of the general principles of pond culture is essential. No more water than is necessary to maintain the pond level need be supplied. A flourishing growth of aquatic vegetation should be present but not in such quantities as to choke the pond. Fertilization with small quantities of sheep manure, meat and fish scrap, superphosphate, or other organic and inorganic materials should be practiced.

Holding bait fish. In retaining bait fish for a short time in tanks, pools, or aquaria, they must be assured an ample supply of cool, well aerated water and overcrowding must be avoided. Anyone who has attempted to keep bait minnows alive for fishing trips must be aware of the fact that they are extremely sensitive to unfavorable conditions. Minnows and shiners kept in close confinement for some time must be fed, preferably ground meat, stale bread or cracker crumbs, sour milk or small crustacean and insect life from fresh-water pools. Care must be taken to avoid overfeeding and fouling of the water by unconsumed food. Where it is impossible to provide a sufficient supply of circulating water for an aquarium of minnows, a fine jet of compressed air will serve to aerate the water. Otherwise, a floating live box with a wire screen covering may be employed where no running is available. If spring water or cold clean water from any other source can be piped into a trough or a tank having a capacity of 300 to 1,000 gallons a comparatively large number of bait fish can be kept for short periods. Without a specific knowledge of the species to be handled and more complete acquaintance with conditions no more detailed advice can be offered.

Further information may be found in the following references which are available in various public libraries.

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*Obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at the price indicated.

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