TURTLES

Friends or Foes of Fish Culture?

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DO TURTLES HINDER or help the fish-culturist? Are they a benefit to fishing or have they no relation at all to game-fish crops? What should be the fish-culturist's attitude toward the aquatic members of this group of reptiles?

Data have been assembled in Michigan which are useful in answering these and similar questions. The information in hand has been obtained largely from laboratory examination of the contents of the digestive tracts of more than nine hundred turtles, mostly from southern Michigan. Snapping, Blanding's, map, western painted, spiny soft-shelled (rubber-back), and musk turtles comprised a large majority of the specimens examined. Field investigations were conducted on hatchery and natural waters to determine where and how these turtles live, to find the relative abundance of the various kinds, and to learn how they are related to man in ways other than as fish predators.

Most of the specimens studied in the laboratory were collected in conventional, barrel-shaped turtle traps of the type shown in the accompanying illustrations. A detailed description of the method is given later in this paper.

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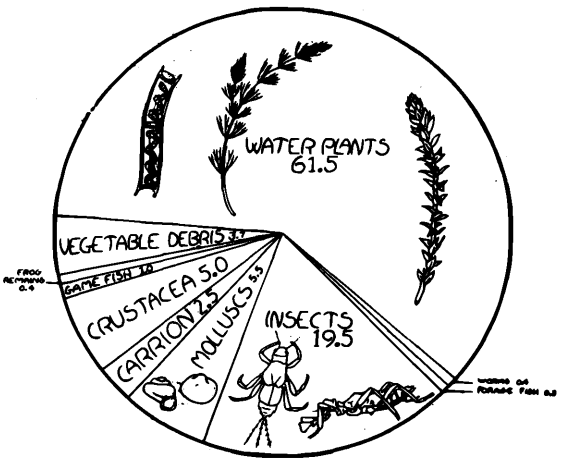
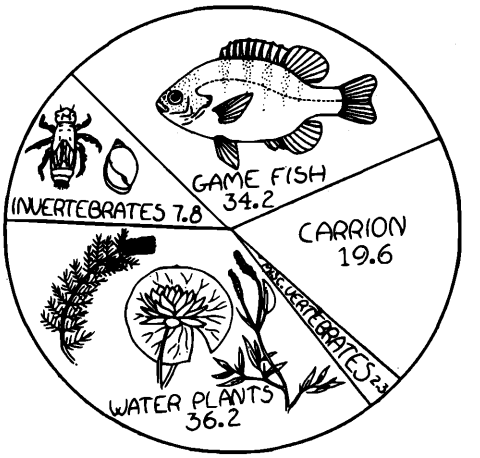
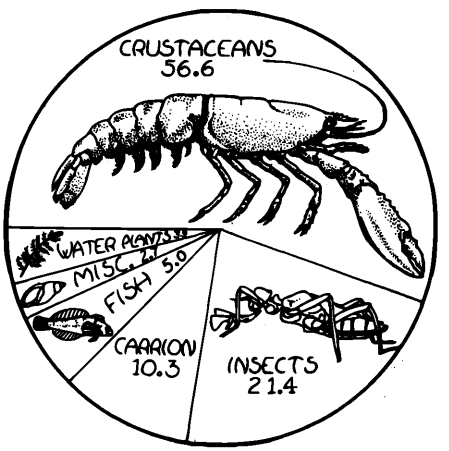
[1] Based on research made possible by the cooperation of the Institute for Fisheries Research, of the Michigan Department of Conservation, the American Wildlife Institute, and the University of Michigan. A part of this report has also been published in AMERICAN WILDLIFE for January-February, 1940.



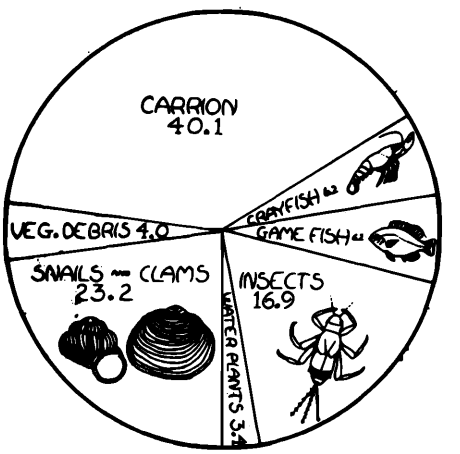
Western painted turtle



Snapping turtle



Blanding's turtle



Musk turtle

The food of several common turtles.
(Charts prepared by J. Roemhild)

The food of these turtles, especially that of the common snapper, differs markedly from that recorded by previous writers on the basis of less extensive studies. About four quarts of food from the stomachs of 186 snapping turtles (Chelydra serpentina) collected on natural waters was made up as follows: one-third, water plants; the second third, game fishes; and the last third, dead fishes and other carrion, insects, crayfishes, snails, and clams (see diagram). Remains of water-plants made up a little more than nine-tenths of the food (about nine quarts) in the intestines of 278 snappers. These findings are considerably at odds with the current general opinions that this turtle is entirely carnivorous, and that it subsists principally on fish and young waterfowl. Twenty-one snappers taken from bluegill and bass rearing ponds had not eaten significantly more game fish, on the average, than had those from wild waters. The major occasions for

concern over this turtle at hatcheries appear to be: (1) when the fishes are extremely crowded in raceways, (2) where eggs of pondfishes are placed on trays in rearing ponds, and (3) when the fishes are concentrated in a seining or holding pool.

Blanding's or the semi-box turtle (Emys blandingii) was discovered to forage chiefly upon crayfishes and aquatic insect larvae in lakes and ponds. Small amounts of carrion, leeches, snails, clams and water weeds were also taken (see diagram). In fish-rearing waters the fishes being cultured appear in the food.

Map turtles (Graptemys geographica) from wild waters had eaten crayfishes, snails, and clams. Also included in their food were a few small fishes and some carrion, insects, and now and then a little aquatic vegetation. No specimens were available for study from hatcheries.

About two-thirds of the food of the western painted turtles (Chrysemys picta marginata) in lakes and ponds was composed of water plants (see diagram). The remaining third was made up chiefly of insects, but includes also some fish remains, leeches, earthworms, crayfishes, scuds, snails, and clams. In hatcheries or rearing ponds, this turtle may prey on eggs and fry and for this reason probably should be removed or excluded from such waters.

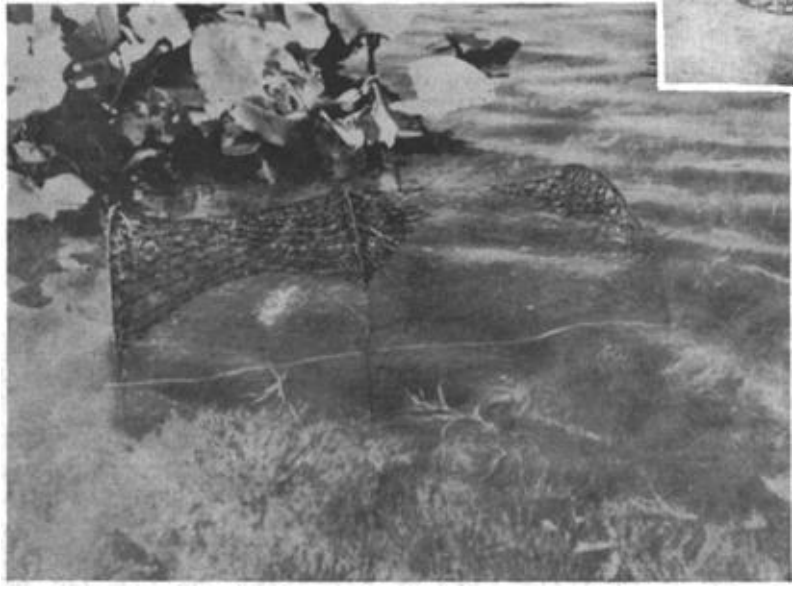
That very adept swimmer, the soft-shelled turtle (Amyda s. spinifera), long thought to prey extensively on fish, was found to feed mostly on crayfishes and burrowing mayfly larvae and other insects. None were studied from fish-cultural waters.

The musk turtle or stink-pot (Sternotherus odoratus) which is so often mistaken for a young snapping turtle, when taken from natural waters had eaten principally carrion, crayfishes, insects, snails, clams, and the hard-coated seeds of water plants (see diagram). At hatcheries there is some evidence that it feeds on eggs and fry, especially those of bass or sunfish. More than a thousand bluegill larvae were found in the stomach of a musk turtle taken from a bluegill nest in a rearing pond.

On the basis of the materials examined from wild waters it seems that of these six common aquatic turtles, the snapper alone eats appreciable amounts of fish. In order to give an idea of the significance of the snapper to game fish populations, the following estimates seem justified. It may be assumed that each of the 186 stomachs which contained food held the remains of less than one "meal" and that each of the 278 intestines which contained food held the remains of more than one meal. Together these may be taken to total 454 meals. The 275 game fishes eaten by these turtles then average about six-tenths of an individual per feeding. In other words, these snappers averaged only about one game fish for every two meals. According to data obtained on snapping turtle populations in two lakes, this turtle averaged about two individuals for each acre of surface area. The average daily loss of game fish due to snappers in such waters might thus be one fish per acre. This is a very small part of the effect of the total predation pressure on the game fish population in any body of water and in itself is doubtless not a determiner of good or bad fishing.

Since the snapping turtle may account in part for poor catches by anglers on certain waters, perhaps thanks are due the commercial turtle hunters who are fast reducing the numbers of these slow-growing reptiles. On some waters, however, it is probable that a reduction of the numbers of sub-legal fishes by this turtle and other fish predators is beneficial to the angler. That a given body of water can produce only so many pounds of fish annually has been known by carp-culturists in Europe for more than a hundred years. If the fish are large, they will be few; if small, many. Predation may, by reducing numbers in some instances, be operating to give ultimately fewer but larger fishes to the angler.

Putting a baited turtle trap over the side.



When properly set, the hoops break water.

In regard to aquatic turtles other than the snapper, the data obtained for natural waters indicate that the greatest importance of these reptiles to game fishes probably lies in the competition they offer such fish for food. These turtles and fishes eat many of the same organisms such as insects, crayfishes, leeches, snails, clams, etc. No general statement regarding policy toward turtles can be made on this evidence, however, since the actual significance of turtles as food competitors is a thing which must be determined separately for each body of water. Similarly, predation by all of these turtles on eggs and fry, particularly on those of basses and sunfishes, must be analyzed for its local effects where it is found to occur.

Several considerations may be pointed out as balancing the possible deleterious effects which turtles may exert as competitors or predators of fishes. They provide a considerable amount of janitorial service in our lakes and streams. Dead and dying fishes and other animals as well as some domestic wastes are eaten

by them and thus prevented from littering bathing and resort beaches. In addition, these turtles are all edible (with the possible exception of the musk turtle) and constitute a source of food supply for man.

In spite of the scanty data on hand for turtles at fish hatcheries it may be stated that at such stations these animals hardly appear to be an asset. They may be trapped for removal to other waters by any of several means. A barrel may be sunk into the bottom of the pond and equipped with a "teetering board." Turtles which climb upon this board to bask in the sun literallty "walk the plank" and are tumbled into the barrel, from which they cannot escape. This type of trap works well for those turtles which habitually crawl out of the water to bask in the sun but for this reason excludes the more strictly aquatic ones such as the snapping, mud, and musk turtles. Many other kinds of effective traps may be designed to fit particular needs. For the most part they will be of two kinds--those which cannot be moved easily from pond to pond, such as the one just described, and those which can be moved more easily.

Ordinary fyke or hoop nets make effective turtle traps but are usually made of twine which will be torn by larger turtles. The conventional type of turtle trap is a modified fyke and may be purchased from dealers or made up to the following specifications (see photos):

NET:	Two-inch square mesh (or size suited to the kinds of turtles) of No. 24 linen seine twine.
LENGTH:	Four to five feet.
HOOPS:	Six gauge steel wire with welded joints, circular, three per trap.
THROAT:	Funnel shaped, eighteen inches deep from front hoop to opening, aperture one to two inches high by twenty inches wide; corners tied to middle hoop.
REAR END:	Closed by pursing string.
PRESERVATIVE:	Asphalt, applied hot to hoops and twine alike.
STRETCHERS:	Wood or nine-gauge steel wire; two for each trap.

Twine keeps best when tarred or barked. A marker float is attached to the trap by two or three feet of stout cord. Before setting such a trap a container filled with bait is suspended in the middle just inside the mouth. Effective containers are punctured tin cans and the best general bait is freshly killed fish. Watermelon rind is a very effective lure for soft-shelled turtles. Best results are obtained when traps are set so that the tops of the hoops are just out of water. In one of these traps as many as seventy-five turtles have been taken in a single night.

WASHINGTON, D. C.--Word has reached the Bureau of Fisheries of the successful arrival at Puno, Peru, on February 10, of a shipment of fish eggs sent by the Bureau from New York on January 26. A loss of only 7½ percent has occurred by the time the eggs were laid down in the Peruvian-Bolivian hatchery at Chucuito, according to Pedro Recavarren, Director of Agriculture at Lima.

The shipment consisted of some two million whitefish eggs and several hundred thousand lake trout eggs, destined to restock Lake Titicaca which lies 12,500 feet above sea level in the Andes mountains bordering Peru and Bolivia. The bulk of the eggs came from New York and Ohio hatcheries.
