

FEATURE ARTICLE

THE CREEK CHUBSUCKER, ERIMYZON OBLONGATUS, IN THE NORTHEAST

---Harold H. Gray

The creek chubsucker (Erimyzon oblongus) is widely distributed throughout the eastern United States. It reaches its northeast geographical limit in southernmost Maine. Here it is confined to about a dozen small ponds and a few streams.

Despite its relatively common occurrence in many states, little attention has been given to the life history, behavior or ecology of the creek chubsucker. This paper presents the results of studies carried out on some southern Maine populations of the species.

Taxonomy

The creek chubsucker is a member of the family Catostomidae, subfamily Catostominae. Together with two other chubsucker species, and the related spotted sucker (Minytrema), it makes up the tribe Erimyzontini.

The genus name of Erimyzon was first proposed by Jordan (1876). Although the type specimen was described by Mitchell (1815), he erroneously placed it in the genus Cyprinus. The only extensive taxonomic work on the genus is included in the classic work of Hubbs (1930). Therein he has described three distinct species - the creek chubsucker E. oblongus, the lake chubsucker, E. sucetta, and the sharpfin chubsucker E. tenuis. The first two species cover much of the eastern United States and are subspeciated on an east-west basis by the intervening Appalachians. Erimyzon tenuis is confined to a rather narrow expanse along the Gulf Coast from Florida to Louisiana.

Description

The creek chubsucker is best characterized, perhaps, by its robust, oblong body which offers a first impression of a moderate humpbacked condition. The color is brownish with a distinct bronzy cast and lighter underparts. The adult displays vague, vertical bars dusky in color. The lateral line is absent. The mouth is subinferior with pleated lips.

In fish over five inches the male can be distinguished from the female by the bilobed anal fin and, during breeding season, by three stout tubercles on each side of the snout. The young have a prominent dark lateral band and are frequently confused with minnows. The creek chubsucker is distinguished from its closest relative, the lake chubsucker, by a larger number of scales in the lateral line (39-45 in E. oblongus, 36-38 in E. sucetta).

Distribution

The creek chubsucker ranges from southernmost Maine south along the Atlantic coastal plain to Florida and west along the Gulf coast to eastern Texas and southeast Oklahoma thence north through Missouri, Illinois and southeastern Wisconsin. It is known from southeastern Michigan, northwestern Ohio and Pennsylvania and the eastern tributaries of Lake Ontario. Specimens from each of the peripheral states are available in the collections of the United States National Museum in Washington, D.C. and were so verified by the author. Earlier works describe a more extreme range including Iowa, Minnesota, North Dakota, Manitoba and east to New Brunswick, Nova Scotia, and even Newfoundland. Harlan and Speaker (1956) provide no record now or ever of the species occurring in Iowa. Eddy and Underhill (1974) report no extant specimens and only sight records from Minnesota and therefore recommend removal of the creek chubsucker from that state's fish faunal list. Kelcher and Koogman (1957) state that no specimens are available to confirm the presence of the genus in Manitoba and indicate that the report of Harkinson (1929) in North Dakota has not been accepted. The reported specimen in the USNM collection from Newfoundland has been lost. Two collections from Nova Scotia proved to be errors of record. Scott and Crossman (1973) report no current evidence of the species in Canada. Three collections from north central Maine were available in the USNM. When examined by the author, all proved to be errors of identification as did a fourth collection taken twenty-five miles north of Sebago Lake. A fifth collection from Sebago Lake was properly identified. It is interesting that the species has apparently retreated from that body of water and similar retreats have been reported in Virginia (Hubbs and Lagler, 1958) and Ohio (Trautman, 1957).

Habitat

In many states where it occurs, the creek chubsucker resides most often in creeks, streams and small ponds. In Maine and apparently some other states also, the typical habitat is a body of water under fifty acres, moderately shallow, having a mud bottom and a significant amount of floating, aquatic vegetation. Maine ponds were often characterized by having sandy shores and slightly acidic waters. Unlike some other states, stream distribution of the creek chubsucker in Maine is limited. Where it occurs in streams, growth is said to be considerably slower and the average size much smaller. Adequate data to support this conclusion is not yet available for this state but seems likely based on the data from other states and the few stream specimens the author has observed.

Associated Species

Two species, the chain pickerel (*Sox niger*) and the brown bullhead (*Ictalurus nebulosus*) are found in all of the ponds where the creek chubsucker occurs in Maine. Other species, the pumpkinseed (*Lepomis gibbosus*), yellow perch (*Perca flavescens*), and the golden shiner (*Notemigonus crysoleucas*) are nearly as common. The white sucker (*Catostomus commersoni*) is also found in virtually all of the same ponds, but seemingly never in any abundance, perhaps indicating a degree of competition.

American eels, common shiners, and the smallmouth bass are found in about half of the chubsucker ponds. Occasionally encountered are largemouth bass, white perch, fallfish, creek chubs, brook trout and brown trout. With perhaps the exception of the northern pike, no significant differences appear in the literature and in the pond selected for Underhill's study (1940) the associated species list is in close agreement.

Forage Role

It is logical to assume that the creek chubsucker might be of some forage value in those areas where it occurs in abundance. Its role in this capacity, however, remains largely undetermined. Only spring studies have been carried out in Maine and even those were of a limited nature. Stomach contents of

dozens of yellow perch, fifty-two chain pickerel, and eight brown trout from three Maine ponds were examined by the author. Of all fish examined only three chain pickerel (all from the same pond) showed chubsucker remains.

The literature offers little supportive evidence of a forage role of the species. Smith, et al (1957) have stated that they appear as a major forage item for pickerel in acidic waters where sunfishes are either absent or not abundant. Other references in the literature refer to the likelihood of their being an important item in the diet of largemouth bass, northern pike, and muskie. Bennett and Childers (1966) report satisfactory results on stocking the related lake chubsucker as a forage species. There is no obvious reason why the young of the creek chubsucker should not also comprise part of the forage of such associated game species but clearly it is an area that will require further study.

Periods of Activity

The creek chubsucker is reported throughout the literature as being nocturnal. Observations on Maine populations reveal this to be only partially true. First, young were more frequently active during the day. This may simply be the result of better observational conditions during the daylight hours and further investigation is warranted.

The second major exception was more definitely established. As will be pointed out in the section on reproduction, breeding was definitely a daytime activity. Thirdly, while adult creek chubsuckers seemed to find sanctuary in deeper waters during the day, net catches indicated at least limited movement at every time of day and night. However, as with other fish, activity was greater on overcast days than on sunny days and very definite periods of movement emerged between 8 pm and 12 pm and again from 5 am to 7 am.

Food Habits

Written accounts of the creek chubsucker label it simply as a bottom feeder. No detailed investigation of food habits appear in the literature. Jordan and Evermann (1905) reported

that it fed on minute crustaceans, insect larvae, and aquatic plants. Schrenkeisen (1938) called it herbivorous and Adams and Hankinson (1928) said some had fed entirely on soil and diatoms and others upon entomostracans and chironomus larvae. The most quantitative study appears to be that of Rice (1942) who examined twenty young specimens averaging only 27mm in length. Intestine contents were listed as ninety-five percent ostracods, five percent Volvox, and a trace of Arcella.

Macroscopic examination of the alimentary tract contents of Maine specimens suggests indiscriminate mud straining habits. Microscopic examination, however, reveals quite a different story. Far from being filled with mud, contents consisted almost entirely of food organisms. Indeed, there was a remarkable degree of selectivity exhibited. In all but one specimen, crustaceans comprised 80-95% (by volume) of the entire diet. The remaining percentage was composed largely of insects, especially chironomid larvae and frequently mayflies. The one exception mentioned above contained about two-thirds chironomids and one-third crustaceans. The primary crustacean groups represented were cladocerans and ostracods with copepods and amphipods far less abundant. In the rare or occasional category were such items as damselflies, caddisflies, beetles, mussels, rotifers, gastrotrichs, bryozoans, nematodes, diatoms, annelids, plant material, sand grains and detritus. Those items together seldom comprised more than five percent of the stomach contents.

Specimens from 2-14" in length were examined. Few differences were found between specimens of various sizes or between specimens from different ponds. It should be noted that only spring foods were analyzed and only specimens from ponds were used in the study.

Growth

The creek chubsucker is not a large fish. Most descriptions cite ten inches as a maximum size. Fish from Maine averaged slightly larger than those reported by Underhill (1940) but significantly smaller than those reported by Wagner and Cooper (1963). Breeding adult females taken from three ponds averaged 8.2-8.9" while males from the same locations were 8.7-9.7". Males were always larger than females averaging some 10-15% more in length and 30-60% more in weight. Differences between ponds accounted for as much as 10% more in length and 60% more in weight. Here are the lengths and weights for males in a typical pond:

Age	II	III	IV	V	VI
Lgth(in.)	5.9	8.0	11.1	12.7	13.6
Wgt(oz.)	1.5	4.2	10.9	15.8	21.0

Females averaged 0.5 to 1.4" less in length over the same age range and weighed 0.3 to 6.0 ounces less. Insufficient numbers of age I fish were available for averaging.

The largest fish taken from any pond was a 14.6" male weighing 30 oz. The largest female taken was 12.8" and weighed 18.5 oz. By way of contrast, fish from a central Pennsylvania lake showed a similar maximum size but much faster growth with two year old males averaging 9.6" and three year olds about 12" (Wagner and Cooper, 1963).

Longevity

The life span of the creek chubsucker appears to vary considerably from pond to pond. Underhill (1940) found eight year classes in a New York pond with four, five, and six year olds predominating. Seven and eight year olds made up less than five percent of the adult population in the pond.

Wagner and Cooper (1963) reported seven year classes with only one specimen reaching the seventh year and only seven percent of the population living beyond the fourth year.

The maximum age of specimens taken from three Maine ponds were 4, 5, and 6 respectively. Older fish comprised very small percentages of the breeding populations which in turn was composed largely of two age classes. In one pond two and three year olds made up 95% of the catch. In a second pond, three and four year olds constituted 84% of the total. In the third pond four and five year olds accounted for 91% of the breeding adults caught.

The question that arises, of course, is why does such a drastic drop occur among older age groups? One possible explanation is that a heavy mortality occurs after spawning. While this phenomena has not been observed in Maine, it does fit with observations made by Breder (Breder and Rosen, 1966) where large numbers of dead fish of uniformly large size were found at the mouths of New Jersey streams just after the breeding season. Arnold (1967) reported similar mass die-offs in a New York Lake.

Thus the oldest individuals may simply die after a final spawning.

Reproduction

Spawning among Maine Erimyzon takes place during the last two weeks of May when the water temperature ranges between 59° and 62° F. Although the fish appear to be most active after dusk or about dawn, spawning takes place from late forenoon to early evening, reaching a peak in mid afternoon.

Spawning sites reported in the literature include both inlets and outlets of ponds. In the pond where the author conducted the most intensive part of his study, both were passed up in favor of sandy north shore sites.

Underhill (1940) reports that it is characteristic of the species to move along the shore before and during spawning. Similar movements were observed in Maine populations but whether this is related to spawning or simply part of the daily movements in search of food is uncertain. The first real sign of spawning is the appearance of loose groups of chub-suckers just offshore of the spawning sites. After what appears to be a general mixing of the group, each male selectively follows a female into shallow water. There pairs tend to maintain a distance of ten feet or so between them and other pairs of fish.

The male follows the female closely giving her occasional prods with his snout tubercles or brushing lightly against her body. The female moves a short distance and the action is repeated. Both sexes frequently stop, pick up a mouthful of sand and then expel it. Should smaller males intrude, as they frequently do, they are quickly driven off by a rush from the attending male. If the intruder is of equal size a fierce contest ensues with opponents butting hard against each other repeatedly, hitting underparts with tubercles and colliding bodies side to side. Seldom does the battle last more than 20 or 30 seconds. In all observations of the author the attending male was the victor and the intruder scooted away to deeper water.

Actual mating takes place when the female swims within a few inches of shore, assumes a head downward position at about a thirty to forty-five degree angle and quivers the caudal fin.

The male slips in beside her and a simultaneous body quivering occurs. At this time the dorsal fins and backs of both fish are often protruding above the water. In what is apparently the moment of release for the milt, the male's tail is curled upward and toward the female. Actual mating lasts about one half to two seconds and is culminated by both fish dashing quickly away to nearby deeper water. The departure leaves a flurry of sand which probably helps to cover the eggs.

Successful mating seems to occur about once every five to ten minutes, usually involving the same pair of fish. While attempted matings take place more frequently, intruders interfere with the process.

Fecundity

It is well known that catostomids are quite prolific. The white sucker (Catostomus commersoni) is reported to produce from 14,000-139,000 eggs with 20,000-50,000 probably being the usual number (Scott and Crossman, 1973). Erimyzon is less fecund.

Wagner and Cooper (1963) reported about 9,000 eggs per average female, with females of fifteen-inch size averaging 29,000 eggs. Figures derived from Maine fish yielded somewhat lower results with an estimated 4,000-5,000 eggs per typical female, and a high of 20,580 from a 12.7 inch, 18.0 oz. one. The average number of eggs per gram of fish weight in Maine specimens consistently averaged between 35-42 while examination of three direct count specimens by Wagner and Cooper yielded 53-89 eggs per gram of body weight.

Population Dynamics

The first study to make a population estimate of the creek chubsucker was that of Underhill (1940). He arrived at a figure of 317 adults in a 35 acre pond or 9 fish per acre. Carnes (1958) reported a density of 12 per acre while Wagner and Cooper (1963) arrived at an estimate of 8 adults per acre. Arnold (1967) in a study of a New York lake found much higher densities - 99 adults per acre during the spawning season and 30 adults per acre during the fall. Based on net catches in Maine, figures of 4-8 adults per acre seemed likely.

In all cases only 2 or 3 year classes make up the bulk of the population. This is probably the result of the post spawning mortality mentioned earlier. Strong and weak year classes have been noted in several studies. In part, however, this may be due to the fact that all of the aforementioned investigators as well as the author experienced difficulty in sampling specimens in the 0+ and 1+ age classes.

For Further Investigation

Like virtually all of our North American native fishes, much remains to be learned about the life history, ecology, and behavior of the creek chubsucker. What has caused its apparent retreat in several localities? What precisely is its forage role at different seasons? Does it really undergo mass dieoffs after spawning? How do age, growth and life activities of stream populations differ from those of lake populations? Why are fish in the age classes of 0+ and 1+ so difficult to capture? Do Erimyzon oblongus make upstream migrations in fall as reported in the old literature and, if so, why? And what about the mysterious sounds that Abbott (1887) described for breeding chubsuckers? Do they really exist? These are only some of the intriguing questions the author is currently investigating. By themselves they are challenging. More importantly, however, they demonstrate the tremendous opportunity that awaits anyone willing to explore the life of a native fish.

Notes: The author would appreciate any information or observations that fellow members may have gathered on this species.

Editor's note: An extensive bibliography accompanied Professor Gray's article (above), which space limitations prevented us from printing. It is available from me on request.