

THE SWAMP DARTER

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Introduction

This is the second in a series of articles describing our native darters. The first article (Schmidt, 1980) discussed the Tesselated Darter, a New England and Atlantic Coast species. The Swamp Darter is found over the same range and in some of the same habitats as the Tesselated Darter, and occasionally they can be collected together. With discussion of the Swamp Darter, the entire darter fauna of New England (2 species) has been covered.

Geography and Systematics

The Swamp Darter (Etheostoma fusiforme) is found from the Ogunquit and Cape Neddick Rivers in southwestern Maine south along the Atlantic coast to Collier and Dade Counties in southern Florida (Collette, 1962). No other darter is found as far south (Briggs, 1958). From Florida, the range of the Swamp Darter extends westward to Caddo Lake on the Texas border and McCurtin County in southeastern Oklahoma. In the Mississippi Valley, the Swamp Darter is found northward to Reelfoot Lake, Tennessee (Collette, 1962) and in Fulton County, Kentucky (Sisk, 1973). A few populations were introduced into western North Carolina (Collette, 1962). Schmidt and Whitworth (1979) discussed the distribution of E. fusiforme in New England in some detail.

The distribution of the Swamp Darter closely follows the fall line (Fig. 1), the border between the hilly piedmont and the flat coastal plain where many of the streams and rivers have rapids and falls. Habitats of E. fusiforme (discussed below) are most common below the fall line, though populations are found above it in Connecticut and southeastern Virginia.

Swamp Darters belong to the subgenus Boleichthys of the genus Etheostoma (Page, 1981). All ten species in this subgenus are characterized by a lateral line strongly arched upward near the head. North of North Carolina, only the Swamp Darter has this characteristic, but elsewhere you must consult either Collette's (1962) key or Page's (1983) key to identify which Boleichthys you have caught. Other small darters of different subgenera may resemble Swamp Darters. Particularly, E. edwini and E. okaloosae of the Florida panhandle and vicinity both have arched lateral lines, but the arch is less pronounced and the lateral line is more complete (the pores end closer to the tail) in these two species. Other small darters that superficially resemble the Swamp Darter either do not have arched lateral lines or have a much less conspicuous arch.

E. fusiforme has had a relatively complicated taxonomic history. Hubbs and Cannon (1935), Bailey (1950), and Bailey and Frey (1951) listed nine different species and subspecies names for the Swamp Darter. Collette (1962) showed that there are only two subspecies of E. fusiforme (Fig. 1); E. fusiforme fusiforme on the Atlantic Coast from the Waccamaw River, North Carolina (Shute, et al., 1982) north to Maine and E. fusiforme barratti from the Pee Dee River, South Carolina south and west throughout the rest of the species' range.

### Habitat

The common name of this darter tells you its typical habitat--swamps and weed-choked ponds. I have collected them in flowing water in Connecticut and Virginia, but usually when found in streams, they inhabit slow backwaters or ponded areas such as old mill ponds or beaver ponds. Bailey (1938) reported that Swamp Darters found in fast water are usually associated with dense vegetation.

Vegetation or other cover is clearly important to Swamp Darters. I have found them over a clean bottom on rare occasions but if vegetation, piles of leaves, or other litter was available Swamp Darters would be found among the litter.

In most of its range, the Swamp Darter is found in dark, acidic water; however, as long as the required cover is available, they do quite well in clear lakes and ponds. Some of the densest populations that I found in Connecticut were in very clear water.

Generally, though, when you are collecting within the range of the Swamp Darter, look in quiet, weedy places. Carefully sort through the weeds that you bring up in your seine or dip net; remember, Swamp Darters are small, cryptically colored, and easy to overlook. In some ponds, I have been very successful collecting Swamp Darters using a dip net from the shore. I have also found that snorkelling with a hand net was very effective for collecting Swamp Darters in moderately clear waters.

### General Biology

Adult Swamp Darters are much smaller than Tessellated Darters. An average adult specimen in New England is about 30 mm long (from tip of nose to tip of tail=total length), roughly  $1\frac{1}{4}$  inches. Their small size makes them easy to overlook and difficult to study.

Swamp Darters feed on small invertebrates which they usually capture on or among aquatic plants. Schmidt and Whitworth (1979) reported that midge larvae and Cladocera (Daphnia) were the most significant foods in Connecticut ponds. Copepods, amphipods, and ostracods were frequently taken, and mayfly and caddisfly larvae were eaten occasionally. These

observations were similar to statements by Everhardt (1950) and Collette (1962 and 1966). Most of the published feeding data are for E. f. fusiforme. My observations of aquarium-held Swamp Darters indicate they do best on live food. They readily take Daphnia and Tubifex worms. Collette (1962) reported training Swamp Darters to eat frozen brine shrimp, frozen Daphnia, and dried fish food formed into small pellets. He supplemented the diet with live guppy fry. If anyone has other experiences with feeding Swamp Darters, I would like to hear from you.

Swamp Darters are a very short-lived fish. In the southern parts of the Atlantic Coast they live for only one year and presumably die soon after they spawn for the first time (Collette, 1962). In the northeast, many Swamp Darters live out the summer after spawning for the first time and some survive into their second fall (Schmidt and Whitworth, 1979). The largest recorded specimen measured 55 mm in total length and was collected in Connecticut during its second fall of live. The life span in aquaria is not documented to my knowledge, but one might expect them to live longer than in the wild. Nevertheless, you should not be disappointed if your Swamp Darters do not live in captivity for more than a year.

### Reproductive Biology

As with Tessellated Darters, the spawning colors of Swamp Darters are not spectacular. In the breeding males, the membranes between the first four dorsal fin spines become blackened, frequently appearing as a dark blotch or bar. The anal and pelvic fins develop darker spots than normal, and the cheeks, belly, and breast areas are also darkened. Collette (1962, Figs 7 and 10) presents photographs of breeding male Swamp Darters. This breeding coloration can be subtle, so you must observe your specimens carefully.

Tubercles (small bony protuberances) appear on the anal fin rays and on the pelvic fin rays of breeding males. These tubercles are more extensive and longer-lasting on E. f. barratti than on E. f. fusiforme (Collette, 1962). The tubercles are barely visible to the unaided eye.

Spawning occurs in early to mid spring (April and May) in the northeast and presumably occurs earlier in the southern subspecies. Males with well-developed tubercles have been caught as early as October on the Gulf Coast (Collette, 1962), but there are no published accounts of spawning time for E. f. barratti.

Spawning behavior in Swamp Darters is less complex and less gymnastic than in the Tessellated Darter (Schmidt, 1980). The following description was taken, in part, from Fletcher (1976), an article reprinted in American Currents. The male

displays before the female by spreading his fins and "dancing." Apparently male Swamp Darters are not territorial and do not defend an area or protect a female from rivals. Once a female becomes interested, the pair swims through the vegetation side by side. The male assumes a position astride the female (see the photograph by Fletcher, 1976) and a few eggs are deposited on the leaves of the plants and then fertilized. This process continues, with the pair darting in and out of the vegetation. No one knows if the female lays all her eggs with one male or if the spawning act terminates for other reasons. There have been no observations on how many females a male will spawn with, or, conversely, how many males a female will spawn with. Apparently neither sex pays any attention to the eggs once they are laid. In contrast to the behavior of the Tessellated Darter, the eggs are simply left to luck. As far as I know, the fecundity (number of eggs in any given female) has never been determined for this species.

Swamp Darters are not bashful about spawning (Fletcher, 1976). I observed spawning behavior in a pair of Swamp Darters about an hour after being transferred to an aquarium from the field. More quantitative observations than have been made to date, particularly on the number of eggs spawned in each spawning act and the number of partners chosen, would be very valuable information.

Eggs hatch in 8-10 days (at about mid 60s F) and larvae require infusoria for about the first week. Fletcher (1976) reports changing over to newly hatched brine shrimp after the first week. Fletcher (1976) said that the fry were pelagic (swimming up in the water column) for about the first month of life. This is a very interesting observation that has not been confirmed in the wild but is rather important in the ecology of the Swamp Darter since the small pelagic fry would be easy prey for a variety of organisms. This observation is also interesting since the adult Swamp Darters, like many fishes that spend their time on the bottom, have no swim bladder to buoy them up in the water.

### Summary

Swamp Darters make very desirable aquarium fishes. They are hardy and will tolerate low oxygen, high temperatures, and other types of mishandling. They are not at all shy about performing for their captives, including spawning.

Although the basic biology of these interesting fish is well known, our knowledge of many aspects of the Swamp Darter's life could be enhanced by aquarium observations. For instance, the spawning behavior of E. f. barratti has not been described, though I am sure it is similar to E. f. fusiforme.

Even though this species is not spectacularly colored, many hours of enjoyment can be derived from observing these subtly attractive fish.

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DISTRIBUTION MAP OVERLEAF

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MUSKELLUNGE SYMPOSIA

Two conferences on the muskellunge are planned for the near future, according to the American Fisheries Society. "Trends of Muskellunge Management in a Changing Environment" is the title of a technical session to be held at the annual meeting of the American Fisheries Society in Milwaukee, Wis., August, 1983. More information can be obtained by contacting Mike Dombeck, Chequamegon National Forest, 157 N. Fifth Ave., Park Falls, WI 54552.

A National Musky Symposium, sponsored by Muskies, Inc. and Minnesota Dept. of Natural Resources, will be held in the La Crosse, Wis. Convention Center on April 4-6, 1984. For further information, please call Bob Schmidt (701)241-3606.



Fig. 1. The distribution of the two subspecies of the Swamp Darter in the eastern and southern United States. The solid dot in western North Carolina represents an introduced population. The map was prepared by Kathleen Schmidt.