SPAWNING OF THE STRIPED MULLET, *Mugil cephalus*, IN THE NORTHWESTERN GULF OF MEXICO[1]

Pelagic eggs of striped mullet, *Mugil cephalus*, were identified from ichthyoplankton samples taken on December 2, 1977, from 89 to 98 km off the Texas coast in the northwestern Gulf of Mexico. This is the first reported spawning of striped mullet in this area. Diameters of eggs ranged from 0.91 to 0.99 mm and averaged 0.95 mm, and diameters of oil globules ranged from 0.30 to 0.36 mm and averaged 0.33 mm. Newly hatched yolk sac larvae were 2.1 mm long.

The striped mullet, *Mugil cephalus* Linneaus, has a cosmopolitan distribution. It occurs in the western Atlantic from Nova Scotia to Santos, Brazil (Briggs 1958). During 1977, 9,926 metric tons were caught by commercial fishermen in the United States (U. S. Department of Commerce 1978). It is an important species in Florida waters where it is also called black mullet and liza.

Although much has been published on the biology of the striped mullet, little is known about the exact locations of their spawning grounds in the Gulf of Mexico. Many authors reported that striped mullet spawn either inshore or within a few miles of the beach (Higgins 1927, Hildebrand and Schroeder 1928, Breder 1940, Gunter 1945, and Taylor 1951). Broadhead (1953) inferred that striped mullet probably spawn 9-37 kilometers off the northwest Florida coast. Anderson (1958) also inferred that striped mullet spawned offshore from the 37 meter line to the Gulf Stream along the Atlantic coast from North Carolina to lower Florida. Prior to our ichthyoplankton survey the only known spawning area in the Gulf of Mexico was reported by Arnold and Thompson (1958), who found striped mullet eggs, larvae and juveniles 74-92 kilometers southeast of the Mississippi River Delta over the continental shelf in water 914 to 1645 m deep.

Our mullet eggs were collected in 1977 during one of nine ichthyoplankton cruises made in the northwestern Gulf of Mexico. The area covered about 8,760 sq km extending from Port Isabel, Texas near the Mexican border to Matagorda Bay (Figure 1).

All ichthyoplankton collections were made with paired bongo net samplers, using standard sampling techniques and equipment (Jossi *et al.* 1975, Smith and Richardson 1977). Tows were double

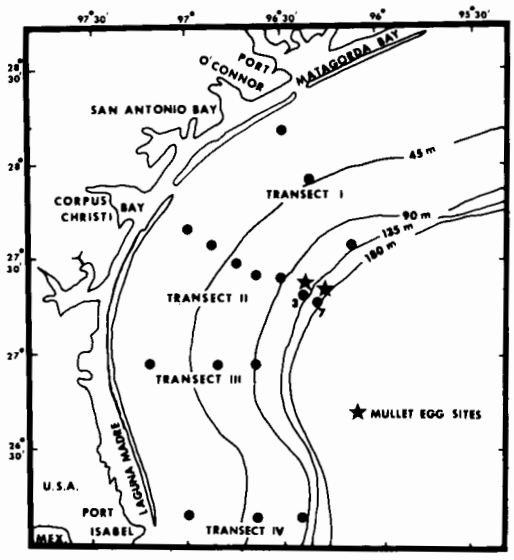

Figure 1. Ichthyoplankton sampling area showing station locations and locations of striped mullet egg collections during 1977 off the south Texas coast.

[1]Contribution No. 79-01PC, NMFS, SEFC, Panama City Laboratory, 3500 Delwood Beach Road, Panama City, FL 32407.

oblique and were made during both day and night from the stern of the ship. Salinity and temperature measurements were taken with STD casts at each station.

Plankton samples were preserved in about 7% buffered Formalin in seawater. Ichthyoplankton was sorted from the entire 0.333 mm net sample. All measurements were made with a stereoscopic microscope using an ocular micrometer. Identifications were made using published descriptions of striped mullet (Sanzo 1936, Vodianitskii and Kazanova 1954, Tang 1964, Yashouv and Berner-Samsonov 1970, and Shehadeh and Norris 1972).

Striped mullet eggs were found in samples collected on December 2, 1977, at Stations II-3 and II-7 located 89 to 98 km offshore from Port Aransas, Texas, at depths of 131 and 183 m (Figure 1). Mean water temperatures and salinities through the water column were 22.2°C and 36.4°/∞ at Station II-3 and 22.4°C and 36.5°/∞ at Station II-7. The total number of eggs collected was 1,112 at Station II-3 and 4,128 at Station II-7. Egg abundances were estimated to be 3,763 and 12,684 under $10m^2$ of sea surface, respectively. Diameters of eggs ranged from 0.91 to 0.99 mm and averaged 0.95 mm, while the oil globules ranged from 0.30 to 0.36 mm and averaged 0.33 mm in diameter. Three yolk sac larvae with mean notochord length of 2.1 mm were also recorded from the samples.

The spawning times of the striped mullet are well documented. Anderson (1958) stated that striped mullet spawned along the South Atlantic coast of the United States from late November to early December or into February. Observations by Gunter (1945) indicated that spawning of striped mullet off the Texas coast occurs from late October to early January with the peak in late November and early December. More recent work by Moore (1974) in the estuarine and coastal waters off Port Aransas showed that post-spawning striped mullet of both sexes appeared from December through May, indicating that some fish had completed spawning by December and that all fish had done so by May. He also suggested that individual mullet spawn more than once during the same spawning season. Our findings indicate that the striped mullet spawns in early winter in the northwestern Gulf of Mexico and support those of Arnold and Thompson (1958).

Based on water temperatures during the time of collection, the mullet eggs probably were about two days old. Hatching of *M. cephalus* eggs in the laboratory at 22°C required 48-50 hrs (Shehadeh and Norris 1972). Drift bottles released in the sampling area in December generally moved in a southwestern direction at a velocity of 10 km or more per day (U. S. Department of Commerce 1976). Thus the approximate spawning site was over the edge of the continental shelf, about 20 km northeast of our sampling site.

ACKNOWLEDGEMENTS

We thank Anne H. Naplin and Elbert H. Ahlstrom for their verification of our mullet egg identification. They and Edward D. Houde reviewed the paper.

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