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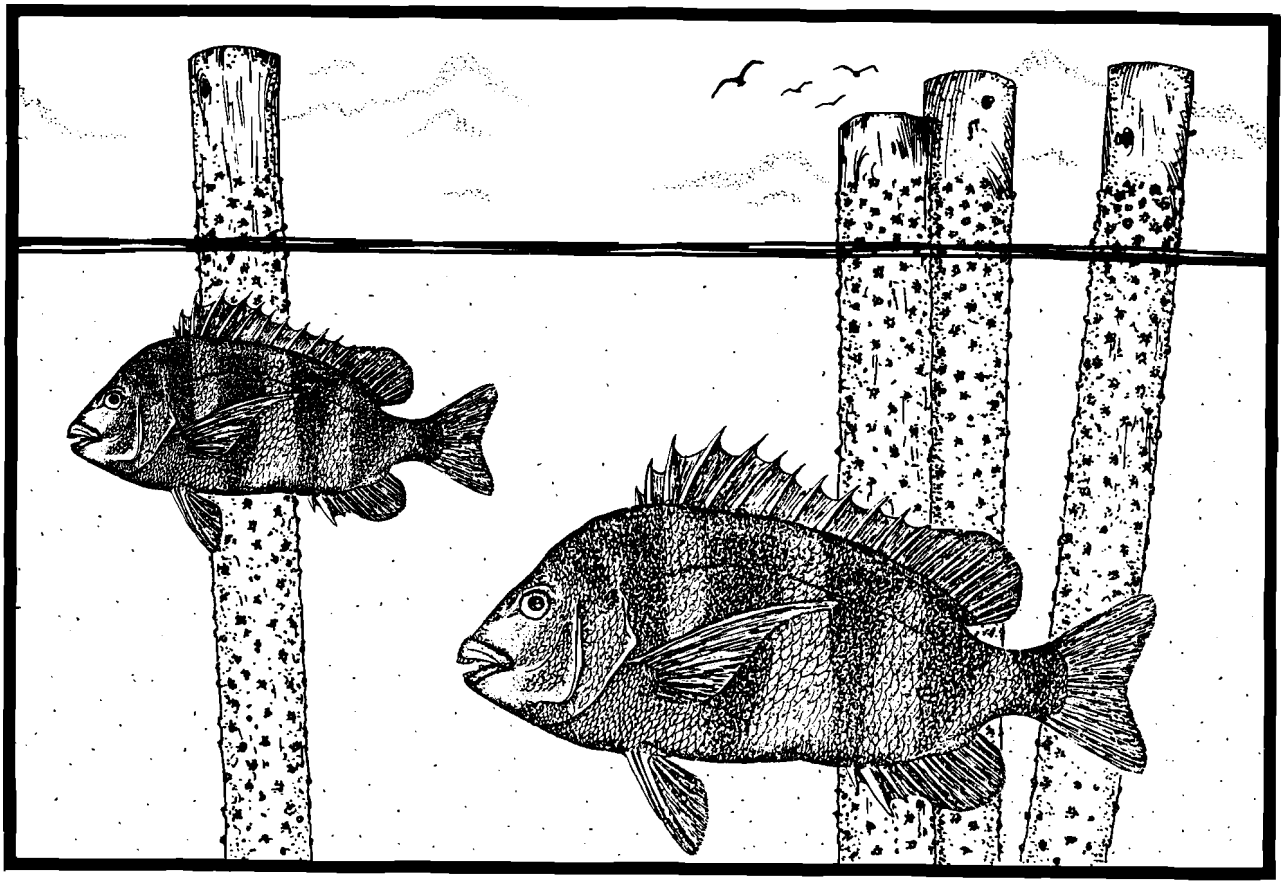
Biological Report 82(11.29)
March 1985

TR EL-82-4

Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Gulf of Mexico)

SHEEPSHEAD



Fish and Wildlife Service
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Coastal Ecology Group
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This is one of the first reports to be published in the new "Biological Report" series. This technical report series, published by the Research and Development branch of the U.S. Fish and Wildlife Service, replaces the "FWS/OBS" series published from 1976 to September 1984. The Biological Report series is designed for the rapid publication of reports with an application orientation, and it continues the focus of the FWS/OBS series on resource management issues and fish and wildlife needs.

Biological Report 82(11.29)
TR EL-82-4
March 1985

Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Gulf of Mexico)

SHEEPSHEAD

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Waterways Experiment Station
Vicksburg, MS 39180

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PREFACE

This species profile is one of a series on coastal aquatic organisms, principally fish, of sport, commercial, or ecological importance. The profiles are designed to provide coastal managers, engineers, and biologists with a brief comprehensive sketch of the biological characteristics and environmental requirements of the species and to describe how populations of the species may be expected to react to environmental changes caused by coastal development. Each profile has sections on taxonomy, life history, ecological role, environmental requirements, and economic importance, if applicable. A three-ring binder is used for this series so that new profiles can be added as they are prepared. This project is jointly planned and financed by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.

Suggestions or questions regarding this report should be directed to one of the following addresses.

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CONVERSION TABLE

Metric to U.S. Customary

Multiply	By	To Obtain
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
kilometers (km)	0.6214	miles
square meters (m^2)	10.76	square feet
square kilometers (km^2)	0.3861	square miles
hectares (ha)	2.471	acres
liters (l)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (g)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (t)	2205.0	pounds
metric tons	1.102	short tons
kilocalories (kcal)	3.968	British thermal units
Celsius degrees	1.8(°C) + 32	Fahrenheit degrees

U.S. Customary to Metric

inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
acres	0.4047	hectares
square miles (mi^2)	2.590	square kilometers
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
short tons (ton)	0.9072	metric tons
British thermal units (Btu)	0.2520	kilocalories
Fahrenheit degrees	0.5556(°F - 32)	Celsius degrees

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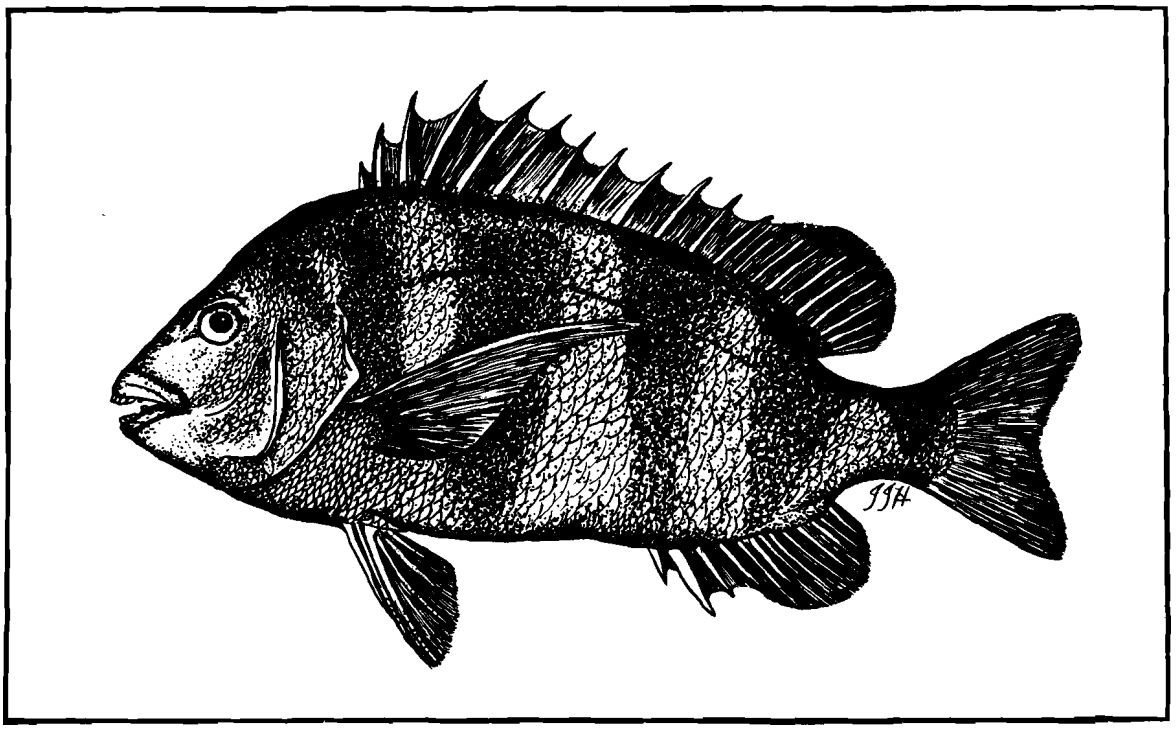

Figure 1. Sheepshead.

SHEEPSHEAD

NOMENCLATURE/TAXONOMY/RANGE

Scientific name.....Archosargus probatocephalus
Preferred Common Name.....Sheepshead
Other Common Names.....English: Sheepshead bream, sheepshead porgie, convict fish; French: Rondeau mouton; Spanish: Sargo chopa, pargo
Class.....Osteichthyes
Order.....Perciformes
Family.....Sparidae

Geographic range: The sheepshead (Figure 1) is common along the Atlantic and Gulf of Mexico coasts (Figure 2) of the United States, from Cape Cod to Texas (Bigelow and Schroeder 1953). It has been reported from Nova Scotia (Gilhen et al. 1976) to Rio de Janeiro (Randall et al. 1978). The sheepshead is divided into three subspecies: A. p. probatocephalus, the northern form, is distributed from Nova Scotia to Cedar Key, Florida; A. p. oviceps ranges in the Gulf of Mexico from St. Marks, Florida to the Campeche Bank, Mexico; and A. p. aries, the southern form, ranges from Belize to Bahia de Sepetiba, Brazil (Caldwell 1965; Randall et al. 1978; Burgess 1980).

MORPHOLOGY/IDENTIFICATION AIDS

Morphological descriptions and identification aids for the sheepshead in this report were largely extracted

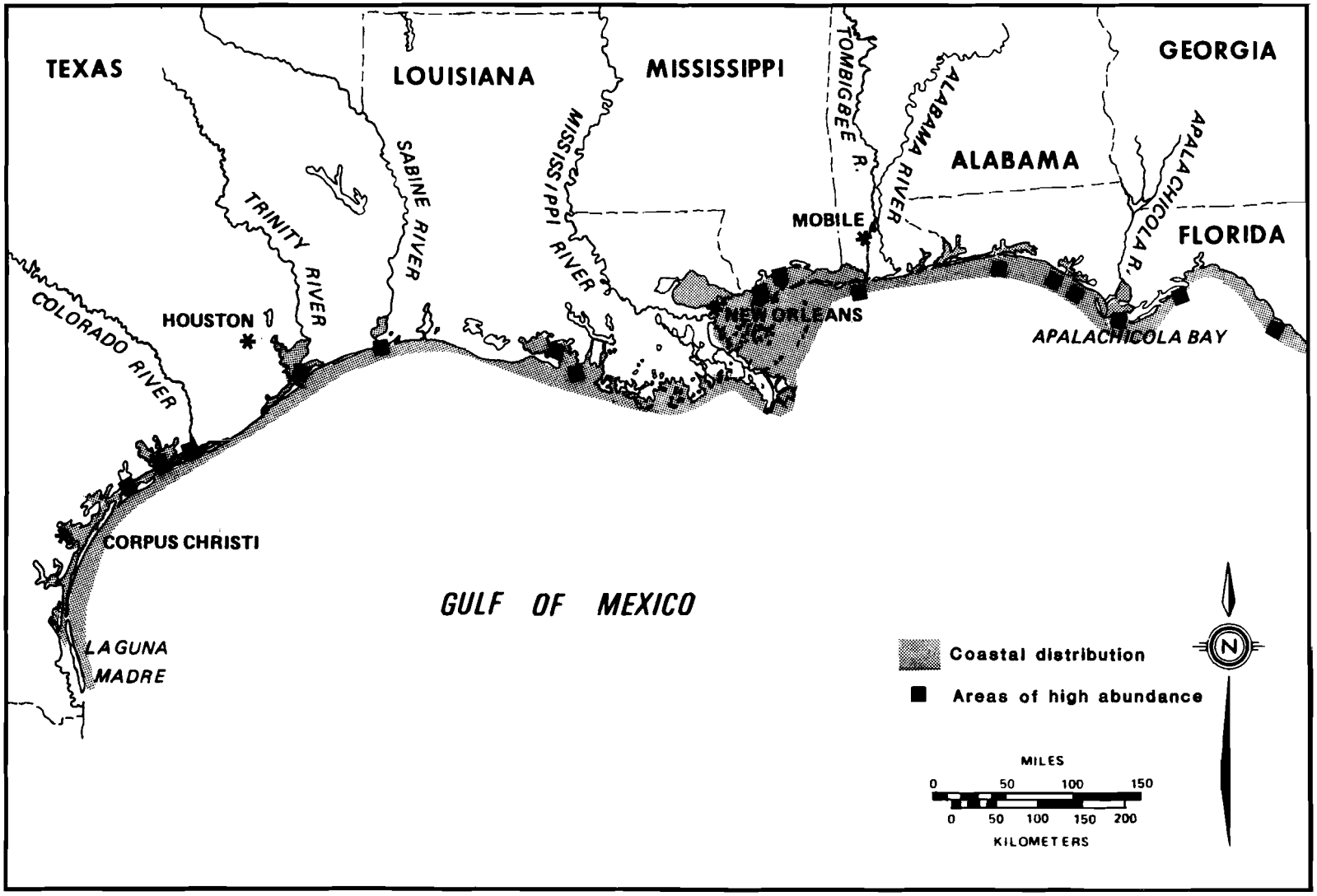

Figure 2. Distribution of sheepshead along the coast of the Gulf of Mexico.

from Hildebrand and Schroeder (1927), Hoese and Moore (1977), and Johnson (1978). The primary counts of fin rays are as follows: Dorsal-XII (spiny rays), 10-12 (soft rays); and anal-III, 10-11 respectively. There are 44-49 scales in the lateral line and 8 scales above and 15 below the lateral line at the insertion of the dorsal fin. The body is deep and compressed and the back is elevated above the short and deep head. The snout is short, 2.1 to 2.6 times in head length; the eye is 2.75 to 4.55 in head length. The mouth is moderate and nearly horizontal, 2.7 to 3.3 times in head length. The incisor-like anterior teeth and broad posterior molars are strong. Gill rakers are short, with six to seven on the lower limb of the first arch. Scales are finely serrate. The dorsal fin has strong spines; the spinous portion is longer than the soft portion. The caudal fin has a shallow fork. The second spine of the anal fin is enlarged. The pectoral fins are long, 2.7 to 3.7 times in standard length (SL).

The adult sheepshead is gray to greenish-yellow and has five to seven vertical black crossbars along the body. Crossbars are more distinct in young specimens. The dorsal, anal, and ventral fins are mostly dusky to black; the caudal and pectoral fins are greenish.

REASON FOR INCLUSION IN THE SERIES

The sheepshead is a relatively popular sport fish in much of its range (McClane 1964) and usually can be caught throughout the year in the Gulf of Mexico and its estuaries (Perret 1971). It has some commercial value for food (Hildebrand and Schroeder 1927; Perlmutter 1961; Burgess 1980), but its acceptance as a food fish varies among coastal states.

In Alabama, and probably the other gulf states as well, more sheepshead could be caught without endangering their abundance (Swingle 1977).

Information on the biology and population dynamics of the sheepshead is scarce.

LIFE HISTORY

Spawning

Sheepshead probably spawn in spring in mid-Atlantic coastal waters (Jordan and Evermann 1896; Hildebrand and Cable 1938; Springer and Woodburn 1960) and in the Mississippi Sound (Christmas and Waller 1973). Spawning probably takes place offshore because larvae and ripe adults are scarce in spring in shallow beach waters and estuaries (Hildebrand and Cable 1938; Springer and Woodburn 1960).

Sheepshead tend to congregate in nearshore waters of the gulf in March, April, and May (Swingle 1977). Adults migrate to offshore waters to spawn in spring and later return to nearshore waters and estuaries.

Sheepshead eggs are about 0.8 mm in diameter (Rathburn 1892), are buoyant, and hatch in about 40 hours at water temperatures near 25°C (Rathburn 1892; Smith 1907).

Larvae

The data on larvae in this section are largely taken from Mook (1977). His findings are the result of his examinations of specimens from the collection of the Florida Department of Natural Resources Marine Laboratory.

Yolk-sac larvae are about 2.0 to 4.5 mm long (Johnson 1978) and have a median fin fold (Mook 1977). The caudal fin is the first of the median fins to form, becoming apparent in larvae 3 mm long as ray elements in the post-ventral part of the fin fold. The caudal and anal fins are well developed

in larvae 4-mm long. The pectorals, the first paired fins to develop, appear as small fin buds in 2-mm long larvae and have developed ray elements in larvae 4 mm long. Yolk-sac larvae of sheepshead have about 24 myomeres (successive muscle segments).

Pigmentation in yolk-sac larvae is limited to one small melanophore at the angle of the jaw and three melanophores along the ventral side of the body posterior to the vent. Some individuals may have one or two small melanophores on the yolk sac. Most melanophores disappear in larvae 6 mm long (Mook 1977).

The morphological development of larval sheepshead (5 to 25 mm long) is similar to that of other perciform fishes, but they attain adult characteristics at a smaller size than do other sparid fishes (Mook 1977). At 6 mm, body depth/length ratio is 3.4, head length/body length ratio is 3.0, and the snout length/head length ratio is 4.2 (Hildebrand and Cable 1938; Johnson 1978). The caudal fin is well developed (Hildebrand and Cable 1938), and the dorsal fin has 7 spines and 12 soft rays.

Pigmentation of the body of larval sheepshead is brownish with a median ventral line. There are three black spots -- one behind the isthmus, one below the base of the pectoral fin, and one a short distance anterior to the anal fin (Hildebrand and Cable 1938). Two dark specks are located at the base of the anal fin as well (Hildebrand and Cable 1938, Johnson 1978).

Most evidence suggests that sheepshead eggs hatch in offshore waters and that the larvae or postlarvae move inshore along beaches, and into estuaries (Hildebrand and Cable 1938; McClane 1964; Burgess 1980). Ostracods constitute much of the diet of sheepshead less than 30 mm long (Hildebrand and Cable 1938).

Juveniles

The dorsal and anal spines of juvenile sheepshead (25 to 30 mm long) are similar to those of adults (Hildebrand and Cable 1938; Johnson 1978). The caudal fin is forked and the lateral line is fully developed. The pectoral fins become larger and oblique instead of rounded as in smaller fish (Hildebrand and Cable 1938). Juvenile sheepshead are most abundant in grass flats and over mud bottoms (Hildebrand and Cable 1938; McClane 1964; Burgess 1980). In late summer, when juveniles are about 40 mm long, they begin leaving the grass flats (Hildebrand and Cable 1938; Johnson 1978) and congregate with adults around stone jetties, breakwaters, piers, and wrecks (Hildebrand and Cable 1938; LaMonte 1952; McClane 1964; Mook 1977; Burgess 1980; Juneau and Pollard 1981).

Juvenile sheepshead collected on grass flats had eaten primarily copepods and filamentous algae (Hildebrand and Cable 1938). Sheepshead that inhabited areas with structures (e.g., pilings and jetties) fed primarily on mollusks and crustaceans (Hildebrand and Cable 1938; LaMonte 1952; Randall et al. 1978).

Migration

Sheepshead are not a true migratory species (Gilhen et al. 1976) -- their movements are primarily offshore and inshore. In Texas and Louisiana they move offshore with the onset of cool weather in late fall (Gunter 1945; Kelly 1965). In winter, high concentrations of sheepshead have been reported at depths of 7 to 12 fathoms near oil platforms and artificial reefs off the Mississippi River Delta and the Mississippi and Alabama coasts (Bennie A. Rohr, National Marine Fisheries Service, Pascagoula, Mississippi; pers. comm. 1983). Sheepshead overwinter in offshore gulf waters and spawn in spring. After spawning, they

apparently return to nearshore waters.

GROWTH CHARACTERISTICS

The sheepshead grows and matures slowly (Hildebrand and Cable 1938; Johnson 1978). No published data were found on growth beyond age group 0 or on size at maturity. Springer and Woodburn (1960) reported that the average total lengths (TL) for young-of-the-year in the Tampa Bay area were 21, 29, and 42 mm long in June, July, and August, respectively.

The heaviest sheepshead recorded weighed 66 kg (Hildebrand and Schroeder 1927; Perlmutter 1961). Large sheepshead in the Chesapeake Bay area ranged from 11 to 33 kg (Hildebrand and Schroeder 1927). Near Beaufort, North Carolina, most sheepshead caught by anglers were 280-380 mm long and weighed 0.5 - 1 kg. Individuals up to 500 mm and 2.3 kg sometimes were caught (Hildebrand and Cable 1938). A sheepshead weighing about 5.4 kg is considered large along the Mississippi coast; they are larger in Louisiana (Bennie A. Rohr, National Marine Fisheries Service, Pascagoula, Mississippi; pers. comm. 1983).

FISHERY

In 1964, sheepshead constituted 15% of the brackish water fish caught in the Mobile Delta by sport fishermen (Swingle et al. 1966). In 1975, about 64% of the sheepshead landed in Alabama were taken by sport fishermen (Wade 1977). In 1979, 1.8 million sheepshead were caught in the Gulf of Mexico by sport fishermen (National Marine Fisheries Service 1981). The sport fishery for sheepshead probably produces a major portion of the total landings of sheepshead in the Gulf States.

Commercially, most sheepshead are accidently caught by shrimp trawlers and discarded (Swingle 1977; Benson 1982), but some are taken intentionally for the market in March, April, and May. Sheepshead are also caught with bottom longlines, seines, and trammel nets (Randall et al. 1978; Tarver and Savoie 1976; Juneau 1975; Christmas and Waller 1973). In some years, sheepshead compose up to 12% of the finfish biomass taken in 12-m trawls off the Mississippi and Alabama coasts during the National Marine Fisheries Service spring groundfish survey (Bennie A. Rohr, National Marine Fisheries Service, Pascagoula, Misssissippi; pers. comm. 1983).

Commercial catches of sheepshead were largest in Florida and Alabama in 1981, and in Texas and Louisiana in 1982 (Table 1) (National Marine Fisheries Service 1983). From 1971 to 1982, annual commercial landings of sheepshead in the northern Gulf of Mexico (including Florida's east coast) was about 453.6 tons (t) (National Marine Fisheries Service 1983). The northern gulf landings (Table 1) were 554 t valued at $246,500 in 1981 and 558 t valued at $225,300 in 1982 (National Marine Fisheries Service 1983).

Sheepshead landings declined in the Gulf States from about 1 million lb in 1939 to a low of 572,000 lb in 1965 (Gunter 1945; Lyles 1967; Christmas and Waller 1973). This decline was attributed more to reduced fishing intensity than to a reduction in available stocks. Landing statistics from 1971 to 1982 support this conclusion (Perret 1971; Christmas and Waller 1973).

ECOLOGICAL ROLE

Sheepshead are omnivorous, and often eat plant material as well as invertebrates and small vertebrates that inhabit shallow, inshore brackish waters (Hildebrand and Cable 1938; Gunter 1945; Darnell 1961; Johnson

Table 1. Commercial sheepshead landings in the Gulf States, 1981-82 (National Marine Fisheries Service 1983).

State	1981 Weight (t)	1981 Value (thousands of dollars)	1982 Weight (t)	1982 Value (thousands of dollars)
Florida	253	$139.3	77	$ 43.3
Alabama	111	36.0	132	43.8
Mississippi	80	24.4	68	21.7
Louisiana	59	27.7	135	36.9
Texas	51	19.1	146	79.6
Gulf Total	554	246.5	558	225.3

1978; Kelly 1965; Odum et al. 1982; Overstreet and Heard 1982). The diet of larval, juvenile, and adult sheepshead was summarized by Benson (1982). Sheepshead larvae usually eat copepods, amphipods, and other zooplankton. Small juveniles eat copepods, mysids, polychaetes, and chironomid larvae; and large juveniles and adults eat blue crabs, barnacles, young oysters, clams, other mollusks and crustaceans, and small fish -- primarily young Atlantic croakers (Odum et al. 1982). The role of the sheepshead in the trophic dynamics of estuaries has not been well documented.

DISEASE AND PARASITES

Sheepshead are hosts of ciliates (Overstreet and Howse 1977), nematodes (Norris and Overstreet 1975), trematodes (Sparks 1957; Hendrix and Overstreet 1977; Deardorff and Overstreet 1981), and isopods (Overstreet 1978), none of which are known to endanger populations of the species.

ENVIRONMENTAL REQUIREMENTS

Temperature and Salinity

Sheepshead have been collected from water at temperatures of 5° (Christmas and Waller 1973; Perret 1971) to 35.1°C (Johnson 1978). Juveniles and adults were collected in gulf waters with a temperature range of 8.0° to 29.6°C. Dunham (1972) and Tarver and Savoie (1976) collected sheepshead from the Lake Pontchartrain-Lake Maurepas estuarine complex in water temperatures of 10° to 34.9°C.

Sheepshead are euryhaline (Gunter 1956) and have been collected in water at salinities of 5.3 to 25.0 ppt (Perret and Caillouet 1974), 2.9 to 22.5 ppt (Dunham 1972), 0.1 to 9.3 ppt (Juneau 1975), 0.0 to 30.0 ppt (Perret 1971), 0.0 to 9.9 ppt (Tarver and Savoie 1976), and 0.0 to 1.5 ppt (Kelly 1965).

No information on lethal upper and lower thermal limits for larvae, juveniles, or adults has been reported. In the Lake Pontchartrain-Lake Maurepas estuarine complex, sheepshead were most abundant at temperatures of 30° to 35°C and salinities of 5 to 10 ppt (Tarver and Savoie 1976).

Other Environmental Factors

Young juveniles commonly live in grass flats over mud bottoms, whereas adults and older juveniles usually congregate on the bottom or along the shore near rocks, pilings, breakwaters,

jetties, and piers.

Sheepshead were killed during severe oxygen depletion in semi-open and closed canals in coastal Louisiana (Adkins and Bowman 1976), but the minimal dissolved oxygen tolerances for sheepshead are unknown.

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16. Abstract (Limit: 200 words)

Species profiles are literature summaries of the taxonomy, morphology, range, life history, and environmental requirements of coastal aquatic species. They are prepared to assist in environmental impact statements. The sheepshead, Archosargus probatocephalus, contributes moderately to the multi-million dollar commercial and sport fishery in the northern Gulf of Mexico. Commercial landings for 1982 were 558 t valued at $225,300; more than 1.8 million sheepshead were caught by anglers in 1979.

Juveniles and adults move offshore as temperatures decline in fall. Spawning probably takes place in offshore waters during the spring. Larvae move inshore to grass flats in estuaries where they feed on soft plants and animals. Juveniles and adults live near structures on the bottom, such as pilings, or along the shore; they are omnivorous, but primarily eat mollusks and crustaceans.

Sheepshead can tolerate wide ranges of temperatures and salinities. Little is known about the actual time of inshore and offshore movements, growth rate, age composition, role in trophic dynamics of estuaries, and age at maturity.

17. Document Analysis a. Descriptors

Estuaries
Fishes
Growth
Spawning
Feeding

b. Identifiers/Open-Ended Terms

Sheepshead
Archosargus probatocephalus
Salinity requirements
Spawning
Habitat requirements
Life history

c. COSATI Field/Group

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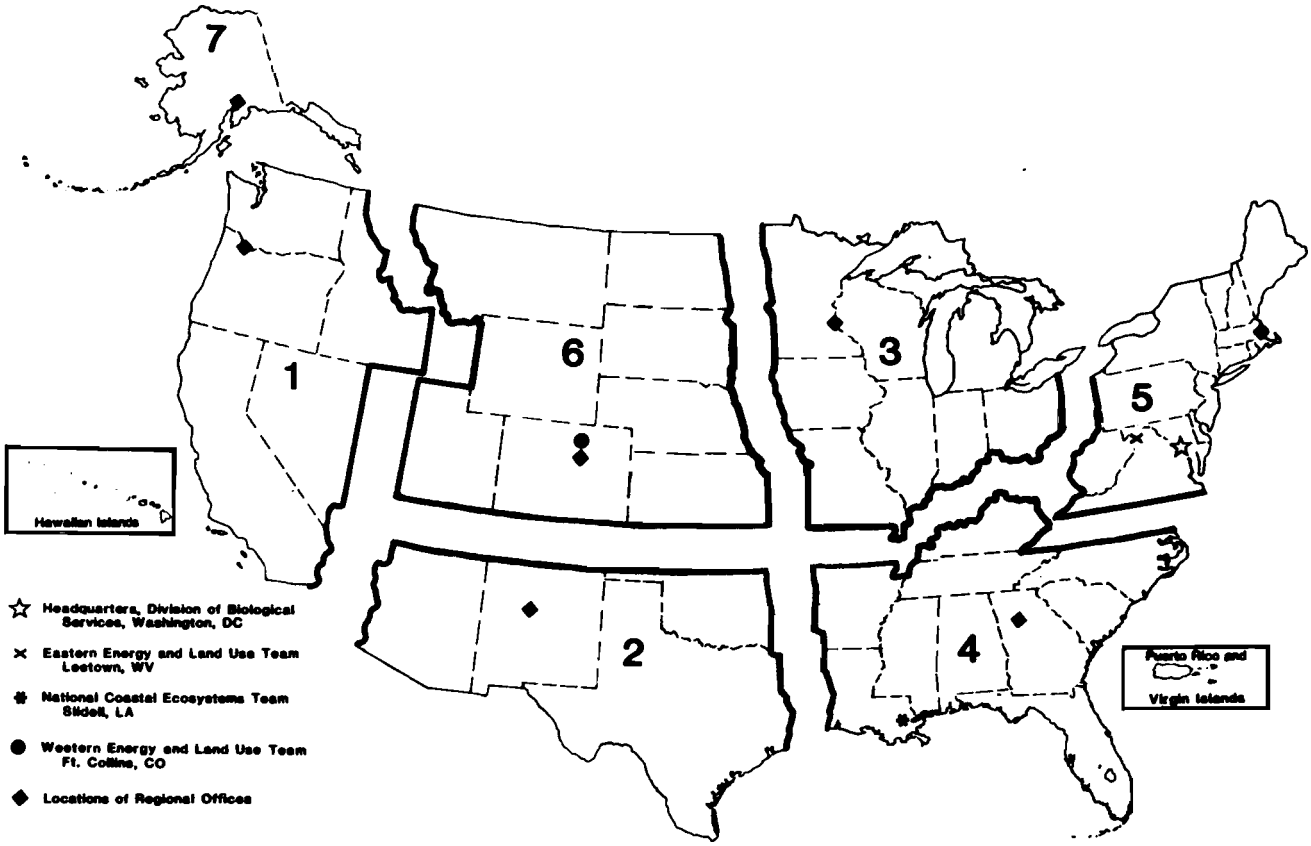

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