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The Importance of the Occurrence of Menhaden in the Coastal Waters and Estuaries of Peninsular Florida

JOHN W. REINTJES

U.S. Bureau of Commercial Fisheries
Beaufort, North Carolina

Abstract

Current information on the distribution and seasonal occurrence of juveniles and adults of three species of menhaden in Florida waters is summarized. Results suggest a resource potential of sufficient magnitude to support a commercial fishery, particularly off the southwest coast during the fall and winter.

INTRODUCTION

THIS IS THE THIRD REPORT on menhaden distribution presented to the Gulf and Caribbean Fisheries Institute. The two previous reports were given at the Twelfth (Reintjes, 1960) and Thirteenth (Reintjes and June, 1961) Annual Sessions. Additional information which has accumulated since then supports the belief that a sizeable population of yellowfin menhaden exists in Florida waters and that seasonal concentrations of Atlantic and gulf menhadens occur during the late fall, winter, and early spring. The purpose of this report is to summarize recent biological information that may help the fishing industry utilize these unexploited or underexploited resources.

Juveniles and adults of three species of menhaden are found in Florida. Although the ranges of the species overlap, the fishery in each locality is supported principally by a single species; near Fernandina Beach by Atlantic menhaden, *Brevoortia tyrannus;* in Indian River and on the southwest coast by yellowfin menhaden, *B. smithi;* and along the northwest coast by gulf menhaden, *B. patronus*.

Since the menhadens are a living resource, the problems associated with the dynamics of the fishery are essentially biological. The geographical distribution of both juveniles and adults provides a starting point for inquiry. Other biological considerations include (1) spawning, hatching, and early development; (2) age and size composition of the catch; (3) survival and growth of juveniles in the estuaries; and (4) behavior and migrations. These and other factors of menhaden biology may determine whether there is good or bad fishing and, ultimately, the success or failure of the industry.

DISTRIBUTION OF ADULTS IN FLORIDA

Very little is known of the distribution of adult menhaden in Florida outside of the reports of landings by the purse seine fisheries at Fernandina Beach and Apalachicola and the annual summaries by Rosen (1959, 1960) and Rosen and Robinson (1961, 1962, 1963). These authors showed an occasional landing of menhaden in nearly every coastal county of the State. No species identity was given except a statement that *B. tyrannus* occurred on the east coast and *B. patronus* on the west. None of the landings were identified as *B. smithi*.

Few reliable reports of adult menhaden in southern Florida are available. Suttkus (1958) reported *B. smithi* from Englewood and Gasparilla Sound on the west coast, and Tabb and Manning (1961) from Florida Bay, near Cape Sable. Biologists of the Bureau of Commercial Fisheries have collected large adults at Palm Beach, Miami, Marathon, Everglades City, and Naples. Last winter, within a few hours after menhaden-like schools were sighted from the air off Naples, menhaden were caught in the vicinity.

Atlantic menhaden

A purse seine fishery for Atlantic menhaden is conducted at Fernandina Beach from April to November. Fishing generally occurs in the vicinity of the reduction plant, but the fleet ranges from St. Augustine to Savannah, Georgia. The catch usually is composed of young, sexually immature fish, one to two years old. At the beginning and end of the season, a few larger, older fish occur in the landings, but never contribute substantially to the catch. These larger fish appear in gill net catches at Indian River in November and may

constitute the older segment of a southern population. The hypothesis of a southern population of Atlantic menhaden is based on differences in size and age composition in the fishery, scale patterns, and fin ray, scute, and vertebral counts. Whether the larger fish appearing off central Florida are the remnants of a short-lived population or a portion of an exploitable stock has not yet been determined.

Yellowfin menhaden

Yellowfin menhaden occur throughout the year in the coastal waters of Florida. Although the extreme range for the species is from North Carolina to the Mississippi Delta, these fish are reportedly abundant only in Florida. A gill net fishery is conducted in Indian River, from New Smyrna to St. Lucie Inlets on the Atlantic coast, and from Suwannee to Sarasota on the Gulf of Mexico. Because of mesh selectivity, the gill nets catch only large, adult fish, approximately three years old. Combined landings have not exceeded 500,000 pounds annually. The catch is sold fresh or frozen for crab bait.

In other localities, yellowfin menhaden are caught incidentally in the seine and gill net fisheries for Spanish mackerel, pompano, and mullet. There is no market for them, however, and they usually are discarded at sea. Small quantities, probably less than 10,000 pounds, annually, are landed at Palm Beach, Miami, Everglades, Naples, Fort Myers, and Punta Gorda.

Another species, fine-scale menhaden, *B. gunteri,* occurs in the Gulf of Mexico but has not been reported from Florida. Yellowfin menhaden from Florida and fine-scale menhaden from Texas are distinguishable from each other by differences in body shape and vertebral and scute counts, but specimens occurring together in Mississippi are not so easily separated. There is some doubt these are two separate species as reported. They may be different populations of a single species.

Gulf menhaden

Until 1962, a purse seine fishery for gulf menhaden was located at Apalachicola. The fleet ranged along the coast from Panama City to Cedar Keys, with occasional catches, in some years, from the vicinity of St. Petersburg. Age and size distributions of gulf menhaden taken by purse seines are strikingly different from those of Atlantic menhaden. Present knowledge of the gulf menhaden is meager, but there apparently is total mortality by age three. This mortality is essentially the same as in an Atlantic menhaden fishery limited to Chesapeake Bay. Whether the high mortality of gulf menhaden is the result of migration, as in Chesapeake Bay, or death, is unknown. If it is migration, somewhere there is an adult stock which might be exploited. If the stock were discovered and exploited by foreign fisheries, the domestic resource could be in jeopardy. On the other hand, if gulf menhaden die at age three, the fishery is depending on the spawning potential of a single year class for each year's brood stock. In either event, it is important to the industry that the fate of these older fish be learned.

According to Roithmayr and Waller (1963), gulf menhaden occurred during all months of the year in catches of the U.S. Bureau of Commercial Fisheries exploratory vessel OREGON and in samples from the otter trawl landings at Pascagoula, Miss. These authors suggested that the gulf menhaden wintering area may be in the north central Gulf of Mexico, not far from the Mississippi Delta. Their conclusion may be correct, although we have found Atlantic

menhaden in otter trawl catches off New York and New Jersey throughout the winter, and we are reasonably sure the wintering area for most of the population is south of Cape Hatteras. This comparison of findings for the Atlantic menhaden and gulf menhaden may not be valid, however, for the migratory behavior in one species is no assurance of the same behavior in another.

Gulf menhaden, larger than those usually occurring in the purse seine fishery, were taken off Naples during the winter. This locality marks the southern extremity of the range for adults. As long as the existence of any significant numbers of the larger gulf menhaden is unknown, these occasional and seemingly unimportant occurrences may be a significant discovery.

DISTRIBUTION OF JUVENILES IN FLORIDA

All of the major estuaries of Florida are nursery grounds for juvenile menhadens. Although the ranges of the three species overlap, a single species usually dominates in each geographical area. Atlantic menhaden is the dominant species in estuaries from Cape Kennedy northward, yellowfin menhaden from Cape Kennedy to Tampa Bay, and gulf menhaden from Tampa Bay north and westward.

Atlantic menhaden

Atlantic menhaden occur abundantly in estuaries from St. Augustine northward, but diminish in numbers to the southward. A few specimens have been taken in Indian River and only two specimens occurred in collections from St. Lucie River, the most southern occurrence of the species. In northern Florida, the St. Johns and St. Marys River systems are important menhaden nursery areas.

Yellowfin menhaden

Juvenile yellowfin menhaden occur in most estuaries from Cape Kennedy to Tampa Bay. Although we have no specimens from Lake Worth or Biscayne Bay, fishermen report that juveniles are very numerous in some years. Collections of spawning yellowfin menhaden landed at Palm Beach and Miami during 1960 support these reports. Tabb and Manning (1961) obtained juveniles from Coot Bay Pond near Cape Sable in 1957 and additional specimens were obtained at the same place in 1961 and 1962. On the west coast, juveniles occur in all principal estuaries northward to and including Tampa Bay.

Gulf menhaden

Juvenile gulf menhaden occur commonly in all estuaries from Tampa Bay northward, but southward their numbers decrease. At Cape Sable, for example, only two specimens of gulf menhaden occurred among several hundred yellowfin menhaden. Although juveniles are distributed along the west coast, important contributions to the gulf menhaden resource appear to be limited to the estuaries from Apalachee Bay westward.

SUMMARY AND CONCLUSIONS

Adult menhadens occur seasonally in the coastal waters of Florida, but the absence of a commercial fishery south of Fernandina Beach makes a quantitative estimate of their abundance nearly impossible. The incidental commercial landings and reports of adults, plus the presence of juveniles in all of the

estuaries, indicate that the menhadens are more abundant than is commonly believed.

An understanding of the seasonal and spatial distribution of each species present in Florida waters may help solve some of the most pressing problems, namely: (1) the fishery potential of yellowfin menhaden, (2) the contribution of Florida estuarine nurseries to the fishable population, (3) the location or existence of older and larger gulf menhaden.

At a time when the menhaden resources are showing signs of instability or weakening, and when other nations are showing interest in the fisheries of the south Atlantic and Gulf States, the answers to these problems are of vital importance to the menhaden industry of the United States. Current studies of the Atlantic menhaden and recently initiated studies of the gulf menhaden are designed to answer some of these problems.

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Requirements of Gulf and South Atlantic Estuarine Research [1]

JAMES E. SYKES
U.S. Bureau of Commercial Fisheries
Biological Laboratory
St. Petersburg Beach, Florida

Abstract

In recent years biological research agencies became deeply concerned about estuarine alteration and the probability of its adverse effect on commercial fisheries. This concern stems from the recognition that most species occurring in Gulf catches spend a portion of their lives in estuaries. In 1962 the U.S. Bureau of Commercial Fisheries allocated funds for estuarine research in the Gulf of Mexico. Studies of the total estuarine complex are in progress. These include: (a) biological productivity and its relation to physical and chemical surroundings; and (b) the effects of natural and man-incurred alteration on estuarine biota and Gulf fisheries. As a part of the 1964 International Biological Year, a study of primary productivity in estuaries will be coordinated among a group of laboratories in the Gulf and South Atlantic Region.

THE TERM "ESTUARY" is subject to varying definitions and continues to be modified as estuarine studies intensify. At a recent research coordinating meeting of the Bureau of Commercial Fisheries, participants modified the definitions of estuaries by Ketchum (1953) and Pritchard (1952) and adopted the following concept:

> "Estuaries are those shallow waters with fluctuating salinities that differ from those of the adjacent sea. Usually, but not always, they are semi-enclosed bodies of water. Physical factors resulting from the mixing of fresh and salt waters and the resulting nutrient enrichment and high productivity of these waters constitute the unique features of estuaries."

The periphery of the Gulf of Mexico contains numerous indentations which may be included in that description. Planimeter measurements show that there are approximately 7,500 square miles of estuarine area extending from the southwest tip of Florida to Brownsville, Texas. This is exclusive of some 15,500 square miles of adjacent, rich marshlands.

The real value of estuaries in their natural state is not generally recognized. Odum (1961) stated that they are among the most naturally fertile areas in

[1] Contribution No. 5 of the Bureau of Commercial Fisheries Biological Station, St. Petersburg Beach, Fla.