MENHADEN: THE RESOURCE, THE INDUSTRY, AND A MANAGEMENT HISTORY

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Preface

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Four species of menhaden, *Brevoortia* spp., are found along the Atlantic and Gulf of Mexico coasts of the United States. The Atlantic menhaden, *B. tyrannus*, is found from Nova Scotia, Can., to West Palm Beach, Fla.; the yellowfin menhaden, *B. smithi*, is found from Cape Lookout, N.C., to the Mississippi River Delta, La.; the Gulf menhaden, *B. patronus*, is found from Cape Sable, Fla., to Veracruz, Mex.; and the finescale menhaden, *B. gunteri*, is found from the Mississippi River Delta, La., to Campeche, Mex.

Menhaden are euryhaline species that inhabit coastal and inland tidal waters. Spawning occurs principally at sea (in northern areas some spawning occurs in bays and sounds). Eggs hatch at sea and the larvae are moved to estuaries by ocean currents where they metamorphose and develop as juveniles.

Menhaden form large surface schools susceptible to purse seines which are now the principal fishing gear. Major fisheries for Atlantic and Gulf menhaden exist on each coast (Fig. 1). Although neither fishery is directed toward the yellowfin or finescale menhaden, both may be part of these other catches to a small degree. During the 1980s, the combined landings for the menhaden reduction fisheries comprised about 40% of all U.S. commercial landings, ranging between 934,000 t and 1,342,000 t, with Gulf menhaden landings representing between two-thirds and three-fourths of the total. Menhaden are processed primarily at reduction plants for fish meal, oil, and solubles. The meal and solubles are used mostly in poultry and livestock feeds, and increasingly in aquaculture, while the oil is used in paints and as an edible oil in Europe and Canada. Smaller purse-seine menhaden fisheries for bait (e.g., crab and lobster) are found on both coasts.

The National Marine Fisheries Service (formerly Bureau of Commercial Fisheries) has maintained records of daily vessel landings and fishing activity since 1940 on the Atlantic coast and since 1946 on the Gulf coast. Sampling for age and size of menhaden landed has been conducted by staff in the NMFS menhaden research program since 1955 on the Atlantic coast and since 1964 on the Gulf coast. Captain's daily fishing reports containing data on individual menhaden purse-seine sets have been collected on both coasts since 1978. In addition, extensive mark-recapture studies (using internal ferromagnetic tags) on adult and juvenile Atlantic and Gulf menhaden have been conducted since the late 1960's. Also, studies on the biology and estuarine distribution of juvenile menhaden have been conducted along the U.S. Atlantic and Gulf coasts since the early 1960's. These studies culminated in extensive juvenile abundance surveys along both coasts during the 1970's.

Management of Atlantic and Gulf menhaden fisheries is by the respective states and coordinated through the Atlantic and Gulf States Marine Fisheries Commissions. State, industry, and Federal inter-

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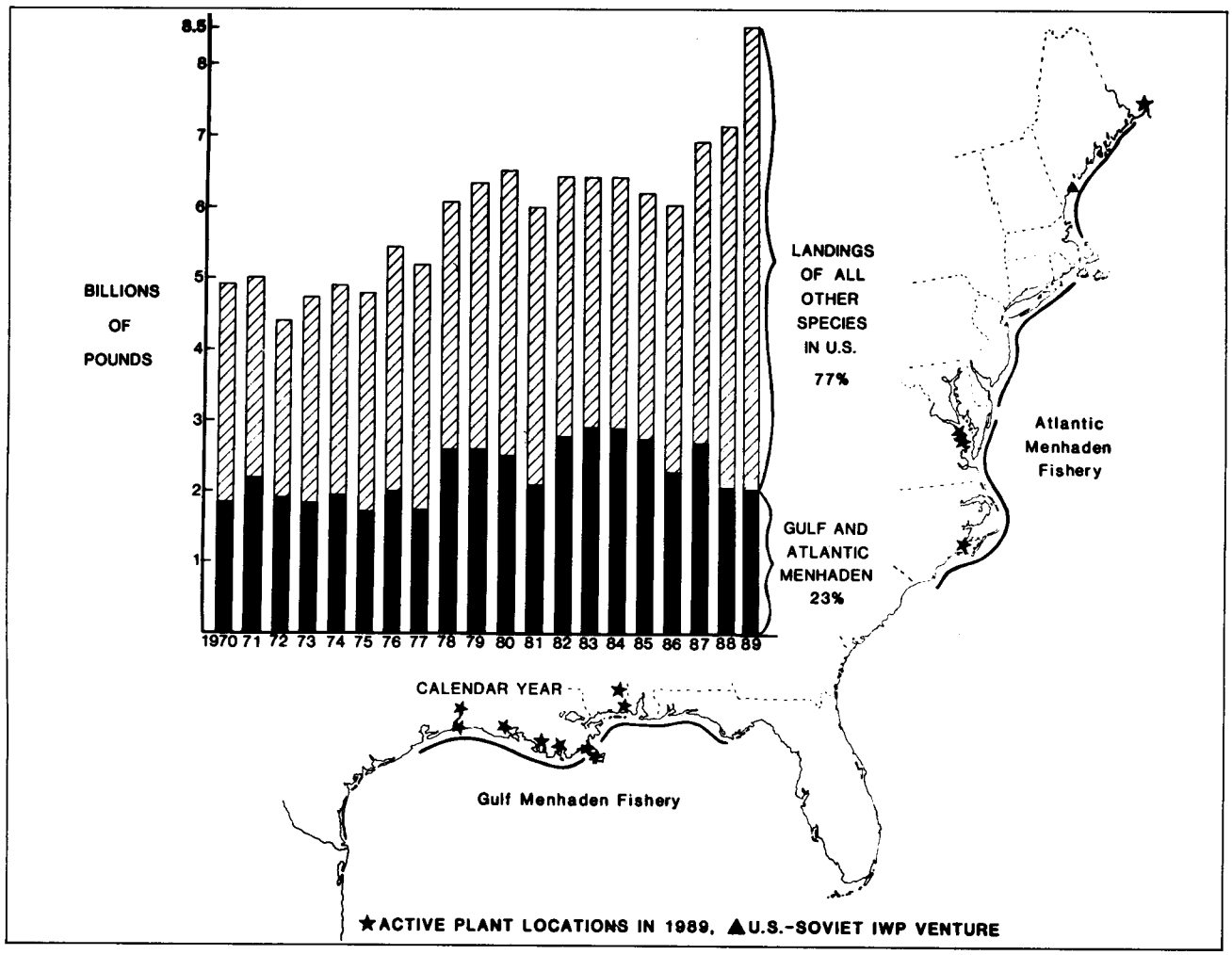

Figure 1.—Gulf and Atlantic menhaden contribution to total U.S. commercial fisheries landings during the calendar year, 1970-87.

ests are represented on the Atlantic and Gulf Menhaden Advisory Committees as part of the interstate commission fishery management process. Information from NMFS is provided to these groups, including stock assessments on these species. Coastwide management plans have been prepared for both Atlantic and Gulf menhaden with recent updates for both species.

This special issue of the *Marine Fisheries Review* provides an historical perspective on the menhaden resource and fisheries. These papers summarize information on menhaden biology, environmental influences on recruitment, results of tagging studies, the fisheries, current and potential products from menhaden, recent assessments of stock status, and describe management interactions including a comparison of management options for the Atlantic menhaden. These papers draw on previously published material and on current research. They are intended to help define "the state of our knowledge" and provide guidance in developing future studies to improve our understanding of menhaden biology and population dynamics.