



Large penaeid shrimp taken by bottom trawling in the Hawaiian Islands.

## NMFS Aids Shrimp Studies in States

Through grants-in-aid, NMFS has provided Federal monies to seven of the States to conduct research studies on shrimp. Such studies permit the States to carry out work of mutual interest that could not otherwise be funded.

Such work is done (not only on shrimp, but many other fisheries subjects) under three separate acts of Congress. These are P.L. 88-309, the Commercial Fisheries Research and Development Act of 1964 as amended; P.L. 89-304, the Anadromous Fish Act of 1965 as amended; and P.L. 89-720, the Jellyfish Act of 1966 as amended.

Details of the work are given in the NMFS publication, "Grant-in-Aid for Fisheries Program Activities, 1972," prepared by the Grant-in-Aid staff, principal contributor, Paul R. Nichols.

Work on shellfish has consisted of 89 projects funded at a total cost of about \$9 million, with emphasis on oyster and shrimp research. Of the projects funded, 63 have been completed and 26 are continuing.

The shrimp projects are:

### Alaska

Chief Investigator: Jerry McCrary

*Pandalid shrimp studies*—Data were collected for detailed description of the life histories of the pink shrimp, sidestripe shrimp, coonstripe shrimp, hump shrimp, and other species if feasible in the Kodiak-eastern Alaska regions. Seasonal geographic distribution, migration pattern, and variations in abundance of these shrimp were investigated also.

(Project Completed 1972)

### Georgia

Chief Investigator: Charles M. Frisbie

*Seasonal abundance and biological stability of the commercial shrimp of Georgia*—Sampling stations were located offshore in sound, rivers, and in marshes throughout the shrimps' habitat. Trawl, seine, and plankton net collected adults, postlarval, and larval shrimp throughout the year. Determinations were made on relative and seasonal abundance, growth rate, sex ratio, spawning success, and limiting environmental factors of shrimp.

(Project Completed 1969)

### Georgia

Chief Investigator: Clifford J. Knowlton

*Preliminary studies of a potential finfish industry from commercial shrimp landings*—The purpose of this study was to determine the species composition and marketable size of finfish in commercial shrimp catches and their relative abundance during the commercial shrimping season.

(Project Completed 1971)

### Louisiana

Chief Investigator: J. G. Broom

*Coastwide study of penaeid shrimp*—The life history of the commercial important species of penaeid shrimp in estuary waters was studied to provide information for improved management of these resources including a coordinated effort through the Gulf State Marine Fisheries Commission.

(Project Completed 1968)

### Louisiana

Chief Investigator: Wilson J. Gaidry

*Investigations of commercially important penaeid shrimp in Louisiana's estuaries*—



Causes of seasonal fluctuations and abundance in shrimp populations in the estuaries are studied to determine how changes in the estuarine environment affect annual and continued production.

(Project Continuing)

### Maine

Chief Investigator: Ronald G. Rinaldo

*Northern shrimp—biological and technical research*—Studies were made on waters adjacent to the Maine coast to determine the relative abundance of species of northern shrimp, particularly *Pandalus borealis*, and life history and seasonal availability of the several species. Technical problems associated with economical and efficient harvesting and marketing these species were also investigated.

(Project Completed 1970)

### Maine

Chief Investigator: Ronald G. Rinaldo

*Northern shrimp—assessment of some population parameters*—This project is designed to establish shrimp population parameters by sampling and enhancing the collection, catch, and data from survey cruises.

(Project Continuing)

### Mississippi

Chief Investigator: J. Y. Christmas

*Investigation of commercial important penaeid shrimp in Mississippi estuaries*—Under this project a study is made of the environmental requirements and relationships of

penaeid shrimp with special reference to variations in commercial catch in an attempt to improve predictions of the availability of shrimp to the fishery.

(Project Continuing)

### North Carolina

Chief Investigator: Edward G. McCoy

*Shrimp studies*—Information was obtained on population dynamics, including migratory behavior, for pink, brown, and white shrimp marked with biological stains and fluorescent pigments and released in nursery areas tributary to Core Sound and Lower Cape Fear River estuaries. A combined total of 26,989 shrimps were marked and released, of which 1,671 or 6.2 percent were recaptured. Mark and recapture studies on brown shrimp were conducted in Pamlico Sound and Bogue Sound estuaries, including Newport River.

(Project Completed 1969)

### North Carolina

Chief Investigator: Edward G. McCoy

*Studies of commercial penaeid shrimp*—This study is undertaken to determine the effect on the resulting commercial catch when pre-commercial-size pink shrimp are harvested and discarded while fishing for commercial-size brown shrimp.

(Project Continuing)

### Oregon

Chief Investigator: Gary Milburn

*Study on the distribution and abundance of pink shrimp, *Pandalus jordani*, in the Pacific Ocean off Oregon*—Sampling of commercial

pink shrimp landings at Warrenton, Newport, and Coos Bay has been completed. Length-frequency, catch, and effort data by area of catch were reported. The vertical distribution and migratory behavior of this species by diel, lunar, and seasonal periods, and the environmental factors which may influence these movements were investigated off the Oregon coast near Astoria and Newport.

(Project Completed 1970)

### Oregon

Chief Investigator: Robert Loeffel

*An evaluation of methods for determining movements of shrimp*—This study was two-fold: (1) to evaluate the feasibility of various techniques of determining the movements of Pacific pink shrimp, and (2) to develop holding and rearing techniques of pink shrimp in aquaria.

(Project Completed 1971)

### Texas

Chief Investigator: Gary M. Stokes

*The population and distribution of penaeid shrimp in Lower Laguna Madre*—The purpose of this study is to determine the population and distribution of juvenile penaeid shrimp in Lower Laguna Madre and its watershed with relation to ecological factors, and conduct a brief survey of the bait shrimp fishery in the Lower Laguna Madre in preparation for future studies dealing with the relationship between juvenile production in the Lower Laguna Madre, the bait fishery, and commercial production in the Gulf of Mexico.

(Project Continuing)

## NMFS Publications on Shrimp, 1970-72

A number of scientific reports on shrimp have appeared in recent NMFS publications. All are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402. An alphabetical list, by author, follows:

**Abramson, Norman J., and Patrick K. Tomlinson**, "An application of yield models to a California ocean shrimp population," *Fishery Bulletin*, Vol. 70, No. 3, p. 1021-1041.

### ABSTRACT

Two types of yield models were utilized to analyze fishery data from California's northern-most bed of ocean shrimp, *Pandalus jordani*. The Schaefer form of stock production model was applied to catch and effort data for the years 1954 through 1969. Age-struc-

tured catch data for 1955 through 1968 were analyzed by the Murphy method to obtain mortality rates and biomass estimates. Catchability coefficients and a growth curve were also estimated. Attempts to fit spawner-recruit models to estimates obtained from the age-structured catch data were inconclusive; so, age specific mortality and growth estimates were only used to fit a yield-per-recruit model.

After comparing the results from the two models, the Schaefer model was deemed most suitable for managing this fishery. The model estimated the maximum sustainable yield at 2.46 million pounds. A strategy for managing the fishery under a quota system was proposed.

**Anderson, William W.**, "Contributions to the life histories of several penaeid shrimps (Penaeidae) along the south Atlantic coast of the United States." U.S. Fish and Wildlife Service, Special Scientific Report—Fisheries

No. 605, May 1970, iii+24 p., 15 figs., 12 tables.

### ABSTRACT

Shrimp, the most valuable fishery resource of the south Atlantic coast of the United States, contributed about 40 percent of the \$27 million exvessel value of all fishery landings in the area in 1966. Three species of shallow-water penaeid shrimps are of greatest commercial importance: white shrimp, *Penaeus setiferus*; brown shrimp, *P. aztecus*; and pink shrimp, *P. duorarum*. The shrimp fishery is reviewed for trends in yield for the area as a unit, by States, and by species, for the 10-year period 1958-67. A trend toward steady decline in total shrimp landings is indicated. During studies on the white shrimp along the south Atlantic coast of the United States in 1931-35, data were obtained on the brown shrimp; the sea bob, *Xiphopenaeus kroyeri*; and *Trachypeneus constrictus*. Observations were also made on the pink shrimp from operations of the Bureau of Commercial Fisheries R/V