

Investigations and Management of the Guianas Shrimp Fishery Under the U.S.—Brazil Agreement ¹

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The U.S.—Brazil Agreement signed on May 9, 1972, is the most recent of the U.S. bilateral fishery agreements. The National Marine Fisheries Service (NMFS) was given, among other responsibilities connected with the Agreement, the task of collecting information about the fishery to meet the terms of the Agreement and to acquire a scientific understanding of the resource. This paper describes the progress made, which includes setting up a logbook system for recording catch and effort statistics and carrying out a resource survey to determine the species composition of the shrimp population on the fishing grounds.

HISTORY OF THE OFFSHORE FISHERY

The commercial shrimp fishery off the northeast coast of South America, as we know it today, began in 1959. The general location and the approximate extent of the offshore fishing grounds are shown in Figure 1. The results of cruises by the U.S. exploratory fishing vessel *Oregon* in the fall of 1957 and the late summer of 1958 focused the attention of the U.S. shrimp industry on the Guianas region (Bullis and Thompson, 1959). Other surveys also contributed to the knowledge of the shrimp and fish resources of the region (U.S. Fish and Wildlife Service, 1954; Higman, 1959; Durand, 1959; Richards, 1955; Salmon, 1958; and Mitchell and McConnell, 1959). Commercial shrimp vessels began operating from Paramaribo in October 1958, from Georgetown in January 1959 and from other ports in the early and mid 1960's. Landings are presently made at six ports (Fig. 1). The vessels of a number of different countries participate in the fishery: Brazil, Guyana, Japan, Korea, Surinam, Trinidad and Tobago and the U.S. (Gross, 1973).

The Guianas shrimp fishery grew rapidly from its beginning. In 1960, the first year for which reliable catch statistics are available, the total landings were 4 million pounds (Fig. 2) (Naidu and Boerema, 1972). By 1968, the year of peak catch, the landings had increased to 27 million pounds. The total catch remained high in 1969 but declined in 1970 and 1971. The smaller total landings in 1971 (20 million pounds) are coincident with the jurisdictional problems of U.S. flag

¹Contribution No. 224, Southeast Fisheries Center, National Marine Fisheries Service, NOAA, Miami, Florida 33149.

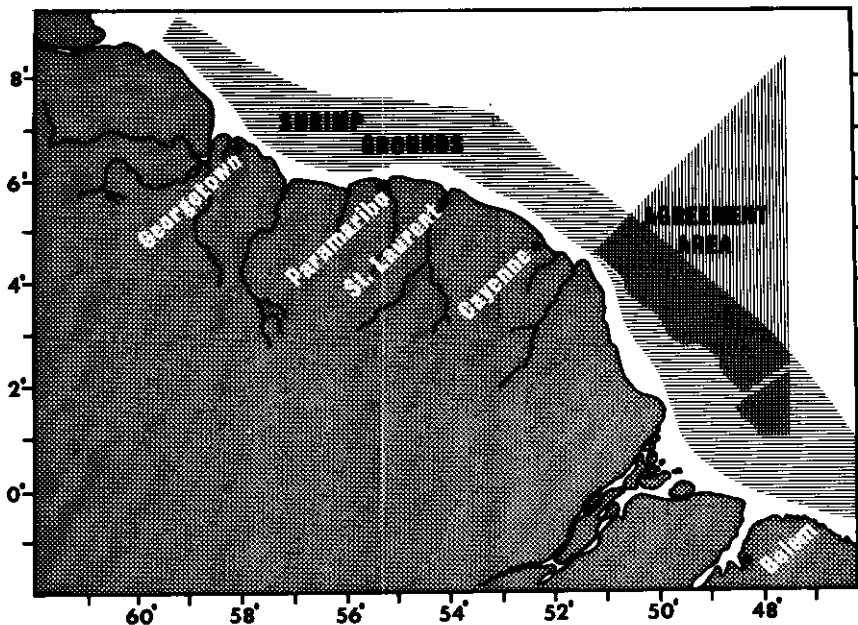


Fig. 1. The Guianas shrimp grounds off the northeastern coast of South America and the area of the U.S.-Brazil Shrimp Agreement. The Agreement area is bounded inshore by the 30-meter depth contour, offshore by the 47° 30' W longitude line, on the north by the northern border of Brazil and on the south by the 1° N latitude line. The principal ports of landing adjacent to the shrimp grounds are shown; not shown is one additional port of landing, Port-of-Spain, Trinidad.

vessels operating off Brazil and the consequent move of these vessels to other fisheries.

The present Guianas shrimp fleet is modern and fairly uniform in size, power and gear. Figure 3 shows the characteristics of the first 163 U.S. vessels which applied for permits to fish in the Agreement area. Their mean age is 4 years; overall length, 73 feet; gross tonnage, 99; and horsepower, 348. Wood-hull vessels make up 69% of the fleet; steel-hull vessels, 27%; and fiberglass-hull vessels, 4%. The catch is preserved by freezing in 53% of the boats and by ice in the remainder.

The catch per unit fishing effort for the Guianas fishery has been calculated from the data on the total annual catch and the total number of vessels in the fishery (Fig. 4). The number of vessels in the fleet increased progressively through 1970. The average catch per vessel increased in the early years of the fishery through 1965 and gradually declined thereafter. The trends in the average catch per vessel vary considerably among the various ports, both for the early years of the fishery (Naidu and Boerema, 1972) and also for the more recent years, 1970 and 1971. This variability is partly because the measure of effort (boat years) is a crude one. Boat counts were made once per year; thus

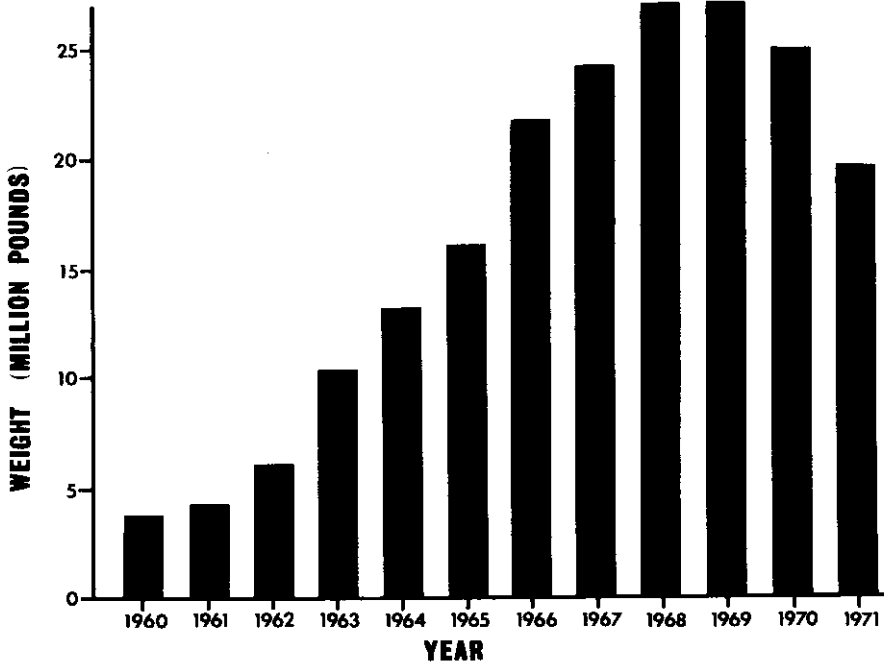


Fig. 2. Landings of shrimp (heads-off weight) for the Guianas fishery, 1960-71.

some boats counted in the fishery may not have fished the entire year and some which fished only part of the year may not have been counted. The different trends in the average catch per vessel at the various ports may be due to the imprecise measure of fishing effort used or may indicate real differences in the stocks fished.

DATA COLLECTION UNDER THE AGREEMENT

In 1972 NMFS established a system for collecting information on catch and fishing effort as part of its responsibility under the U.S.—Brazil Agreement. The Agreement requires that vessel skippers keep records of their fishing activity. A logbook form was designed after consultation with fleet operators, plant processors and representatives of the Brazilian fisheries department (Fig. 5). Completion of the form provides a record of information on fishing time, area and catch for each trip. To aid the skipper in describing his fishing area the logbook form includes a chart of the fishing grounds marked with grid zone number and depth. Fishing time is recorded as number of drags made and number of hours fished each day and separate entries are made for fishing during the day and at night. Catch is given as total pounds (heads-off weight) caught each day and the fisherman is asked to indicate the species and the predominant size category.

The Agreement requires that logbook records be kept for fishing in the area of Agreement off Brazil. However the U.S. industry, realizing the importance of

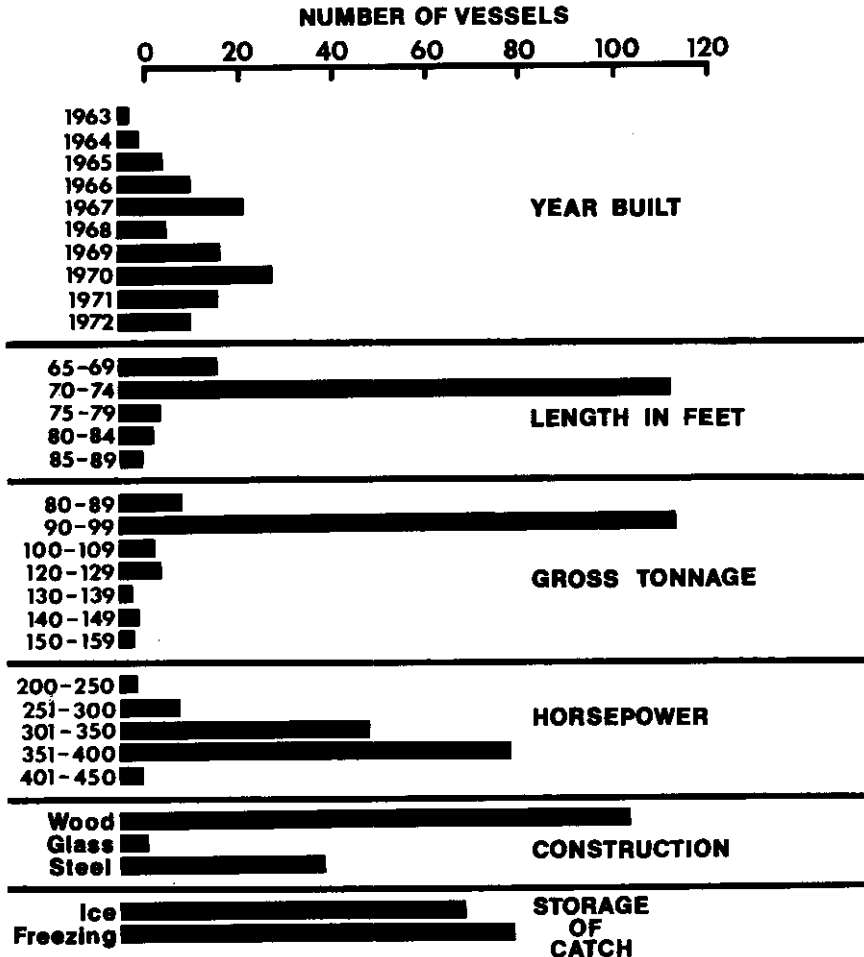


Fig. 3. Characteristics of U.S. flag shrimp vessels currently registered under the U.S.-Brazil Shrimp Agreement. No vessels were included in the 110-119 gross tonnage category.

this information, has taken a far-sighted step by volunteering to record and submit these data for the entire area of the fishery. In addition to the logbook reports, we receive a report from each processing plant of the size composition of each vessel's landings. It is important to point out that although NMFS provides the logbook forms and processes and analyzes the statistical data, the U.S. industry collects and submits the information. The collection of raw data is the most important part of any fishery statistics system and represents a significant input of time and effort by industry members — the vessel captains and the fleet managers — towards providing the basic information necessary to understand and manage this fishery.

The information from the logbook reports will be tabulated and made available in summary form. The summary, prepared by computer print-out on a monthly or quarterly basis, will show the catch in pounds and the fishing effort in number of drags made and number of hours fished for each fishing zone and depth range. This information will be further used to study the unit of fishing effort which will best describe the fluctuations in the stocks.

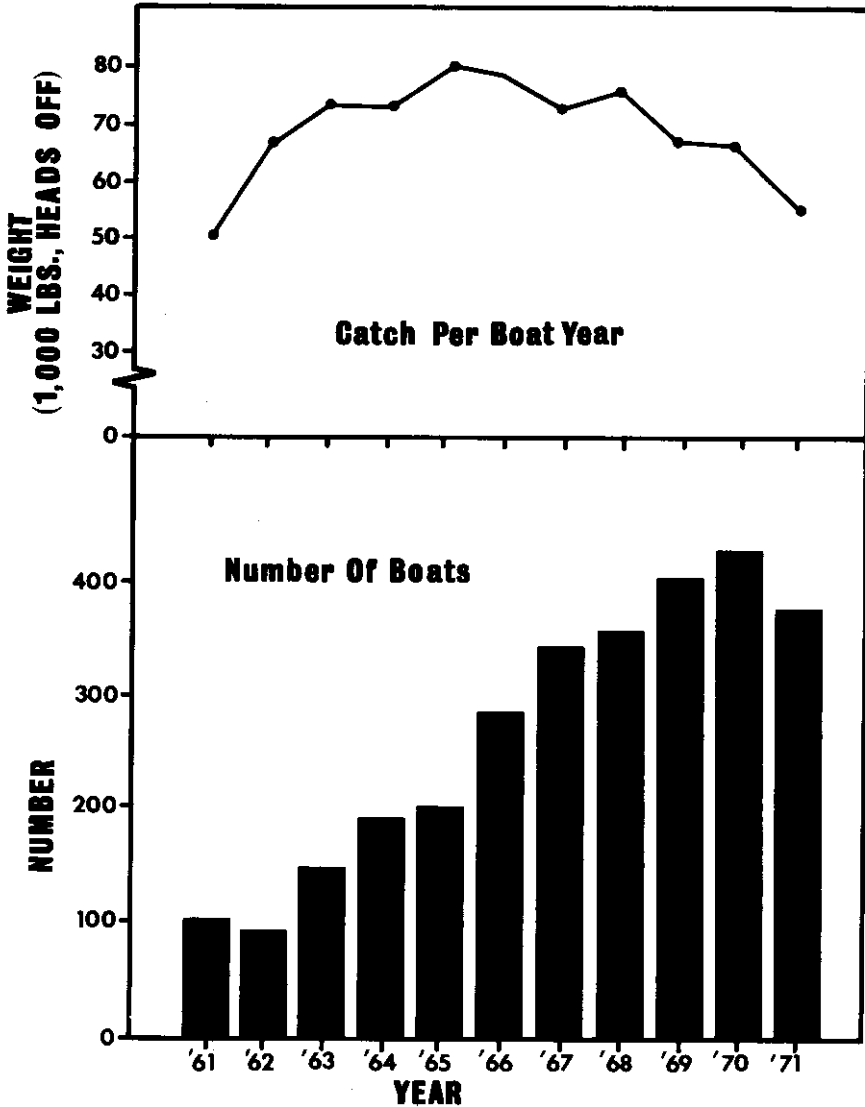


Fig. 4. Average annual catch per vessel and the number of vessels operating each year in the Guianas shrimp fishery.

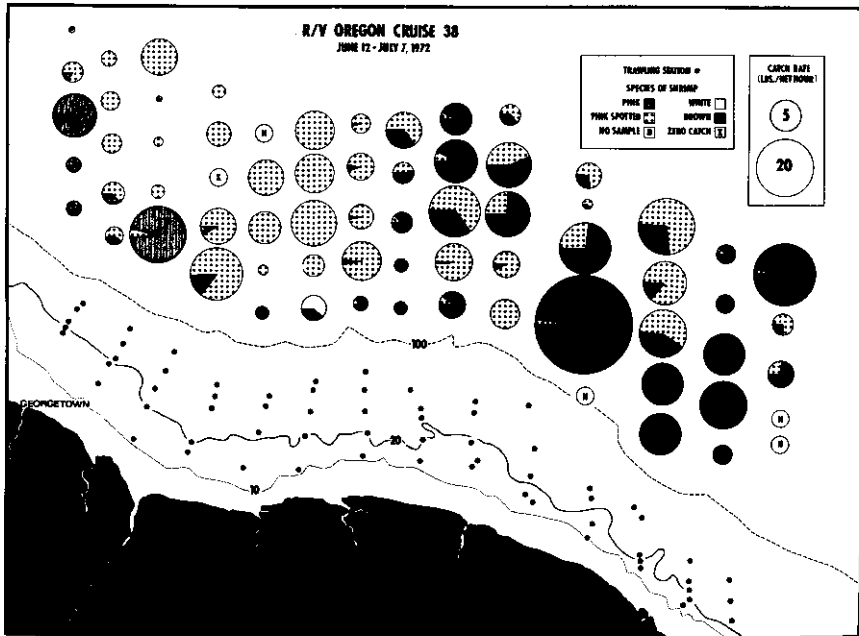


Fig. 6. Species distribution and catch rate of commercial shrimp off the Guianas in June and July 1972. The black dots indicate the geographical location of trawling stations of the *R/V Oregon II* along 14 inshore-offshore transects. The corresponding circles represent the catch rate and species composition of shrimp at these stations.

highest catch rate of pink shrimp (18.5 pounds per net hour) was made at 15 fathoms off the mouth of the Corentyn River. At the offshore stations of the three transects off central Surinam the catch consisted almost entirely of pink spotted shrimp; at the inshore 15-fathom stations, of brown shrimp (*P. aztecus subtilis*) or a mixture of brown shrimp and white shrimp (*P. schmitti*). At the remaining transects off eastern Surinam and French Guiana the catch was almost exclusively brown shrimp and pink spotted shrimp, with brown shrimp predominating at 19 out of the 32 stations. Catches of brown shrimp were highest at the 20-fathom station, 50 miles northwest of Cayenne (60.5 pounds per net hour).

Our survey showed that a single species of shrimp dominates the catch in many areas. For the present we are asking the fishermen to indicate on the fishing logbooks the kind or kinds of shrimp caught. Later it may be desirable to sample the landings in order to get more exact data on the species composition of the catch.

DISCUSSION

The sustained harvest from a living marine resource usually requires proper management of its fishery. Tropical shrimp stocks are presently fished in a number of areas throughout the world. Their fisheries have generally remained productive, despite intensive exploitation. Among the reasons for the continued high production of these fisheries is the apparent biological resiliency of shrimp

stocks (their high reproductive capacity and turnover rate). Furthermore the environment for shrimp has been affected adversely only in a small part of the total habitat. In spite of these favorable biological and environmental conditions, man's increasing technological capability for exploitation of living resources may eventually require that we regulate the harvest to insure maximum sustained production from the resource. Whether regulation needs to or will be applied to the Guianas shrimp fishery remains to be seen. In any event the U.S.-Brazil Shrimp Agreement provides the opportunity to study this fishery and to collect information necessary to understand its dynamics.

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