

United States Department of the Interior, J. A. Krug, Secretary
Fish and Wildlife Service, Albert M. Day, Director

Fishery Leaflet 319*

Washington 25, D. C.

September 1948

THE SHRIMP AND THE SHRIMP INDUSTRY OF THE
SOUTH ATLANTIC AND GULF OF MEXICO

Prepared in the Branch of Fishery Biology

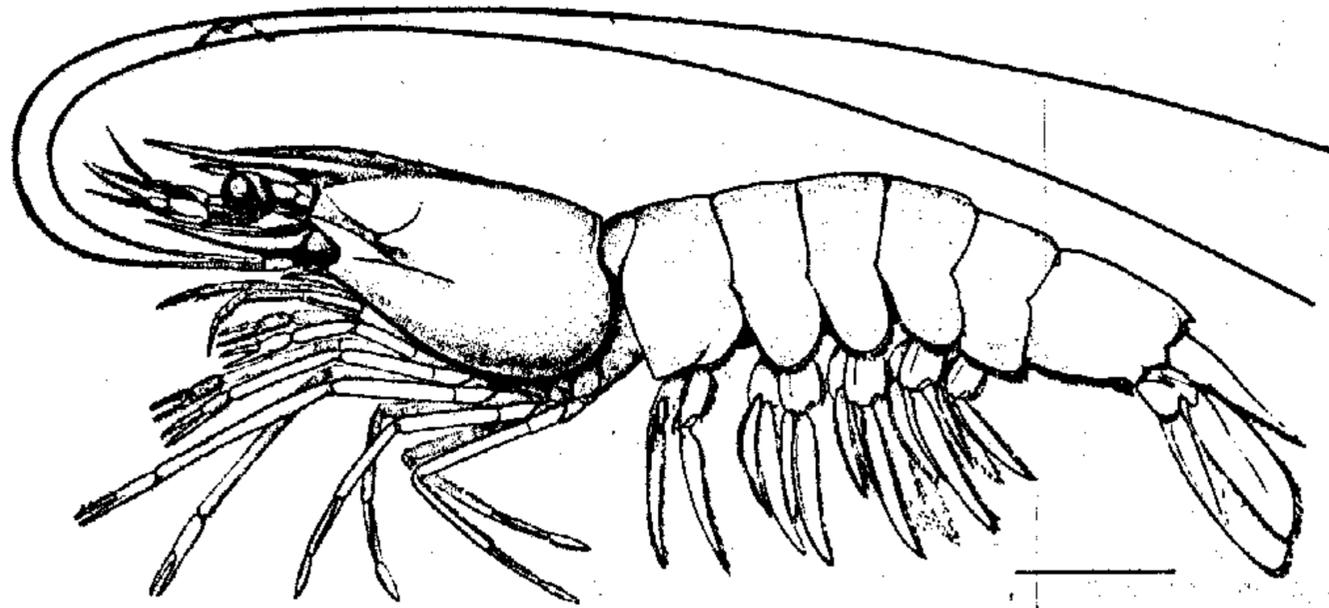
The shrimp fishery of the United States is centered primarily in the eight South Atlantic and Gulf States where almost 100 million pounds are taken annually. The shrimp ranks first in value among all the fisheries of the South and usually rates as the sixth most valuable fishery of the United States, including Alaska. There are three species of shrimp, all members of one family (Penaeidae) which are of commercial importance in this area. The common shrimp, Penaeus setiferus, yields at least 95 per cent of the total catch whereas the grooved shrimp, Penaeus brasiliensis, and the sea bob, Xiphopenaeus kroyeri, produce the remainder.

These three species of sea shrimp have the first three pairs of thoracic (walking) legs, of which there are five pairs in all, fitted with chelae (pincers). The common shrimp and the grooved shrimp have teeth both above and below on the rostrum (head spine), whereas the sea bob has rostral teeth only on the upper surface. The grooved shrimp can be distinguished from the common shrimp (which it closely resembles superficially) by the presence on the grooved shrimp of grooves on either side of the rostrum which extend to the back margin of the carapace (head shell). In the common shrimp these grooves do not extend more than half the length of the carapace.

In the sea bob the last two pairs of walking legs are slender and much elongated. It was from these four elongate legs and the two antennae or feelers that the designation sea bob was derived. Sea bob is a corruption of the French "six barbes" which means six beards - the name given to this shrimp by the French fishermen of Louisiana. The sea bob does not attain the size of either the common shrimp or the grooved shrimp and for this reason it is used chiefly for drying.

* This leaflet supersedes I-107

Life History of the Common Shrimp. - The common shrimp, *Penaeus setiferus*, spawns during the spring and summer in the open waters of the Atlantic and Gulf. The male can be distinguished readily from the female by the presence of a structure called the petasma which appears as a projection on the inner side of the first pair of swimming legs. The sperm which is wrapped in a capsule called the spermatophore is transferred to the female apparently with the aid of the petasma. In ripe males the spermatophore is readily apparent at the bases of the fifth walking legs. The common shrimp, unlike the crab and crayfish, does not carry the eggs attached to appendages on the ventral surface of the abdomen but lays them directly into the water. The eggs which issue from the bases of the third legs of the female are apparently fertilized on emission. The female produces in the neighborhood of 500,000 eggs. These eggs, when extruded into the water and fertilized, soon hatch the young shrimp which are about 1/100 of an inch in



THE SOUTHERN SHRIMP. (About one-fifth larger than natural size.)

Penaeus setiferus, Edwards. (p. 661.)
 Drawing by A. E. Sarsen, from specimens obtained in the coast of Louisiana.

length and have the appearance of tiny mites or ticks. This stage is called nauplius. After passing through several naupliar stages the young shrimp develop into the zoae. After several more molts it appears as a mysis in which for the first time the young shrimp begins to look like the general conception of a shrimp. The mysis is the last larval stage which, in the

common shrimp, is passed through before it is hardly more than a third of an inch long. These larval stages of the common shrimp are planktonic, in other words they float freely in the water and are more or less at the mercy of the currents. The young shrimp then move to the inside waters where they can be secured in great abundance in the sounds, bays, rivers, and bayous throughout the spring and summer. These inside waters apparently serve as nursery grounds for the young shrimp.

As the shrimp grow they tend to seek larger bodies of water and by June, July, or August, depending upon the locality, some of them attain sufficient size (about 4 inches) to enter the commercial fishery. By September practically the entire fishery is composed of young shrimp derived from the spawning of the preceding spring and summer. With the oncoming of winter and the resultant cooling of the waters the larger shrimp move to deeper and more stabilized bodies of water such as the sounds and the open waters of the Atlantic and the Gulf of Mexico. During the winter at times of extreme cold the shallow inside waters which are readily affected by changes in temperature are frequently entirely depopulated of shrimp. Throughout the winter the growth rate of the shrimp is lessened but with the coming of spring and the associated warming of the waters they again assume their rapid growth rate and the sex products begin to mature with spawning following. A disappearance of the mature shrimp is associated with spawning and since no two-year old shrimp have been found it is presumed that they die after spawning. From all the evidence so far gathered, the common shrimp appears to be an annual.

Food. - The shrimp is omnivorous in its feeding habits - plant detritus, worms, crustacea, small mollusks, mud and sand can be found in their intestinal tracts. In aquaria they have been observed to attack and devour small fish and other shrimp. A shrimp is particularly susceptible to attack from another member of the same species during the process of molting - when the old shell has been discarded and the new one is still soft.

Miscellaneous. - The shrimp like other crustacea wears its skeleton on the outside of the body and in order to grow must cast off this shell and replace it with a new and larger one. The frequency with which these shells are cast is not known, but with young shrimp during the summer months the interval between molts appears to be relatively short. In the process of shedding all of the hard structures of the shrimp are cast off and renewed.

The common shrimp swims in a forward direction by the use of the pleopods or abdominal feet. When frightened or when rapid movement is desired the shrimp, with a flip of the abdomen, can propel itself backward with remarkable speed. With this flexing of the powerful muscular abdomen, the

shrimp is also able to leap clear of the water.

Cultivation of Shrimp. - Numerous inquiries have been received concerning the cultivation of shrimp. Due to the fact that the larval stages of the shrimp are both oceanic and planktonic, it is highly improbable that successful cultivation of this organism could be achieved. The common shrimp when confined in aquaria tend to absorb their eggs instead of laying them. Whether this phenomenon is caused by confinement or by the use of less saline waters than those in which it is customary for the shrimp to spawn is not known, but nevertheless this condition would have to be overcome before successful cultivation could be achieved. In any event, the wide expanse of excellent natural breeding and nursery grounds in the South Atlantic and Gulf area does not at present call for such methods for the continuance of an abundant supply of shrimp. Biologically sound regulation of the fishery appears to be a much better method than cultivation for achieving these ends.

Nutritive value of Shrimp. - Shrimp possess the same general food properties that are commonly attributed to fishery products. In general, marine products are an excellent and economic source of highly digestible proteins, a good source of vitamins, and an excellent source of minerals in quantity and variety. Shrimp are unusually rich in minerals and contain a high natural content of iodine. As a consequence, shrimp like other marine foods are ideal for those areas in which goiter is prevalent. It is well known that iodine deficiency in the diet is the cause of the most prevalent type of goiter. Shrimp also contain vitamins A and D.

Iodine Shrimp. - Shrimp occasionally possess a characteristic iodoform odor (the typical odor associated with hospitals) which is commonly thought to be caused by preservatives put on the shrimp. On the contrary, this odor is a result of the shrimp having eaten various marine organisms which impart this odor. Croakers and other bottom living fish frequently have been noted to possess this same iodoform smell which is undoubtedly caused by a source similar to that of the shrimp. Although possibly unpleasant, it is not harmful.

Methods of Capture. - By far the major quantity of shrimp are taken at present with the otter trawl, although in Louisiana haul seines are still used to some extent. Cast nets are used in securing shrimp for bait and in some localities the cast net is used in order to 'test' the fishing grounds to determine whether or not the shrimp are in sufficient numbers to permit a profitable haul with the seine. In Lake Pontchartrain, La., during the fall sufficient quantities of shrimp baited with clams are taken by cast netters to supply the local New Orleans markets for several weeks.

The otter trawl consists of a bag, in which the catch is accumulated, with a wing on either side for directing the shrimp into the bag. At the extreme end of each wing is attached an otter board which, acting on the principle of a kite, forces the net open and downward so that it is constantly on the bottom.

Before the introduction of the trawl which came into prominence between 1915 and 1918 the haul seine was the chief commercial shrimping gear. These seines consisted of a wall of mesh 150 to 300 fathoms in length with a lead line along the bottom and a cork line along the top. The otter trawl, a more efficient and adaptable gear has entirely replaced the seine in the South Atlantic and Gulf with the exception of Louisiana where a few seines are still operated.

Other Shrimp Fisheries of the United States. - There is a small shrimp fishery in the Middle and North Atlantic states. The shrimp taken in this area are used chiefly as bait. In San Francisco Bay, Calif., up to 500,000 pounds of shrimp are taken annually. In pre-war years the major portion of San Francisco Bay shrimp were dried for export to the Orient. These shrimp are small and consist of three species, all belonging to a different family from the common shrimp of the South Atlantic and Gulf. A shrimp fishery exists in Southeastern Alaska where a number of species, not in the same family as the common shrimp of the South Atlantic and Gulf, are taken. The Alaskan shrimp are chiefly cooked and shipped in ice to the western markets.

---oOo---

The following publications contain further and more detailed information on the shrimp and the shrimp industry of the United States. They may be consulted in Government depository libraries, or may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Johnson, Fred F. and Milton J. Lindner
Shrimp Industry of the South Atlantic and Gulf States with Notes on Other Domestic and Foreign Areas. U. S. Bureau of Fisheries Investigational Report No. 21. 83 pp., illus. 1934. 10 cents.

Weymouth, F. W., Milton J. Lindner, and W. W. Anderson
Preliminary Report on the Life History of the Common Shrimp Penaeus setiferus (Linn.). U. S. Bureau of Fisheries Bulletin No. 14. 26 pp., illus. 1933. 5 cents.