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Studies of Spot Shrimp, *Pandalus platyceros*, at Little Port Walter, Alaska

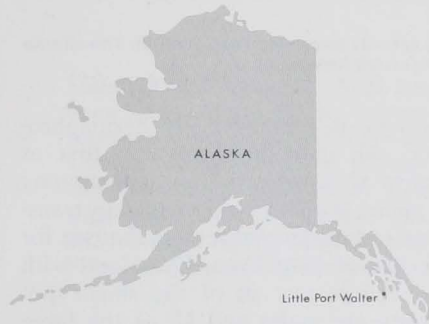
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The spot shrimp, *Pandalus platyceros*, is the largest shrimp found in the North Pacific—large individuals may reach 30 cm (12 inches) in length and weigh up to 120 g (one-fourth pound). Spot shrimp are important predators on many of the smaller animals that share their environment and in turn are an excellent food for many of the larger marine animals and for man.

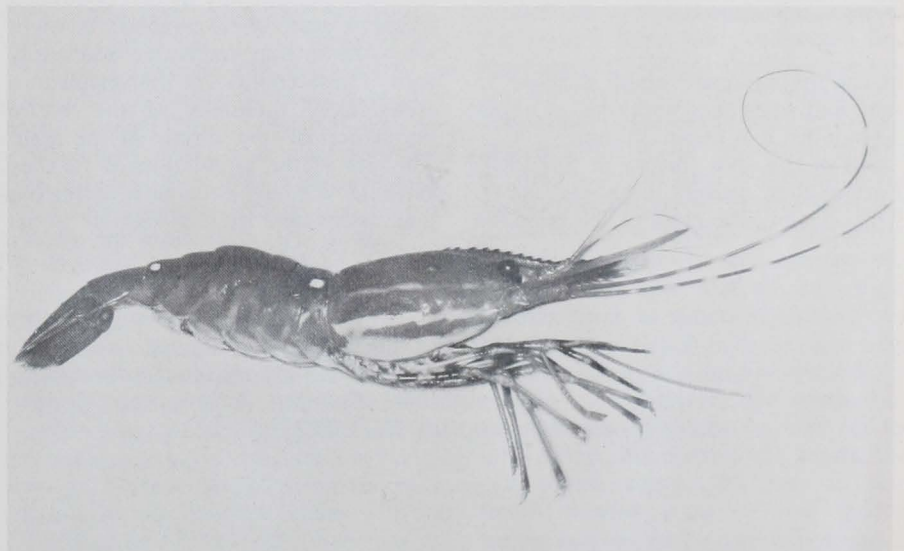
Juvenile spot shrimp have been studied since 1967 at Little Port Walter on southern Baranof Island, southeastern Alaska. The study began after NMFS biologists exploring for shrimp concentrations in the area found many young spot shrimp in the inner part of the Little Port Walter estuary. The location lent itself perfectly to the study because of the existing fishery research station, which has served as a center for salmon studies since 1934.

Initial observations by biologist-divers and results of pot fishing showed that only juvenile spot shrimp were present in the inner bay of Little Port Walter. The inner bay is a small body of water—about 750 m long and 450 m wide, with a maximum depth of 21 m—and within the bay, the spot shrimp inhabit only the relatively hard-bottom, kelp-covered periphery. The behavior of the shrimp was clearly regulated by the daily periods of light and dark—during daylight

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Alaska, showing location of Little Port Walter.



The spot shrimp is the largest shrimp species inhabiting the North Pacific Ocean. Large females like the one above may reach a foot in length (excluding the antennae) and one-fourth pound in weight.

they remained inactive and hidden under kelp fronds or in crevices among the rocks; at night they were out in the open and foraging actively for food on the bottom.

The study of the juvenile spot shrimp at Little Port Walter was designed to answer several important questions about the species. First, what was the role of an area such as Little Port Walter in the early life history of the spot shrimp? Second, how many shrimp were in the bay and what were the dynamics of the population? Third, what were the behavior and ecological relationships of the shrimp while in the study area?

The inner bay at Little Port Walter serves as a nursery area for young spot shrimp—only small juveniles are ever seen in the bay. The shrimp, hatched during the early spring in the deep-water environment of the adults, enter the shallow nursery area during their first summer after passing through their planktonic larval stages. They then remain in the bay through their first fall and winter and second spring and summer. Sometime during their second fall and winter when they are 19 to 23 months old, they all emigrate from the bay, apparently seeking the 60- to 200-m water in which the adult spot shrimp are usually found.

The spot shrimp are extremely small when they enter the nursery area. The smallest, collected in July, have a carapace length of only 3 or 4 mm. At 1 year



Hidden and inactive during the day, young spot shrimp actively forage for food at night. The shrimp above was photographed at night while on a heavily encrusted kelp frond.



A diver observes the behavior of a group of spot shrimp near a baited trap.

of age the carapace length is about 15 mm, and when they emigrate, at about 20 months, it is about 25 mm.

All of the spot shrimp in the Little Port Walter nursery area are males. This species, like most of the pandalid

shrimps, is protandrically hermaphroditic. All individuals develop first as males; after maturing and functioning as males, at about 3 to 5 years they transform to females and remain that sex for the rest of their lives. Therefore, with few exceptions, all of the small spot shrimp are males and all of the large ones are females.

The number of spot shrimp in Little Port Walter vary widely from year to year. Index counts of shrimp abundance are made periodically by divers along a series of established transects at night when the shrimp are active and easily seen. These counts are converted into area-density estimates of the entire population of spot shrimp in the area. The size of the population of yearling shrimp in the bay in the early spring has been estimated from a high of about

66,000 in 1972 to a low of about 11,000 in 1967. This sixfold difference in year class strength within this one nursery area may be indicative of the magnitude of the annual variability in recruitment to the populations of adult shrimp.

The behavior and the ecological relationships of the spot shrimp in Little Port Walter have also been investigated, principally by direct observations by night-diving biologists. In addition to the nocturnal nature of this species, much has been learned of the spot shrimp's feeding behavior, associated species, and substrate preference. The shrimp are carnivorous and feed both by scavenging dead animal material and by preying on living organisms such as amphipods, euphausiids, limpets, annelids, and other shrimps. Among the dozens of species of vertebrate and invertebrate animals commonly found associated with the young spot shrimp, another pandalid, the dock shrimp, *Pandalus danae*, is the most consistent. Spot shrimp in the nursery area may be found on substrates ranging from bedrock to muddy sand; the principal requirement seems to be that there be adequate cover to provide daylight hiding places. Heavy coverings of the low kelps such as *Laminaria* sp. and *Agarum* sp., sunken wood debris, or even artificial materials all provide acceptable cover for the shrimp.

Future studies of the spot shrimp at Little Port Walter will include continued monitoring of year class strength and an attempt to locate the adult population to which the young shrimp are recruited. The latter work, relying on future recovery of shrimp marked and released within the nursery area, should help to tie the studies at Little Port Walter into a more complete understanding of the total life history of the spot shrimp.

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