The Life Cycle of a Shrimp

Shrimp Eggs

Shrimp eggs are tiny, almost invisible particles released deep in Gulf waters to float in the water column, providing food for zooplankton and incidental nutrition primarily for filter feeders ranging from rays and sharks to mollusks. Released in certain salinities when water temperature increases significantly, these tiny eggs fill a niche that is lagniappe for most animals that consume them and a selected food source for a few small fishes at the bottom of the sea's food web. Although shrimp mature from eggs to larvae in a short time, shrimp eggs are available to the food web over a long period because spawning is not an isolated event. White shrimp spawn two or three times when stimulated by temperature increases from late spring to early fall (from April to September off Louisiana). Brown shrimp spawn throughout the year, although April to May and September through November appear to be peak spawning times off Louisiana's coast.

Nauplius Larva and Protozoea Larva

Larvae develop from floating fertilized eggs, growing and molting through many of each of these stages over a two- or three-week period. Although shrimp at all life stages are opportunistic omnivores (consume both plants and animal matter), these hardly visible nauplii and protozoea have little control over their diet. They cannot swim or control their movements. Nevertheless, they interact with other species as feeders and as food throughout the water column. They feed on nanoplankton, zooplankton and phytoplankton (green algae, copepods and diatoms) as well as suspended detritus, while small fishes and filter feeders consume some of them.

Mysis Larva

Maturing larvae in the mysis stage are carried towards shore by flood tides and wind-driven currents, continuing to feed on zooplankton and phytoplankton. A shrimp larva at this life stage is large enough in size for some juvenile fish to see and hunt. Its niche is more noticeable and it is more aware of its environment. Mysis larvae seem to respond to light by moving away from it — that is down in the water column to avoid predators – although they do not yet have swimming appendages.

Postlarva

Currents and incoming tides carry the maturing crustacean into brackish (mixture of salt and fresh water) estuarine waters. Over a 4-6 week period, the individuals begin to look like shrimp and to forage or graze like shrimp, clinging to the bottom most of the time. They develop swimming and walking legs. At this stage in Louisiana, the postlarva shrimp seek plant detritus (especially *Spartina* detritus) and micro-algae from the water column and from the sea's bottom. It also forages for worms, decaying animal parts, and live micro-animals on both the soft and hard sea bottoms and on the shells of bottom-dwelling organisms. As feeder and food, the post larval shrimp continues to provide food but begins to be a key consumer of detritus, contributing significantly to the health of the estuarine waters.

Juveniles

Over the next one or two months, the juvenile shrimp interact with many species as predator and prey throughout the estuary as far inland as covered by salty waters, and outside along protected coastal areas. Small juveniles prefer shallow salty water along the edges of marshes, where plants provide both cover and detritus, and where microorganisms thrive in the soft bottom. Small juvenile shrimp are food for juvenile fishes also living in the estuary such as southern flounder, spotted seatrout, red drum, inshore lizard fish, Atlantic croaker and pinfish. Wading birds tend to ignore small juvenile shrimp and gulp their predators, but the birds seek and eat larger, more visible juvenile shrimp. As they graze on the soft estuary floor, juvenile shrimp contribute to turbidity, thus stimulating bacterial and micro-algal growth, which, in turn, increases their own food source. They consume whatever is available such as detritus, chitin, parts of worms and snails, fish parts, sponges, corals, copepods, other crustaceans, algae and vascular plant stems and roots. Cannibalism is common. As maturing juvenile shrimp move farther into the estuary to satisfy their appetites, their effect on the estuary spreads. Juvenile white shrimp are known to move farther up into the estuary than juvenile brown or pink shrimp. Eventually, all will turn towards the sea.

Subadult

Temperature changes stimulate growth, and, along with salinity changes, regulate the maturing shrimp's migration within the estuary and back out to sea. The subadult scavenges for detritus, chitin, parts of worms and snails, fish parts, sponges, corals, algae, and vascular plant stems and roots, as well as other juvenile shrimp. It is an important food source for many predators of increasing size – pinfish, sheepshead, red drum, black drum, Atlantic croaker, sand seatrout, sea catfish, gafftopsail catfish, southern kingfisher, southern flounder and spotted seatrout. It is also popular with commercial fishers seeking bait.

Any weather change such as a cold front, wind change or major rainfall that sharply alters temperature or salinity stimulates the subadult to move towards the estuarine shores of barrier islands in the passes, feeding on the bottom during daylight to avoid wading birds and commercial fishers, rising in the water column after dark to feed opportunistically. Areas in the passes that are protected from heavy winds, tides and surf become glutted with young adults and subadults waiting for a high tide to carry them out to sea. Many are harvested at this stage.

Adult

Out in the Gulf once more, the adult shrimp continues to grow in size on the sea's bottom as an opportunistic omnivore, and its niche at this stage is primarily as food for many. It lives in deep water, 60-500 feet below the sea's surface. The adult shrimp, around a year old, will be snared by commercial trawlers and consumed by spotted seatrout, lady fish, crevalle jack, bluefish, Florida pompano, Spanish mackerel, silver seatrout, black tip sharks, Atlantic sharpnose sharks, Gulf kingfish, red snappers, sand seatrout, and redfish. However a few will survive long enough to reproduce when a sharp increase in the water column's temperature will stimulate the females to spawn, producing thousands of eggs to begin the cycle again.