



Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute

Blue crabs are common in all of Florida's coastal waters. In 1860, William Stimpson, a taxonomist who admired the coloration of these crabs, named the group that includes blue crabs *Callinectes*, meaning "beautiful swimmer." In 1896, the blue crab was first described by Mary Rathbun, who gave it the specific name *sapidus*, meaning savory. Blue crabs are classified as Phylum Arthropoda, Class Crustacea, Order Decapoda, Family Portunidae. All of these terms translated provide a concise description of blue crabs. They have a shell and ten jointed legs, and they spend much of their lives in estuaries. These beautiful swimming crabs are indeed a delicious meal.

BLUE CRAB

Beautiful, Savory Swimmer

The hard outer shell, the exoskeleton, is made of chitin (pronounced *ky-tin*) with calcium salts added for strength. Shells of adult crabs usually measure five to seven inches, but sometimes as much as

nine inches, from the tip of one lateral spine to the other. The eyes are mounted on short stalks and can move independently. Between the eyes are two long antennae and two shorter antennules, which are used as sensory organs.

The upper surface of the crab shell is bluish to dark green to brownish-green. The fingers of the males' claws are blue, tipped with red; the females' claws are red with darker red tips. The lower body is creamy white or white.

Males may also be distinguished from females by examining the underside of the body. The male abdomen, or apron, is shaped like an upside-down Y. The female apron is triangular when she is immature and is almost semicircular when she is old enough to reproduce.

Description

The blue crab's ten legs include one pair that has claws and stout spines for feeding and defense, three pairs of sharply pointed walking legs, and one pair that serves as flat swimming paddles at the rear. Blue crabs can walk rapidly over the sea floor on their walking legs, or they can swim sideways at good speed. The claw of the leading edge is folded close against the body, and the other claw, on the side away from the direction of movement, trails straight out behind.

The shell, called the carapace, is two-and-a-half times as wide as it is long. Two lateral spines extend out on either side. The front edge of the shell is serrated, or "toothed," with eight teeth on each side between the spines and the eyes. Between the eyestalks are two prominent bulges with two teeth between them.

Distribution and Habitat

Although blue crabs are uncommon north of Cape Cod, they may range from Nova Scotia to northern Argentina. They are abundant in Chesapeake Bay and along the Florida coast. They have been successfully introduced into European waters and are found off France and Denmark and in the Mediterranean Sea. They are abundant in the Nile River delta of Egypt and in Israel. Blue crabs have recently been found in San Francisco Bay, where they may be a threat to the native crab population.

AT A glance	Scientific Name	<i>Callinectes sapidus</i>
	Size	Adults usually measure five inches to seven inches, but sometimes up to nine inches, from the tip of one lateral spine to the other.
	Range	Nova Scotia to northern Argentina; off France and Denmark; Mediterranean Sea; Nile River delta; Israel; San Francisco Bay; all along the Florida Coast.
	Habitat	Soft-bottomed estuaries, bays, deltas; females migrate offshore to spawn.
	Harvest	Five traps maximum without a license; traps may be worked only during daylight hours. Females with eggs prohibited. Crabs to be sold must be five inches minimum carapace width.





In Florida, male blue crabs are most prominent in upper bays and around river mouths. They seem to prefer soft bottoms where they can bury themselves, leaving only eyestalks and antennae sticking out. They are essentially shallow-water inhabitants, preferring water less than 35 meters (100 feet) deep, but they have been seen in water 90 meters (280 feet) deep. After maturing in the upper bay areas, female blue crabs move down the bay to spawn. Large populations of females are also found in certain offshore waters where blue crabs migrate.

Blue crabs normally live in the salt waters of temperate and tropical seas, but they are also found in water ranging from fresh to very salty. Depending on their stage of development, blue crabs may require specific salinity and temperature ranges, food supply, water quality, and habitat.

FAST FACT

One tagging study documented female blue crabs that moved 500 miles in 100 days.

Only female blue crabs are migratory. Tagging studies suggest that on the gulf coast of Florida, male blue crabs tend to remain in the estuaries, moving at random and without direction. Females, however, migrate, moving offshore and alongshore in saltier waters. They travel principally in fall and winter, generally heading in a northerly direction. On the east coast of Florida, males also tend to remain in estuaries, but females make offshore migrations only to spawn.

Life History

Reproduction

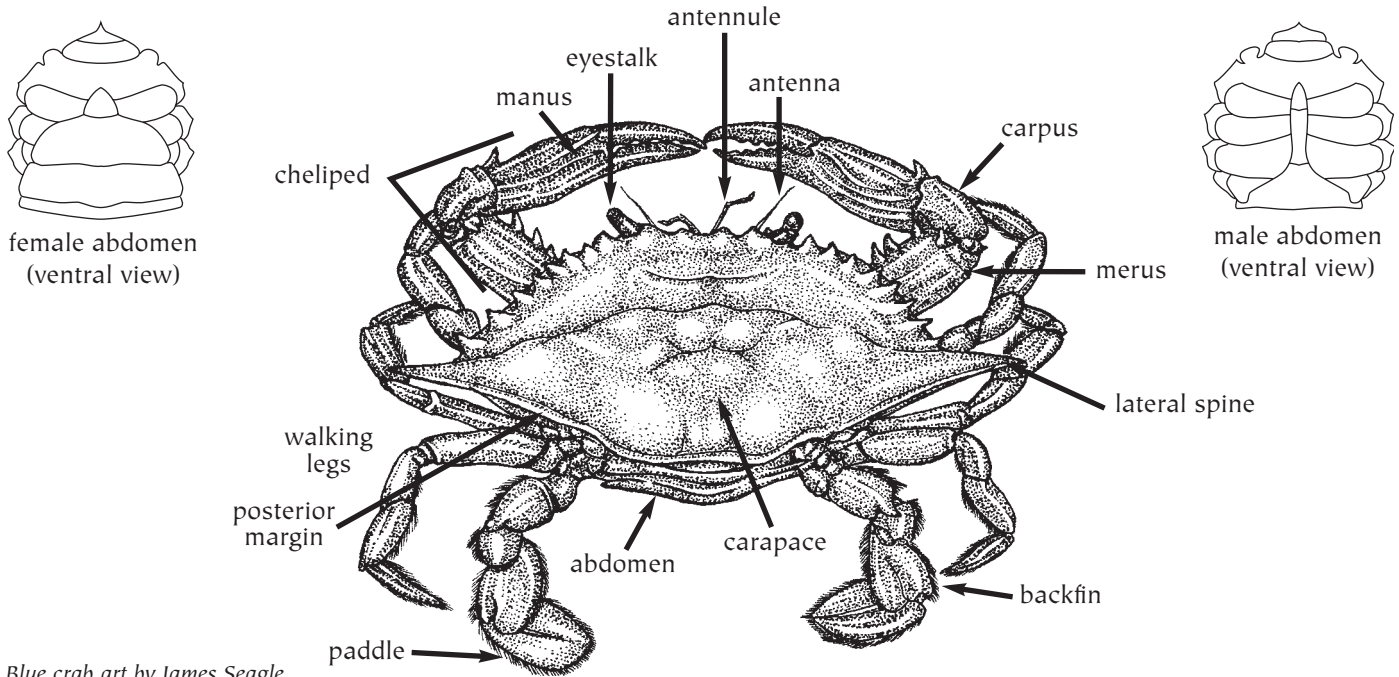
Blue crabs are thought to live as long as four years, although their exact lifespan is unknown. In Florida waters, blue crabs spawn almost all year, except in the cooler months of December through February. Males become sexually mature in 12 to 16 months and at a smaller size (about four inches) than females do, but they continue to grow after reaching maturity. Females reach sexual maturity in 12 to 14 months, at a size of 5 to 7 inches. When they molt at maturity, growth stops; therefore, it is known as the “terminal molt.” Females mate only once, but males may mate several times.

Mating occurs in brackish water after the female’s terminal molt. The sperm is stored in the female’s body for up to a year and so will be available for repeated spawnings, even though mating for the female is a one-time event. She may spawn one to nine months after mating, depending on water temperatures.

Up to two million tiny eggs are deposited on feathery structures called swimmerets under the semicircular “apron” and form a large, orange, spongy mass. Though blue crabs typically inhabit brackish waters, the eggs need higher salinities to hatch, so the female moves offshore. The orange egg mass becomes dark brown as the developing young use up the yokes. After two weeks, the eggs hatch, and tiny, free-swimming, larval-stage zoeae are released into the sea.

Life Stages

The zoea is a strange-looking creature with large, dark eyes;



Blue crab art by James Seagle

Abdomen art after Food and Agriculture Organization of the United Nations, Species Identification Sheets



a round body; a long, curved spine on its back; a shrimp-like tail; and two pairs of leg-like appendages. It swims backward in jerks by snapping its tail (abdomen) under its body. The zoea is very fragile and cannot tolerate sudden changes in temperature or salinity. It is estimated that one in a million eggs spawned will survive to maturity. The zoea passes through seven increasingly complex molts over 31 to 49 days and finally emerges as a later-stage larva called a megalopa.

The megalopa has a flattened body with tail section that is shorter than the zoea's but still extends straight from the body. It has true legs and may either swim or crawl about. The megalopa settles to the bottom and takes advantage of incoming tidal currents to sweep it shoreward to the estuarine nursery grounds, where it metamorphoses into the first crab stage. When the megalopa molts after 6 to 20 days, depending on salinity and temperature, it looks like a true crab for the first time and measures about one-tenth of an inch wide.

The crabs reach their adult stages in brackish water 12 to 18 months after they hatch. While growing from zoea to adult, the female crab molts 18 to 20 times. The male molts 25 or more times.

Molting

Because its skeleton is on the outside and encloses the crab, it can grow only by shedding its shell in the process known as molting. When a new shell begins to form under the old, the last two segments of the swimming paddles change color. In mature crabs, a white line indicates that the animal will molt in one or two weeks, a pink line denotes molting in three to six days, and a red line suggests that molting will be completed in one to three days.

Molting crabs hide in vegetation or crevices because they are defenseless while they molt and for a time thereafter. Because even the stomach lining will be lost, crabs stop feeding when molting time nears. Some of the carbohydrates, proteins, and calcium of the old shell are dissolved and stored in the body for use in the new shell. Muscle attachments loosen and reattach to the new shell.

A four- or five-inch crab may take two or three hours to molt. The old shell splits at the back "seam," the carapace is lifted, and the crab backs out. The new shell, soft and elastic, will absorb great amounts of water and stretch before it hardens, about 72 hours after the molting ends. As the crab continues to grow, a new soft shell forms, and the cycle is repeated.

The smallest crabs molt every three to five days, increasing in size approximately 33% each time. Crabs measuring about an inch wide molt every 10 to 15 days. A four-inch-wide crab molts every 20 to 25 days, depending on water temperature and available food, and increases in size 25% to 35% before the shell hardens. Greater size

increases are usually associated with less salty water because the water, and certain elements in it, can be absorbed better.

Blue crabs and other crustaceans have the remarkable ability to regenerate lost appendages. They may deliberately shed claws and legs when danger threatens, but at the next molt, a new appendage will be produced to replace the lost one. Their regenerative powers are not well understood, and scientists are very interested in the process.

Feeding

Zoeae are filter feeders, consuming tiny plants and animals afloat in the sea. The megalopae have small, sturdy claws and feed more selectively, capturing other small creatures.

Blue crabs feed on a great variety of plant and animal material, both living and dead. Though they are often considered to be scavengers, they prefer live or fresh food. They can capture small fish with lightning-quick grabs of their strong, slender claws, or they may harvest young oysters and clams. Blue crabs will also eat each other, preying on injured or soft-shelled crabs they encounter.

Parasites and Diseases

Numerous parasites cause diseases in blue crabs. Certain protozoa (single-celled animals) can infect the muscle tissue of blue crabs, turning it white. Fishermen refer to affected crabs as "sick crabs." The disease is passed on when crabs eat crabs that are "sick." The infected meat, when cooked, has a cotton-like texture. Along the Atlantic seaboard of the United States, the protozoan amoeba *Paramoeba pernicioso* is responsible for many crab deaths. It has not yet been found in the Gulf of Mexico.

The gills of blue crabs are often infested with parasites such as nemertean worms and goose-necked barnacles. In less salty waters, the brown leech may be found clinging to the abdomen and appendages. It is probably harmful to the crab, but it has not been identified as a cause of mass mortalities.

Although external parasites are shed with the exoskeleton at each molt, the internal ones remain. The sacculinid barnacle is a serious parasite in Florida crabs. This strange barnacle lives inside the crab, but its large sac extends outside the body and is sometimes mistaken for an egg mass. (The barnacle's sac is smooth and usually gray, whereas an egg mass looks spongy and is orange to dark brown.) This parasite prevents the crab from molting and sometimes modifies sexual characteristics.

Larval worms, flukes, and bacterial and fungal infections, some of which may be harmful to humans, are common in blue crabs. Therefore, proper handling and cooking of the meat is very important. Other crab diseases may be caused by heavy metals. Industrial and chemical pollution, pesticides,



and alteration of drainage patterns may also contaminate crabs and reduce their chances of survival.

Farming Potential

Farming blue crabs does not seem to be commercially feasible. Though most of their lives are spent in brackish and low-salinity waters, eggs successfully hatch only in saltier waters. Crabs in larval stages are microscopic, fragile, and susceptible to sudden changes in temperature and salinity. Crabs take a year or more to reach sexual maturity, and if they are crowded, they eat each other. Any crabs produced via farming could not be competitively priced because of the costs involved.

Soft-shell crab production, however, might be a viable industry. When blue crabs are harvested, they are examined for signs of molting. Potential “peelers” are separated and kept in floating pens until they molt. They are held for an hour or two after emerging so the soft shell can develop a certain degree of toughness. They may be shipped live in damp moss or similar material, or they may be frozen.

Fishing Gear and Methods

In Florida, blue crabs are popular in both recreational and commercial fisheries. Many people use dip nets to catch crabs. They place bait on a fishing line, and when the crab grabs the bait, the crab is gently pulled to the surface and caught in the dip net. An “open” trap is also common. A weighted trap lies flat with bait in the center. When crabs go to the bait, lines bring up the trap walls, and the trap is hauled to the surface. The regular baited traps used by commercial fishermen are also popular with recreational fishermen.

The commercial blue crab fishery relies mainly on baited traps. Most of these traps are made of plastic-coated, galvanized wire and have funnel-shaped entries. Once the crab is inside, it cannot easily escape. The traps are pulled at regular intervals, and crabs are removed through a hinged door. Marked buoys identify the traps and their owners.

Trotlines are used in some areas. Long, stout lines with pieces of bait are laid on the bottom and marked with buoys. To harvest the crabs, the line is pulled into a boat over a roller attachment. The crabs cling to the bait as they are brought up and caught in a dip net.

Harvesting Regulations

Florida regulations permit using no more than five traps to catch blue crabs unless a Saltwater Products License is

obtained from the Florida Fish and Wildlife Conservation Commission (FWC). Traps may be worked only during daylight hours, and there are regulations on trap size and materials used. Egg-bearing females may not be taken. Crabs to be sold must measure at least five inches from point to point across the carapace. A special activity license is required to possess blue crabs less than five inches wide for the soft-shell crab or bait trade. The recreational harvest limit is 10 gallons of whole crabs per day.*

Economic Importance

Collectively, recreational fishermen harvest many pounds of blue crabs each year, but the amount is not known.

Commercial landings reported in Florida fluctuated widely during 1986–2002. Landings reached more than 18 million pounds in 1987 and 1996 and dropped to less than 8 million pounds in 2001 and 2002. Gulf coast landings dropped from about 11 million pounds in 1999 to about 4.5 million pounds in 2001 and went up to 7.1 million pounds in 2003. The Atlantic coast landings have decreased from about 4.5 million pounds in 1998 to 2 million pounds in 2003.

The soft-shell crab production in Florida is irregular, ranging from about 72,000 pounds to over 250,000 pounds between 1990 and 2003.

Similar Species in Florida Waters

Besides the blue crab, *Callinectes sapidus*, Florida has five other *Callinectes* species. These crabs are similar in form but have variations in body size, color, and length of the lateral spines; they are best identified by having an extra pair of teeth between the eyes. Although the configuration of the teeth of the six species differs, the teeth of all six are generally unequal in size and lack sharp points.

Some swimming crabs of the genus *Portunus* may also be mistaken for blue crabs, but they are usually smaller and are orange, red, or purple. A speckled crab similar in shape to the blue crab is easily distinguished by its color—light brown with small round spots and yellow-tipped legs.

*Fishing regulations may change annually. Contact the FWC Division of Law Enforcement for information about current regulations. You can also view the current saltwater fishing regulations at the Web site for the FWC, Division of Marine Fisheries Management, located at <http://MyFWC.com/marine>.



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