Stone Crab

Menippe mercenaria

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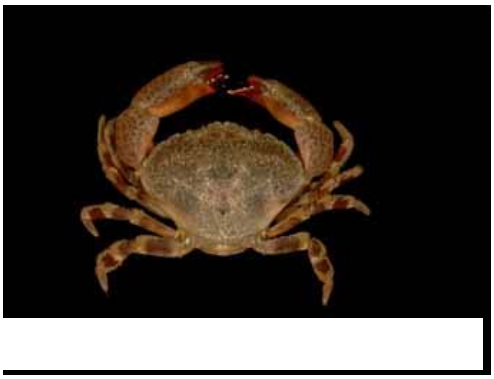

DESCRIPTION

Taxonomy and Basic Description

The stone crab is a true crab in the Family Xanthidae. The xanthid family of crabs is commonly called mud crabs. This is a highly diverse family characterized by having a body that is transversely oval or hexagonal and a broad front without rostrum. The last pair of legs is unmodified (Williams 1984).

The shell of the stone crab is nearly smooth to the unaided eye and transversely oval with the front broad and notched centrally. The lateral margins of the carapace are divided into four lobes. The pincers are large and heavy, unequal in size and nearly smooth. The inside of the palm has a patch of fine, oblique and parallel striations. The walking legs are stout and hairy toward the end (Williams 1984). The claws of the stone crab are asymmetrical; there is a major or crusher claw and a minor or pincer claw. Only the claw of a stone crab is harvested and a legal size claw has a propodus base measurement of more than 70 mm (2.75 inches) (SCDNR 2005). In South Carolina, only the larger of the two claws may be taken (SCDNR 2005).

The color of juveniles is generally dark purplish-blue, often with a white spot occurring on the inner carpus. Juveniles also exhibit three prominent white spots in the form of an inverted triangle on the carapace. Older individuals vary in color from brown to green on the anterior half of the carapace, with tan to cream coloration on the posterior half. The carapace is mottled with darker blotches. The fingers are dark and the walking legs are either entirely purple or brown, or with partial dark and light coloration (Caldwell 1986).

Status

The stone crab is not a state or federally listed species; however, stone crabs are dependent upon coastal nursery grounds and thus may be a potential indicator species of the health of estuarine habitat. In addition, stone crab claws are harvested in South Carolina; it is not clear what impact that activity may have on the population.

POPULATION DISTRIBUTION AND SIZE

Stone crabs are found from North Carolina south around peninsular Florida to the Yucatan Peninsula and Belize and throughout the Bahamas and Greater Antilles (Florida Fish and Wildlife Conservation Commission 2003). In South Carolina, the stone crab is a conspicuous inhabitant of estuaries and inlets. They occur along the coast in high salinity areas, bays, sounds and along jetties (Wenner and Stokes 1984).

No long-term surveys exist to determine population size of the stone crab in South Carolina. Adequate information to determine population abundance and health is not available.

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Across its geographic range, stone crabs inhabit jetties, dead shell, mud and grass flats and oyster reefs (Williams 1984). Stone crabs occur in areas characterized by high salinities and live oyster beds. Although the stone crab may dwell on a variety of bottom types throughout its geographic range, the shell substrate of oyster reefs provides reinforcement for creation of stable burrows, as well as protection from predators. Adult stone crabs live in burrows below the low tide mark around oyster bars and mud flats. The burrows provide protection for molting crabs and those females incubating eggs (Williams 1984).

In South Carolina, the American oyster is the principle food of the stone crab, which uses its major cheliped to crush the shell. Thus, stone crabs in South Carolina are generally found in proximity to intertidal oyster beds. Stone crabs may also eat other bivalves and crustaceans such as blue crab. Wenner and Stokes (1984) found that stone crabs were most abundant in areas immediately adjacent to the ocean and inlet areas with steep banks; fast current speeds yielded more stone crabs than did creek sites that had a gradual slope and slower current.

Few studies on the life history of the stone crab have been done in South Carolina. Egg bearing females occur from May to October with a peak from May to August. Females with mature ovaries occur during spring and summer. Juvenile stone crabs occurred throughout the year (Caldwell 1986). Mating is similar to that of other crabs in that the male protects the female while copulation occurs. Individual females have been reported to spawn several times during a year (Porter 1960). Once the eggs are extruded, larvae hatch as a larval form called zoea and develop through five zoeal stages, followed by a single more advanced larval stage called a megalopa before metamorphosis into the first crab stage. Juvenile crabs occur on shell bottom and consume a variety of foods including polychaete worms, small bivalves, oyster drills and occasionally other stone crabs (Bender 1971). Crabs mature at around 2 years of age.

CHALLENGES

Stone crabs can be affected by water pollution. Urban contaminants such as heavy metals, polychlorinated biphenyls (PCBs), hydrocarbons, pesticides and herbicides entering coastal waters via runoff from farmlands and suburban yards could negatively affect stone crab populations. Stone crab productivity is considered to be dependent on the maintenance of coastal nursery grounds, especially oyster reefs. Disease and pollution that affect oyster reefs could indirectly have a negative impact on stone crab populations. C. M. Bearden observed thousands of dead stone crabs washing ashore on beaches just north of Charleston Harbor in the late 1960s, presumably because of a mass die off caused by disease (D. Whitaker, SCDNR, pers. comm., 2005).

Stone crab claws are harvested in South Carolina; however, there is no directed fishery for stone crabs (the major fishery for the stone crab is located in Florida). Stone crab claws are generally taken incidentally to the blue crab fishery in South Carolina, although there may be some

individuals who directly target stone crab. The stone crab fishery depends on the ability of crabs to regenerate a lost limb. This unique fishery lands only the large, meaty claw of these crabs. One claw is removed from each trapped crab and the animal is released alive. If carefully treated, adult stone crabs can regenerate their claws several times. Most of the stone crabs sampled in South Carolina had at least one legally harvestable claw. Of those captured with both claws, most possessed unregenerated claws (Wenner and Stokes 1984). Estimates of the proportion of the harvest composed of claws regenerated after natural claw loss is around 10 percent for South Carolina. Survival depends partly upon the skill of the fisherman, who must separate the claw from the crab's body at the proper joint. If the joint is pierced or snapped quickly enough, the crabs own defense reflex contracts its muscles and sheds the claw cleanly. If a crab is de-clawed incorrectly (if, for example, part of the body is taken with the claw), the crab may bleed excessively or may be unable to regenerate a new claw, which significantly increases the likelihood that the crab will die (Wenner and Stokes 1984).

Landings of stone crab claws in South Carolina may increase because of added interest and awareness of the potential for a fishery. However, it is unlikely that this state's stone crab population could withstand the level of fishing effort found in the Florida fishery. Wenner and Stokes (1984) found that catch per unit effort appeared to be less than six pounds of claws per trap. Until data are available on effort and yield of claws from crabbing operations in South Carolina, it will not be possible to properly assess the impact of fishing on existing stocks of stone crab. In other parts of its range, scientists and fishers believe that the population is heavily fished, although landings have remained stable (Florida Fish and Wildlife Conservation Commission 2003).

CONSERVATION ACCOMPLISHMENTS

At present, the minimum legal size of a harvestable claw is 70 mm (2.75 inches), which allows most females to mature and reproduce at least one season prior to attaining legal size. Although a declawed female can bear eggs and contribute to the spawning stock, mortality can result from incorrect claw removal or because the female is unable to adequately feed or protect herself. Protection of egg bearing females is a conservative measure that may be beneficial to the resource. Stone crabs have relatively high fecundity. A single female may produce four to six egg masses or "sponges" during a single mating season with an average of 4.5 spawnings per molt (U.S. Fish and Wildlife Service 1984). Each egg sponge may contain between 160,000 and 1,000,000 eggs.

Declawing crabs immediately upon their capture is also a legal stipulation that represents a good conservation measure. If crabs are held for long periods before declawing, they are subjected to air exposure and desiccation.

South Carolina is actively involved in the restoration of oyster habitat by planting shell in coastal waters, which provides a foundation for settlement of oyster larvae. Over time, these new reefs will collect oysters through natural larval settlement. Eventually, these areas should develop into natural oyster habitat. Maintenance, enhancement and restoration of oyster reefs secondarily provide excellent habitat that benefits the stone crab and other marine species that use such habitat.

CONSERVATION RECOMMENDATIONS

- Determine the impact of stone crab bycatch in the blue crab fishery on reproductivity and survivorship of stone crab.
- Monitor stone crab populations, independent of fishery monitoring, in order to determine population status.
- Educate fishers about the proper method to remove a stone crab claw to achieve higher survivorship following claw harvest.
- Continue the SCDNR oyster habitat restoration project to ensure that essential habitat for stone crab populations is maintained in South Carolina waters.
- Work with municipalities to include Best Management Practices (BMPs) in development plans throughout the coastal zone. Such plans should include installation of retention ponds, modified septic systems and stream bank protection measures.

MEASURES OF SUCCESS

In the event that municipalities implement BMPs along coastal waterways, we should observe improved water quality in marine ecosystems. In turn, the improved water quality will benefit many sensitive marine species, including the stone crab. Continuation of the oyster bed restoration project will provide habitat for the stone crab, which will result in stable to increasing population trends.

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