

Coquina clam

Donax variabilis

Contributor (2005): Larry DeLancey
(SCDNR)

Reviewed and Edited (2013): Peter
Kingsley-Smith (SCDNR)

DESCRIPTION

Taxonomy and Basic Description

This small species of clam, described by Say in 1822 (Adamkewicz and Harasewych 1996), is well known to visitors to sandy beaches where its shells are found in abundance. Live coquinas are often exposed by retreating waves on sandy oceanic beaches and seem to be more active in the warmer months. Coquina clams possess wedge-shaped shells, generally less than 2.5cm (1 inch) in length, and are characterized by variously colored bands radiating along the shells (Miner 1950). This species is a member of the bivalve family Donacidae, with *D. variabilis* being larger and more abundant than *D. fossor* along sandy beaches in the Southeastern US. [Note: The coquina is also discussed in the Intertidal Marine Invertebrates Guild.]



STATUS

The seemingly abundant coquina clam is considered an indicator species for the sandy beach-ocean front habitat. This filter feeder is an important link in food webs, feeding on small particles such as microalgae and detritus and, in turn, being consumed by fish such as Pompano (*Trachinotus carolinus*) and “whiting” (*Menticirrhus* spp.), as well as shorebirds (Finucane 1969; Nelson 1986; DeLancey 1989; Wilson 1999). Coquina clams can also be consumed by humans (Miner 1950).

POPULATION SIZE AND DISTRIBUTION

The coquina clam ranges from Virginia south through the Gulf of Mexico to Texas (Ruppert and Fox 1988) and is common on most ocean front beach types that occur in South Carolina. The prevalence of coquina clams in this habitat makes it an excellent indicator of the health of this ecosystem.

Although current population status for these species is unknown, it appears to be common or abundant on the beaches in South Carolina. Surveys in South Carolina and the Southeastern US. have consistently documented the occurrence of coquinas since the 1940s and have found that it is among the most abundant macroinvertebrates present in the intertidal area during spring, where numbers have been recorded as exceeding 1000 per m² (93 per ft.²) (Pearse et al. 1942; Shealy et al. 1975; Knott et al. 1983).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

The coquina clam is among several taxa that are uniquely adapted to live and feed in the waves as the tides ebb and flow on sandy, ocean front beaches. Coquina clams can be seen rapidly burrowing, often in groups, as waves recede down the beach. Like most bivalves, coquinas are filter feeders, ingesting phytoplankton, bacteria, and other small suspended particles. The sandy beach ecosystem is one of the most familiar to the public and, like other littoral habitats, is extremely dynamic, being eroded or accreted (built up) often in a period of months. Although many organisms feed in the surf zone, this clam has unique adaptations to this habitat type, making the coquina clam a key habitat indicator species.

CHALLENGES

Rising sea levels, global warming, and beach erosion are the greatest challenges to the long-term sustainability of sandy beach habitat that is required for species such as the coquina clam. The natural supply of sand borne by rivers from sources in the mountains has been curtailed by the construction of dams and reservoirs throughout the 20th century (Komar 1998). Although beach renourishment projects restore sand to eroded beaches, these activities can significantly negatively affect populations of coquina clams and other sand dwelling invertebrates as they are buried under tons of sediment. Populations may take at least one to two years to recover following beach renourishment activities (Reilly and Bellis 1983; VanDolah et al. 1994).

Rapid coastal development also poses a problem for coquinas and other beachfront dwelling species through its associated human activities in sensitive dune areas, potential increased erosion from groins and temporary seawalls, and the disruption of sand flow. As mentioned earlier, harvest by humans could also negatively impact coquina clams populations (Velez et al. 1985).

CONSERVATION ACCOMPLISHMENTS

Under South Carolina's Beach Front Management Act of 1990, activities such as groin and seawall construction that may accelerate erosion have been greatly curtailed. This Act and the current administrative policy have attempted to discourage beachfront development by denying building permits and reducing funds for renourishment. In addition, intertidal beach habitats are currently protected from most construction by municipal or state setback laws such as amendments under the South Carolina Beachfront Management Act first established in 1988 (http://www.scdhec.gov/environment/ocrm/beachfront_management.htm). There have been significant strides made in the education of the public concerning the need for the protection of dunes and stabilizing vegetation. In addition, many beaches in South Carolina do not permit motor vehicles access because of the damage these vehicles can cause to the beaches and the dunes.

Most monitoring efforts for beach invertebrates have been conducted as part of environmental impact studies required by the US Army Corps of Engineers and SC Ocean and Coastal Resource Management (OCRM) for beach renourishment projects. Future research and monitoring activities will hopefully continue to provide at least short-term estimates of the abundances for coquinas and other oceanic sandy beach organisms that can be compared to previous studies.

CONSERVATION RECOMMENDATIONS

- Periodically conduct assessments of beach invertebrates and their communities to determine their condition.
- Prepare impact models of Coastal Zone dynamics on build-up and erosion of beaches.
- Work with coastal municipalities and communities to reduce future impacts of development on beach environments.
- Work with appropriate state, local, and non-governmental agencies to discourage development on beachfront properties.
- Educate the public as to the importance of beach and dune habitat and initiate participative projects such as dune vegetation plantings.
- Encourage planned development projects in coastal zones, particularly on barrier islands, to reduce associated impacts of development on the long-term health of sandy beach habitats in South Carolina.
- Continue to investigate and document the effects of rising sea levels and global warming on beach habitats.
- Discourage the building or repair of sea walls and groins on South Carolina's beaches to allow more natural movement of sand and, ultimately, more natural beach renourishment.
- When feasible, remove dams and reservoirs that block the flow of sand and sediment from upland areas to allow for more natural beach renourishment.

MEASURES OF SUCCESS

Normal surf zone dynamics will cause beaches to accrete, erode, and move up and down the coast over decadal timeframes. The most obvious sign of success for species such as the coquina clam is the continued presence of healthy beaches with adequate, natural supplies of sand.

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