

The Asian Green Mussel: Recent Introduction to the South Atlantic Bight

Classification. Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Subclass: Lamellibranchia
Order: Mytiloida
Family: Mytilidae
Genus: *Perna*
Species: *viridis* (Linnaeus 1758)

Common Name: Asian Green Mussel



Perna viridis specimens collected from St. Augustine, Florida in November 2003.
Length = 7.5 cm (left) and 6.0 cm (right). Note barnacles and other fouling organisms.

Physical Characteristics: Green mussels are bivalves, which typically have two hinged shells closed by one or two adductor muscles. A strong ligament holds the two valves together at the hinge. The foot is generally laterally compressed with no operculum. The family Mytilidae, to which this species belongs, is characterized by narrow, elliptical, fan-shaped, thin valves which are of the same size; the absence of prominent hinge teeth; anterior adductor muscle reduced or absent; and often the presence of byssal threads for anchoring to hard substrates. The shell of *P. viridis* is bright green as a juvenile, fading to brown with green edges as it matures. The inner shell surface is bluish green and smooth, and the adductor muscle is kidney shaped. Adults can reach 15 cm in length.

Distribution: The native habitat of *Perna viridis* is the Indo-Pacific region, primarily along Indian and southeast Asian coasts. Recently, western populations have been introduced to the Caribbean (Trinidad), the Gulf of Mexico (Tampa Bay), and the

southeast Atlantic coast of the US (Florida and Georgia). They generally inhabit intertidal, subtidal and estuarine environments with high salinity. *P. viridis* attaches to hard substrata but is capable of relocating. Dense colonies can develop in optimal temperature and salinity conditions, sometimes with thousands of individuals per square meter. *Perna* species appear to thrive in intake pipes of industrial plants, where they may interfere with operation.

A similar species, *Perna perna* (Brown Mussel) is indigenous to Africa and the western coast of South America. *P. perna* has a more saturated brown color with small occasional patches of green. Until recently, the *P. viridis* and *P. perna* were geographically isolated and thus easily distinguished, however their recent expansions have made proper identification more reliant on detailed morphological features

Commercial and ecological significance: The green mussel is harvested commercially in the Indo-Pacific as a human food resource due to its dense and fast growth. It is not recommended for consumption when found in areas like Tampa Bay because of its potential to harbor toxins, parasites and other health risks.

The green mussel has been recognized as an invasive species since its recent introduction into the Caribbean and western Atlantic. It is not known when the species was introduced, however populations have been recorded in Trinidad as early as 1990. *Perna viridis* became rapidly established in the Gulf of Mexico after the first observation of its presence in Tampa Bay (1999), and has since been observed on the east coast as far north as Savannah, Georgia (2003). It is likely that the mussel larvae were brought to these areas via freighter hull fouling and ballast water, and/or by dispersal in coastal currents near mariculture facilities

Because of its dispersed spawning nature, lack of local predators, fast growth, and high tolerance of environmental conditions, the mussel population is expected to expand in Atlantic habitats until it reaches its thermal limits.

Impacts: The most obvious nuisance impacts involve the clogging of water pipes (restricting flow) and accumulation on boat hulls, pilings, buoys and other man-made structures. In the same manner, the mussels may clog crab traps and clam culture bags, making the commercial harvest of these native species more difficult. There are conflicting views on the potential impact on local oyster species. Green mussels and oysters generally occupy different habitats, but it is likely that their populations may overlap. It may be too early to predict the outcome of the green mussel invasion.

There is an ongoing interest in monitoring and controlling the spread of this invasive species along the Florida, Georgia and, ultimately, South Carolina coastlines. Control of *Perna viridis* may prove challenging if populations reach the carrying capacity of the region in a short period of time. Unfortunately, many methods of controlling invasive species also inadvertently damage native species as well, so more research is needed before taking drastic measures to control it in its new environment.

Web Sources:

Australia's National Introduced Marine Pest Information System
http://crimp.marine.csiro.au/Reports/Perna_viridis_sheet.pdf

Article by Chuck Woods in the University of Florida News
<http://www.napa.ufl.edu/2002news/greenmussel.htm>

USGS invasive species webpage
http://www.usgs.gov/invasive_species/plw/mussels.html

Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute
http://www.floridamarine.org/features/view_article.asp?id=4315

References:

Benson, Amy J., Dan C. Marelli, Marc E. Frischer, Jean M. Danforth and James D. Williams. 2001. Establishment of the green mussel, *Perna viridis* (Linnaeus 1758) (Mollusca: Mytilidae) on the west coast of Florida. *Journal of Shellfish Research* 20(1):21-29.

Ingrao, Debra A., Paula M. Mikkelsen and David W. Hicks. 2001. Another introduced marine mollusk in the Gulf of Mexico: the Indo-Pacific green mussel, *Perna viridis*, in Tampa Bay, Florida. *Journal of Shellfish Research* 20(1):13-19.

Rylander, Kent, Julio Perez and Juan Antonio Gomez. 1996. Status of the green mussel, *Perna viridis* (Linnaeus, 1758) (Mollusca: Mytilidae), in north-eastern Venezuela. *Caribbean Marine Studies* 5:86-87.

Siddall, Scott E. 1980. A clarification of the genus *Perna* (Mytilidae). *Bulletin of Marine Science* 30 (4):858-870.

Species of the Month Authors: Susan Thornton-DeVictor and David Knott