Perna perna 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Mollusca	Bivalvia	Mytiloida	Mytilidae

Common name Mexilhao mussel (English), brown mussel (English)

Synonym
Mya perna
Mytilus pictus , (Born 1780)
Mytilus africanus , (Chemnitz 1785)
Mytilus afe , (Gmelin 1791)
Mytilus elongatus , (Lamarck 1817)
Mytilus perna
Chloromya perna
Mytilus venezolanus , (Andreu 1965)
Perna picta , (Born)
Perna indicata , Kuriakose and Nair.

Similar species *Mytilus galloprovincialis, Perna viridis, Choromytilus meridionalis*

Summary Perna perna, commonly known as the brown mussel, is a bivalve mussel that has recently invaded North America, around the Gulf of Mexico. It is quickly becoming a nuisance of water-cooling systems for power stations and can alter the physical structure of a habitat. Perna perna is an edible species and has been known to cause Paralytic Shellfish Poisoning (PSP) outbreaks to those that consume contaminated mussels.

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Species Description
Perna perna which is native to the tropics and the subtropics is a smooth-shelled, elongate low-shelled bivalve. It is recognized by its brown colour (hence the name brown mussel), its best identifying characteristic is an internal \"divided posterior retractor mussel scar.\" The shell of *P. perna* is thin around the edges and thickens posteriorly. The mussel reaches a maximum size of 90mm in intertidal zones and a maximum size of 120mm is reached in sublittoral zones. Maximum shell size is influenced by vertical distribution (The Gulf States Marine Fisheries Commission, 2003).

Lifecycle Stages
Veliger (the free-swimming larva of certain marine gastropods) larvae are formed after fertilization. Hinge teeth are well developed and increase in number, fifteen hours after fertilization, columnar structures develop as the larvae approach metamorphosis. The critical period for development is during and after metamorphosis. Metamorphosis of the brown mussel larvae is marked by the secretion of byssal threads 10-12 days post-fertilization. The survival of the larvae depends mainly upon the settling on a stable, hard substrate, usually a rock, at the initial phase of metamorphosis in optimal temperatures between 10-30°C and salinities between 30.9-32.1 ppt. Optimum temperature and salinities delay the completion of this initial stage allowing a greater amount of time for the larvae to settle on a substrate. The larvae settle in dense aggregations on rocky shores (The Gulf States Marine Fisheries Commission, 2003).

Uses
In its native range, Brereton-Stiles (2005) states that, \"The presence *P. perna* in the low shore fringing the surf zone transforms an otherwise flat rock surface into a complex three-dimensional matrix, and provides a home for a wide range of organisms such as limpets, polychaetes, barnacles, snails and algae to name but a few. Furthermore, it is a key part of the diet of many marine animals including crayfish, octopus, a number of fish species and less obviously, for whelks, which drill a small round hole in the shell and ingest parts of the contents as a protein-rich snack. *P. perna* is a crucial contributor towards the biodiversity and functioning of a healthy rocky shore ecosystem.\"
The Gulf States Marine Fisheries Commission (2003) states that, \"The edible brown mussel has been harvested in Africa and in South America. This bivalve is a good candidate for cultivation mainly because they have a rapid growth rate, reaching a commercial size of 60-80mm in 6-7 months (Chung and Acuna, 1981).\"

Habitat Description
In the Gulf of Mexico, *Perna perna* has been found colonising jetties, navigation buoys, petroleum platforms, wrecks and other artificial hard substrata, as well as natural rocky shores (Hicks and Tunnell, 1995). Hicks and McMahon (2002) report that, \"This species' long-term, incipient lower and upper thermal limits were 7.5degreeC and 30degreeC, similar to the seasonal ambient water temperature range of 10-30degreeC reported for other populations worldwide. This species' narrow incipient thermal limits, limited capacity for temperature acclimation and poor freeze resistance may account for its restriction to subtidal and lower eulittoral (the marine intertidal zone subject to wave action; the shore of a lake between high and low water marks) zones of cooler subtropical rocky shores.\" The Gulf States Marine Fisheries Commission (2003) states that, \"Salomao *et al.* (1980) reported the adult salinity tolerance to range from 19-44 ppt. The veliger larvae have a similar salinity tolerance range of 15-55 ppt (Romero and Moreira, 1980). Hicks (personal com.) has found the nonindigenous Texas population of *P. perna* to have a salinity tolerance range of 15-50ppt.\"

Reproduction
The Gulf States Marine Fisheries Commission (2003) states that, \"Lasiak (1986) reported that *Perna perna* consists of two separate sexes that can be distinguished during breeding season by the mantle colour. The mussels spawn through external fertilization by releasing eggs and sperm into the water column. Spawning is thought to be triggered by a 3-4°C drop in temperature brought on by coastal upwellings during the winter months (Carvajal, 1969).\"

Nutrition
Like its more popular cousin, *Perna viridis*, *Perna perna* is a filter feeder, feeding mainly on phytoplankton. Food availability is an important factor that determines its growth rate.

General Impacts
The Gulf States Marine Fisheries Commission (2003) states that, \"*Perna perna* can sink navigation buoys and affect shipping safety (Hicks and Tunnel, 1995).\" Barbera-Sanchez *et al.* (2004) documented severe outbreaks of Paralytic Shellfish Poisoning (PSP) in Venezuela. *P. perna* in the area contained levels of PSP toxins that exceeded international safety limits.

Management Info
Hicks and McMahon (2002) report that, \"Near extinction of *Perna perna* from Texas Gulf of Mexico waters occurred in the summer of 1997 when mean surface-water temperatures approached its incipient upper limit of 30degreeC.\" A cycle of particularly warm summer like of that seen in 1997 might control *P. perna* to a certain degree naturally in its introduced range.
Preventative measures: A two year study undertaken for the Department of Environment and Heritage, Australia by CSIRO (Commonwealth Scientific and Industrial Research Organisation) Marine Research, was designed to identify and rank introduced marine species found within Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species). Potential domestic target species, in this context are defined as ship-vectored, established, non-native (or cryptogenic) species that have demonstrated significant impact on human health, economic interests or environmental values in the Australian marine environment. Potential international target species are similarly defined as ship vectored, non-native (or cryptogenic) species that have demonstrated significant impacts outside of Australia. All of the non-native potential target species identified in the independent report published are ranked as high, medium and low priority, based on their invasion potential and impact potential.
The impact potential of a species is expressed in terms of their actual (or potential) human health, economic and environmental impacts. *P. perna* has been categorised as one of ten potentially most damaging species. The potential international target species are prioritised by their location in the invasion potential/impact potential space. *P. perna* has been categorised as 'Low priority'. (Hayes *et al.* 2005)
Chemical: *P. perna* is a common pest organism in cooling water systems of coastal power stations where it can coexist with *P. viridis* and *Brachidontes striatulus* (Rajagopal *et al.* 1996; 2003a, 2003b). A comparison of the chlorine tolerance of these three species shows that *P. perna* is the most sensitive among the three. Data collected by the authors show that, \"Continuous dosing at a residual level of at least 1 mg/L is necessary to force *P. perna* to close their shells, without allowing a recovery phase (Rajagopal, 2003a). Therefore, it is desirable to maintain such residual levels during peak settlement periods of *P. perna* to prevent fresh colonization. However, the residual levels to be administered depend on the most tolerant species. Therefore, to control a mussel fouling community containing *P. viridis*, *P. perna*, and *B. striatulus*, chlorine residuals are to be chosen based on the tolerance of *P. viridis*, which is the most tolerant among the three\".

Pathway
The brown mussel is thought to have been introduced by ballast water releases from ships of Venezuela (Hicks and Tunnel, 1995) (Gulf States Marine Fisheries Commission, 2003).

Principal source: Gulf States Marine Fisheries Commission, 2003. *Perna perna* (Linnaeus, 1758)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Dr. S. Rajagopal Institute for Water and Wetland Research Radboud University Nijmegen The Netherlands and Dr. V. P. Venugopalan, BARC Facilities, Kalpakkam, India.

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ALIEN RANGE

[1] ATLANTIC - WESTERN CENTRAL
[3] MEXICO
[6] UNITED STATES

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Summary: The electronic tool kits made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).
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Summary: This report is the final report of a two year study designed to identify and rank introduced marine species found within Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species).
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Summary: English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
Invasive species - Molluscs is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Moluscos[Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informaci&#65533;n sobre especies invasoras de m&#65533;xico cuenta actualmente con informaci&#65533;n aceca de nombre cient&#65533;fico, familia, grupo y nombre com&#65533;n, as&#65533; como h&#65533;bitat, estado de la invasi&#65533;n en M&#65533;xico, rutas de introducci&#65533;n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p&#65533;gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci&#65533;n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci&#65533;n novedades, para conocer los cambios.
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