

Perna perna 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Mollusca	Bivalvia	Mytiloidea	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.



[view this species on IUCN Red List](#)

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.



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Perna perna*

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 30°C." 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
[6] UNITED STATES

[3] MEXICO

BIBLIOGRAPHY

27 references found for *Perna perna*

Management information

Bainy, A. C. D., E. A. Almeida, I. C., Muller, E. C. Ventura, and I. D. Medeiros. 2000. Biochemical responses in farmed mussel *Perna perna* transplanted to contaminated sites on Santa Catarina Island, SC, Brazil. *Marine Environmental Research*. 50(1-5). July-December, 2000. 411-416.

[Centre for Environment, Fisheries & Aquaculture Science \(CEFAS\), 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.](#)

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).

The decision support tools are available from:

<http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx> [Accessed 13 October 2011]

[The guidance document](http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf) is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].

[Gulf States Marine Fisheries Commission \(GSMFC\), 2003. *Perna perna* \(Linnaeus, 1758\). University of Southern Mississippi/College of Marine Sciences/Gulf Coast Research Laboratory.](#)

Summary: Available from: http://nis.gsmfc.org/nis_factsheet.php?toc_id=149 [Accessed 19 May 2005]

[Hayes, K., Sliwa, C., Migus, S., McEnulty, F., Dunstan, P. 2005. National priority pests: Part II Ranking of Australian marine pests. An independent report undertaken for the Department of Environment and Heritage by CSIRO Marine Research.](#)

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).

Available from: <http://www.marine.csiro.au/crimp/reports/PriorityPestsFinalreport.pdf> [Accessed 25 May 2005]

Rajagopal S, Nair KVK, Azariah J, van der Velde G, Jenner HA., 1996b. Chlorination and mussel control in the cooling conduits of a tropical coastal power station. *Marine Environmental Research* 41: 201-220.

Rajagopal S, Nair KVK, van der Velde G, Jenner HA., 1996a. Seasonal settlement and succession of fouling communities in Kalpakkam, east coast of India. *Netherlands Journal of Aquatic Ecology* 30: 309-325.

Rajagopal S, van der Velde G, van der Gaag M, Jenner HA., 2003c. How effective is Intermittent chlorination to control adult mussel fouling in cooling water systems? *Water Research* 37: 329-338.

Rajagopal S, Venugopalan VP, Nair KVK, Azariah J., 1991. Biofouling problems and its control in a tropical coastal power station a case study. *Biofouling* 3: 325-338.

Rajagopal S, Venugopalan VP, Nair KVK, van der Velde G, Jenner HA., 1998. Settlement and growth of the green mussel *Perna viridis* (L.) in coastal waters: influence of water velocity. *Aquatic Ecology* 32: 313-322.

Rajagopal S, Venugopalan VP, van der Velde G, Jenner HA., 2003a. Response of fouling brown mussel, *Perna perna* (L.) to chlorine. *Archives of Environmental Contamination and Toxicology Issue: Volume 44, Number 3*

Rajagopal S, Venugopalan VP, van der Velde G, Jenner HA., 2003b. Tolerance of five species of tropical marine mussels to continuous chlorination. *Marine Environmental Research* 55: 277-291.

Rajagopal S, Venugopalan VP, van der Velde G, Jenner HA., 2005. Greening of the coast: what makes the mussel *Perna viridis* so successful? *Aquatic Ecology (Under Revision)*

Rajagopal S., V. P. Venugopalan, G. Velde, and H. A. Jenner. 2003. Response of fouling brown mussel, *Perna perna* (L.), to chlorine. *Arch Environ Contam Toxicol*. 2003 Apr; 44(3):369-76.

Segnini, M. I., K. S. Chung, and J. E. Perez. 1998. Salinity and temperature tolerances of the green and brown mussels, *Perna viridis* and *Perna perna* (Bivalvia: Mytilidae). *Revista de Biologia Tropical*. 46 (SUPPL. 5). Dec., 1998. 121-125.

General information

Barbera-Sanchez, A., J. F. Soler, L. R. Astudillo, and I. Chang-Yen. 2004. Paralytic shellfish poisoning (PSP) in Margarita Island, Venezuela. *Revista de Biologia Tropical*. 52 (Suppl. 1). September 2004. 89-98.

[Brereton-Stiles, R. 2005. Lectures in Conservation: Brown Mussels and Rocky Shore Co-management. World Wildlife Fund.](#)

Summary: Available from: <http://www.worldwildlife.org/lectures/mussel.cfm> [Accessed 19 May 2005]



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Perna perna*

[CONABIO. 2008. Sistema de información sobre especies invasoras en México. Especies invasoras - Moluscos. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.](#)

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 información sobre especies invasoras de México cuenta actualmente con información acerca de nombre científico, familia, grupo y nombre común, así como hábitat, estado de la invasión en México, rutas de introducción y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la página de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualización, por favor consulte la portada (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), en la sección novedades, para conocer los cambios.

Especies invasoras - Moluscos is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Moluscos [Accessed 30 July 2008]

DeVictor, S. T., and D. Knott. UNDATED. The Asian Green Mussel: Recent Introduction to the South Atlantic Bight.

Hicks, D. W., and J. W. Tunnell. 1993. Invasion of the south Texas coast by the edible brown mussel *Perna perna* (Linnaeus 1758). The Veliger 36:92-94.

Hicks, D. W., and J. W. Tunnell. 1995. Ecological notes and patterns of dispersal in the recently introduced mussel, *Perna perna* (Linnaeus 1758), in the Gulf of Mexico. American Malacological Bulletin 11: 203-206.

Hicks, D. W., and R. F. McMahon. 2002. Temperature acclimation of upper and lower thermal limits and freeze resistance in the nonindigenous brown mussel, *Perna perna* (L.), from the Gulf of Mexico. Marine Biology (Berlin). 140(6). 2002. 1167-1179.

Hicks, D. W., J. W. Tunnell, and R. F. McMahon. 2001. Population dynamics of the nonindigenous brown mussel *Perna perna* in the Gulf of Mexico compared to other world-wide populations. Marine Ecology Progress Series 211:181-192.

[ITIS \(Integrated Taxonomic Information System\), 2004. Online Database *Perna perna*](#)

Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=568077 [Accessed March 2005]

Jory, D., T. Cabrera, B. Polanco, R. Sanchez, J. Millan, J. Rosas, C. Alceste, E. Garcia, M. Useche, and R. Agudo. 1999. Aquaculture in Venezuela: perspectives. Aquaculture Magazine 25 (5).

McQuaid, C. D., J. R. Lindsay, and T. L. Lindsay. 2000. Interactive effects of wave exposure and tidal height on population structure of the mussel *Perna perna*. Marine Biology (Berlin). 137(5-6). December, 2000. 925-932.

Tejera, E., I. Onate, M. Nunez, and C. Lodeiros. 2000. Initial growth of brown (*Perna perna*) and green mussels (*Perna viridis*) in suspended culture in the Gulf of Cariaco, Venezuela. Boletín del Centro de Investigaciones Biológicas Universidad del Zulia. 34(2). Agosto, 2000. 143-158.

Wetterer, J. K., Walsh, P. D. and White, L. J. T. 1999. *Wasmannia auropunctata* (Roger) (Hymenoptera: Formicidae), a highly destructive tramp ant, in wildlife refuges of Gabon, West Africa. African Entomology 7: 292-294.