GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Potamocorbula amurensis***

Potamocorbula amurensis 简体中文 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Mollusca	Bivalvia	Myoida	Corbulidae

Common name
Asian clam (English), Nordpazifik-Venusmuschel (German), Amur river corbula (English), Amur river clam (English), brackish-water corbula (English), Chinese clam (English), Numakodaki (English, Japan), Asian bivalve (English), marine clam (English)

Synonym
Corbula amplexa , (for *P. ustuala*) Adams, 1862
Corbula frequens , (for *P. ustulata*) Yokoyama, 1922
Corbula labiata , (for *P. ustulata*) Reeve, 1844
Corbula pustulosa , (for *P. ustulata*) Yokoyama, 1922
Corbula ustulata , (for *P. ustulata*) Reeve, 1844
Corbula vladivostokensis , (for *P. ustulata*) Bartsch, 1929
Potamocorbula amurensis , Reeve (now considered to be, 1861)
Potamocorubala ustulata , separate spp by Carlton, 1999., 1844

Similar species
Potamocorbula laevis, Potamocorbula rubromuscula, Potamocorbula ustulata

Summary
The suspension-feeding clam, Potamocorbula amurensis is native to Japan, China and Korea in tropical to cold temperate waters. Known as the Asian or Chinese clam, it has been designated as a major bilogical disturbance with significant ecological consequences in the San Francisco Bay area of California where large populations have become established.

view this species on IUCN Red List

Species Description
The Asian clam *Potamocorbula amurensis* grows to around 2-3cm in length. It is usually white, tan or yellow in colour with no markings on the external valves. The valves are thin and smooth, with one shell slightly longer than the other. There is a prominent external keel on the top of the left valve, which extends slightly down the shell. Older specimens appear wrinkled on the shell surface. The inhalent and exhalent siphons are brown in colour and short in length. *P. amurensis* buries into sediments on the sea floor and exposes 1/2 to 2/3 of its shell above this sediment in order to feed (NIMPIS, 2002a).

Notes
The largest specimen of *Potamocorbula amurensis* collected in San Francisco Bay as of August 1988 was 25.1mm in length (NIMPIS, 2002b).

Habitat Description
Potamocorbula amurensis is a highly tolerant species. It is found from almost freshwater areas to high salinity areas. It exists from tropical to cold temperate waters, mostly subtidally, but it has been found in the intertidal zone. It occurs in all sediment types: mud, peat, clay, sand and is most abundant on a variety of mixed mud-sand bottoms (NIMPIS, 2002a). With its ability to survive in polluted environments, this salinity-tolerant bivalve has a distinct advantage in invading a variety of geographic areas and habitats.

Reproduction
Studies indicate that some populations of *Potamocorbula amurensis* spawn throughout the year and that newly settled individuals become reproductive within a few months. San Francisco North Bay populations spawn in Spring and Fall, while South Bay populations are reproductive all year round. In Korea spawning occurs twice a year from May - June and Sept – Oct. Males and females are separate. Spawning is induced by physical stress, heat shock, rough handling or placing in filtered water. Newly settled clams become reproductive within a few months. Females can produce from 45,000 to 220,000 viable oocytes, the number produced is, however, independent of female size. The development of larval stages appears to be influenced by water temperature (Nicolini & Penry (2000) in NIMPIS, 2002b).

Nutrition
Potamocorbula amurensis is a suspension feeder that can consume large amounts of phytoplankton and zooplankton per day. It consumes many species, the main ones appearing to be diatoms and copepods (NIMPIS, 2002a). The bivalve buries itself in subtidal sediments, exposing half to three-quarters of its shell above the sediment-water interface and anchoring itself by byssal threads which adhere to small rocks or other hard objects in the sediment. A current of water passing in through the bivalve’s inhalant siphon is filtered by gills to extract oxygen and microscopic plants, such as diatoms, which are passed on to its mouth. The water current then flows out of the bivalve’s gill chamber through the posteriorly-located exhalant siphon. Very little was known about the reproduction, growth and feeding of *P. amurensis*. However, significant research is being undertaken in California following its invasion of San Francisco Harbour (Department of Fisheries, 2000-2001).

General Impacts
The suspension-feeding clam *Potamocorbula amurensis* has been designated as a major biological disturbance with significant ecological consequences. NIMPIS (2002a) states that \"the introduction of *P. amurensis* to the San Francisco Bay in California has resulted in dramatic changes to the soft sediment communities of the area. It is thought to be responsible for the collapse of some commercial fisheries in addition to the decline in the diversity and abundance of many benthic species in the area. The clam consumes large amounts of phyto- and zooplankton and therefore changes many of the existing community dynamics, resulting in many benthic species being unable to obtain enough food for growth. The clam is also a dominant species in the bay, accounting for 95% of the biomass in some areas. This reduces the amount of available space for other species to grow and reproduce\".

Management Info
Preventative measures: Strategies to decrease the risks of future introductions involve ballast water management. Ballast water management regulations have been put in place in countries like the USA, Australia and New Zealand. Oxygen deprivation, which has been trialed as a treatment in ballast tanks, is found to be unsuccessful in the case of the Asian clam. It has a high tolerance to low oxygen and is found in polluted or eutrophic areas and hence, low oxygen is unlikely to be successful unless hypoxic conditions can be maintained for a long time (McEnnulty *et al.*, 2001).
In Australia's National List of Invasive Marine Species, the Asian clam has been classified as one of the species whose incursion can trigger an emergency response. Regulations have been put in place for the management of internationally sourced ballast water, a known vector for the Asian clam (DAFF, 2004). In New Zealand, surveillance systems have been put into place for the early detection of any incursions of *P. amurensis*, classified as one of 6 exotic high impact species (MAF, 2008).
Physical: The Asian clam is preyed upon by birds, fish and crabs. However, options for its large-scale control are limited (Department of Fisheries, WA). Dredging, beamtrawling and mopping as control options have been found to be unsuccessful in the case of the Asian clam. Dredging is unlikely to succeed as a control option due to very high densities and the small size of this species. *P. amurensis* is a comparatively thin, fragile shell more subject to breakage.

Pathway
The Asian clam's initial introduction to San Francisco Bay was as veliger larvae transported in ballast water by trans-Pacific cargo ships. *P. amurensis* larvae have the ability to tolerate substantial changes in salinity. Studies in the San Francis

Principal source: NIMPIS (2002). *Potamocorbula amurensis* (*Corbula amurensis*) species summary. National Introduced Marine Pest Information System (NIMPIS) Eds: Hewitt C.L., Martin R.B., Sliwa C., McEnnulty, F.R., Murphy, N.E., Jones T. & Cooper, S.

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)

Review:

Pubblication date: 2005-11-09

ALIEN RANGE

[1] UNITED STATES

BIBLIOGRAPHY

40 references found for **Potamocorbula amurensis**

Managment information
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 is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].
Cohen, Andrew N. 2005 Guide to the Exotic Species of San Francisco Bay. San Francisco Estuary Institute, Oakland, CA, Species Gallery *Corbula amurensis* (Schrenck, 1861)
Summary: *Corbula amurensis* available from: http://www.exoticsguide.org/species_pages/c_amurensis.html [Accessed 23 February 2006] Guide to the exotic species of San Francisco Bay available from: http://www.exoticsguide.org
DAFF, 2004. Prevention of Incursions of Marine Pests
Hayes, K., Sliwa, C., Migus, S., McEnnulty, 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]
MAF (Ministry of Agriculture and Forestry)/Biosecurity New Zealand 2008, An Independent Review of New Zealand s Biosecurity Surveillance Systems .
McEnnulty, F.R., Jones, T.E. and Bax, N.J. (2001), The Wed-Based Rapid Response Toolbox.
Summary: Web publication: . Date of release: June 2001, Date of access: 13/06/2002

General information
Alpine, A. E., Cloern, J. E.(1992).Trophic interactions and direct physical effects control phytoplankton biomass and production in an estuary.Limnology and Oceanography37:946-955.
Bernard, F.R., Cai, Y., Morton, B. (1993). Catalogue of the living marine bivalve molluscs of China. Hong Kong University Press, Hong Kong.
Canuel, E. A., Cloern, J. E., Ringelberg, D. B., Guckert, J. B., Rau, G. H.(1995).Molecular and isotopic tracers used to examine sources of organic matter and its incorporation into the food webs of San Francisco Bay.Limnology and Oceanography40:67-81.
Carlton, J.T. 1999. Molluscan invasions in marine and estuarine communities. Malacologia 41(2):439-454.
Carlton, J.T., Thompson, J.K., Schemel, L.E., Nichols, F.H.1990.Remarkable invasion of San Francisco Bay (California, USA) by the Asian clam *Potamocorbula amurensis*. I. Introduction and dispersal.Marine Ecology Progress Series66:81-95.

Carlton J.T.&#65533;1996.&#65533;Marine Bioinvasions: The alteration of marine ecosystems by nonindigenous species.&#65533;Oceanography&#65533;9(1):36-43.
Cloern, J., Alpine, A.&#65533;(1991).&#65533;*Potamocorbula amurensis*, a recently introduced Asian clam, has had dramatic effects on the phytoplankton biomass and production in northern San Francisco Bay.&#65533;Journal of Shellfish Research&#65533;10(1):258-259.
Cole, B.E., Thompson, J.K. & Cloern, J.E. Measurement of filtration rates by infaunal bivalves in a recirculating flume. Marine Biology 113, 219–225 (1992). https://doi.org/10.1007/BF00347274
CONABIO. 2008. Sistema de informaci&#65533;n sobre especies invasoras en M&#65533;xico. Especies invasoras - Moluscos. Comisi&#65533;n 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 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.
Especies invasoras - Moluscos is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Moluscos [Accessed 30 July 2008]
Decho, A. W., Luoma, S. N.&#65533;(1991).&#65533;Time-courses in the retention of food material in the bivalves *Potamocorbula amurensis* and *Macoma balthica*: Significance to the absorption of carbon and chromium.&#65533;Marine Ecology Progress Series&#65533;78:303-314.
Decho, A. W., Luoma, S. N.&#65533;(1994).&#65533;Humic and fulvic acids: Sink or source in the availability of metals to the marine bivalves *Macoma balthica* and *Potamocorbula amurensis*.&#65533;Marine Ecology Progress Series&#65533;108:133-145.
Department of Fisheries, 2000-2001. Introduced Marine Aquatic Invaders. Chinese Clam.
Summary: Web publication [Date accessed: 27 July 2004] The Department of Fisheries is responsible for the management of Western Australia s fish, marine and aquatic resources and pearling industry, while protecting and conserving the various related ecosystems.
Duda, T. F.&#65533;(1994).&#65533;Genetic population structure of the recently introduced Asian clam, *Potamocorbula amurensis*, in San Francisco Bay.&#65533;Marine Biology&#65533;119:235-241.
Feyrer, F; Herbold, B; Matern, S. A; Movle, P. B. 2003. Dietary shifts in a stressed fish assemblage: Consequences of a bivalve invasion in the San Francisco Estuary. Environmental Biology of Fishes. 67(3). 277-288.
Furlani, D.&#65533;(1997).&#65533;A bibliography of the introduced marine species in Australian waters.&#65533;CRIMP Technical Report Number 12, CSIRO Marine Research,&#65533;Hobart, Tasmania, Australia178pp.
Garcia, M. H.&#65533;(1997).&#65533;A method of spawning induction, fertilization and subsequent early development of *Potamocorbula amurensis*.&#65533;American Zoologist&#65533;37(5):45A.
ITIS (Integrated Taxonomic Information System), 2005. Online Database *Potamocorbula amurensis*
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.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Potamocorbula+amurensis&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
Jassby, Alan D; Cloern, James E; Cole, Brian E. 2002. Annual primary production: Patterns and mechanisms of change in a nutrient-rich tidal ecosystem.Limnology & Oceanography. 47(3).698-712.
Kimmerer, W. J., Gartside, E., Orsi, J. J.&#65533;(1994).&#65533;Predation by an introduced clam as the likely cause of substantial declines in zooplankton of San Francisco Bay.&#65533;Marine Ecology Progress Series&#65533;113:81-93.
Koh, C. H., Shin, H. C.&#65533;(1988).&#65533;Environmental characteristics and distribution of macrobenthos in a mudflat of the west coast of Korea (Yellow Sea).&#65533;Netherlands Journal of Sea Research&#65533;22:279-290.
Lee, B-G., Luoma, S.N.&#65533;(1998).&#65533;Influence of microalgal biomass on absorption efficiency of Cd, Cr and Zn by two bivalves from San Francisco Bay.&#65533;Limnology and Oceanography&#65533;43(7):1455-1466.
Lee, B-G., Wallace, W.G., Luoma, S.N.&#65533;(1998).&#65533;Uptake and loss kinetics of Cd, Cr and Zn in the bivalves *Potamocorbula amurensis* and *Macoma balthica*: effects of size and salinity.&#65533;Marine Ecology Progress Series&#65533;175:177-189.
Linville, Regina G; Luoma, Samuel N; Cutter, Lynda; Cutter, Gregory A. 2002. Increased selenium threat as a result of invasion of the exotic bivalve *Potamocorbula amurensis* into the San Francisco Bay-Delta. Aquatic Toxicology (Amsterdam). 57(1-2). 51-64.
Moyle, P.B., 1991. Ballast water introductions. Fisheries, 16(1):4-6.
Murrell, M. C. & Hollibaugh, J. T.&#65533;1998.&#65533;Microzooplankton grazing in northern San Francisco Bay measured by the dilution method.&#65533;Aquatic Microbial Ecology&#65533;15:53-63.
National Introduced Marine Pest Information System (NIMPIS), 2002b. *Potamocorbula amurensis* identification details. National Introduced Marine Pest Information System (Eds: Hewitt C.L., Martin R.B., Sliwa C., McEnnulty, F.R., Murphy, N.E., Jones T. & Cooper, S).
Summary: Web publication , Date of access: 7/26/2004
Nichols, F. H., Thompson, J. K., Schemel, L. E.&#65533;(1990).&#65533;Remarkable invasion of San Francisco Bay (California, USA) by the Asian clam *Potamocorbula amurensis* . II. Displacement of a former community.&#65533;Marine Ecology Progress Series&#65533;66: 95-102.
Nicolini, M. H. & Penry, D. L.&#65533;(2000).&#65533;Spawning, fertization, and larval development of *Potamocorbula amurensis* (Mollusca: Bivalvia) from San Francisco Bay, California.&#65533;Pacific Science&#65533;54(4):377-388.

O Riordan, C.A., Monismith, S.G., Koseff, J.R.�(1995).�The effect of bivalve excurrent jet dynamics on mass transfer in a benthic boundary layer.�Limnology and Oceanography�40:330-344.
Pereira, W. E., Hostettler, F. D., Rapp, J. B.�(1992).�Bioaccumulation of hydrocarbons derived from terrestrial and anthropogenic sources in the Asian clam *Potamocorbula amurensis* in San Francisco Bay estuary.�Marine Pollution Bulletin�24:103-109.
Pereira W.E., Wade, T.L., Hostettler, F.D., Parchaso, F.�(1999).�Accumulation of butyltins in sediments and lipid tissues of the Asian clam *Potamocorbula amurensis*, near Mare Island naval shipyard, San Francisco Bay.�Marine Pollution Bulletin�38(11):1005-1010.
Thompson, J. K., Schemel, L. E., Nichols, S. J.,�1991.�An Asian bivalve, *Potamocorbula amurensis*, invades San Francisco Bay with remarkable speed and success.�Journal of Shellfish Research�10:259.
Werner, Inge & Hollibaugh, James. (1993). Potamocorbula amurensis: Comparison of clearance rates and assimilation efficiencies for phytoplankton and bacterioplankton. Limnology and Oceanography - LIMNOL OCEANOGR. 38. 949-964. 10.4319/lo.1993.38.5.0949.
Zhao, J.�1993.�A preliminary study on the reproductive period of *Potamocorbula amurensis* and the relation between the period and water temperature.�Chinese Journal of Zoology�28:41-44.