GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Musculista senhousia***

Musculista senhousia 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Mollusca	Bivalvia	Mytiloida	Mytilidae

Common name

Asian mussel (English, USA), green mussel (English, USA), cuckoo mussel (English), senhouse mussel (English), hototogisu (English), Senhouse's mussel (English), Asian date mussel (English), Japanese mussel (English, USA), green bagmussel (English, USA), date mussel (English)

Synonym

Brachidontes (Arcuatula) senhousia , Kira, 1959
Brachidontes (Musculista) senhousia , Kira, 1962
Brachidontes aquarius , Grabau and King, 1928
Modiola bellardiana , Tapparone-Canefri, 1874
Modiola senhausii , Reeve, 1857
Modiola senhousia , Benson in Cantor, 1842
Modiolus senhousei , Hanna, 1966
Musculista senhausia , Morton, 1974
Musculus (Musculista) senhousia , Yammamoto & Habe, 1958
Volsella senhausi , Smith, 1944
Modiola arcuatula , Hanley, 1844

Similar species

Xenostrobus securis, Modiola arcuatula

Summary

Musculista senhousia is a small, short-lived mytilid mussel native to east Asia which has successfully spread to New Zealand, Australia, the Mediterranean and the Pacific coast of the USA. It can grow rapidly and is capable of marked habitat alteration through the construction of byssal mats on the surface of soft sediments.

view this species on IUCN Red List

Species Description

Musculista senhousia is a small mussel with a maximum length of around 30mm, but most commonly 10-25mm in length and up to 12mm in width. It has a smooth, thin shell which is an olive green to brown in colour, with dark radial lines or zigzag markings. A well developed byssus is used to construct a cocoon which protects the shell. This cocoon is made up of byssal threads and sediment. *M. senhousia* burrows vertically down into the sand/mud leaving only its posterior end protruding, allowing its siphons access to the water to enable feeding (NIMPIS, 2002; CIESM, 2005).

Notes

Predation by native species contributes significantly to community resistance to invasion by *Musculista senhousia* in southern California, and may locally prevent the mussel from establishing dense, habitat-modifying beds with potential effects on native species. (Reusch, 1998).

Lifecycle Stages

Musculista senhousia eggs and larvae are planktonic, and remain in the plankton for 45-55 days. It can reach adult size within 9 months, and up to 25mm within a year. Life span is thought to be between 18 and 24 months (Crook, 1996; CSIRO, 2000; NIMPIS, 2002; CIESM, 2005).

Habitat Description
Musculista senhousia is an opportunistic species which can be found from intertidal to subtidal habitats (to a depth of 20m) and on soft or hard substrata. It prefers to settle in groups on soft substrata, but is capable of fouling wharf pilings and man made structures. When settled on hard substrata the mussel will not form a protective cocoon. When densities are high, individual byssal cocoons fuse to form continuous byssal carpets. Densities of \"up to 2,500 mussels per square metre in Hong Kong, 2,600 per square metre in Western Australia, 2,800 per square metre in Japan, 3,300 per square metre in New Zealand, 8,600 per square metre in Mission Bay, 12,400 per square metre in San Diego Bay and 16,000 per square metre at Auckland, New Zealand have been reported. Crooks (2002) reported that densities of 5,000-10,000 per square metre are typical in mats in Mission Bay, with peak densities of over 150,000 mussels per square metre. Juveniles have been reported to settle on eelgrass at densities of 28,650 per square metre and on synthetic line at 126,000 per square metre; they later drop off these substrates to settle in mats on the bottom\" (Cohen, 2005). *M. senhousia* is a highly adaptive species, and is able to tolerate low salinities (CSIRO, 2000; NIMPIS, 2002).

Reproduction
Musculista senhousia is a species with high fecundity, rapid growth, a short life span and good dispersal ability, making it a successful invader. In the northern hemisphere it reproduces in the summer, larvae being most abundant through autumn and early winter. It has separate sexes, with males and females spawning at the same time. Spawning time varies within a limited spawning season (NIMPIS, 2002; CIESM, 2005).

Nutrition
Musculista senhousia, like most mussels, is a suspension feeder. It lives endobenthically just below the sediment surface, where it filters phytoplankton from the water column with a short (<5mm) siphon (Morton, 1974; in Reusch and Williams, 1998; NIMPIS, 2002; Allen and Williams, 2003).

General Impacts
Musculista senhousia can dominate benthic communities and potentially exclude native species. It settles in aggregations and is therefore able to reach high densities. Unlike most mussels, *M. senhousia* lives entirely within the sediments, surrounded by a bag of byssal threads. At mussel densities of greater than 1500 m2, individual byssal bags coalesce to form a continuous mat or carpet on the sediment surface. The presence of these mats dramatically alters the natural benthic habitat, changing both the local physical environment and the resident macroinvertebrate assemblage. Although this can result in increased species richness and abundance of some species, mussel mats reduce the densities of many common native bivalves and the growth of nearby eelgrass (NIMPIS, 2002; Allen and Williams, 2003). Crooks (1999) found that the effects of *M. senhousia* appear to be scale dependent. At larger scales, surface-dwelling, suspension-feeding clams are competitively inhibited. At smaller scales, however, the mussel benefits a variety of biota.
M. senhousia deposits large amounts of organic matter in the sediment, which possibly results in the accumulation of toxic metabolites such as sulfide, which can have adverse effects on seagrass growth (Morton, 1974; Ito and Kajihara, 1981; in Reusch and Williams, 1998).

Management Info
A two year study was undertaken for the Department of Environment and Heritage (Australia) by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to identify and rank introduced marine species found within Australian waters and those not found within Australian waters.
All of the non-native potential target species identified in this report are ranked as high, medium and low priority, based on their invasion potential and impact potential. A hazard ranking of potential domestic target species based on invasion potential from infected to uninfected bioregions identifies *Musculista senhousia* as a 'medium priority species' - these species have a reasonably high impact/or invasion potential.
For more details, please see Hayes *et al.* 2005.
The rankings determined in Hayes *et al.* 2005 will be used by the National Introduced Marine Pest Coordinating Group in Australia to assist in the development of national control plans which could include options for control, eradication and/or long term management.
McEnnulty *et al*. (2001) list four possible control options for *M. senhousia*: air exposure/dessication/freezing, commerical harvesting for food and fertiliser, dredging/beamtrawling/mopping, heated water treatment (baths, spray). Please see The Web-based Rapid Response Toolbox for more detailed information.
Predation by native species contributes significantly to community resistance to invasion by *M. senhousia* in southern California, and may locally prevent the mussel from establishing dense, habitat-modifying beds with potential effects on native species. (Reusch, 1998).

Pathway
Musculista senhousia may have been introduced to Australia as an accidental importation with Pacific oysters (CSIRO, 2000). In the Mediterranean, invasion of *M. senhousia* has been strictly linked with shellfish farming and trading.The initial invasion of the Pacific coast of the USA is attributed to transport with oysters imported from Japan (Mistri *et al*. 2004).

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

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

Review:

Pubblication date: 2006-11-16

ALIEN RANGE

[9] AUSTRALIA
[1] CHINA
[5] FRANCE
[10] ITALY
[2] MEDITERRANEAN & BLACK SEA
[4] NEW ZEALAND
[1] TANZANIA, UNITED REPUBLIC OF
[1] CANADA
[2] EGYPT
[2] ISRAEL
[1] MADAGASCAR
[1] MEXICO
[1] SLOVENIA
[25] UNITED STATES

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28 references found for **Musculista senhousia**

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, A.N. 2005. *Musculista senhousia*. Guide to the exotic species of San Francisco Bay. San Francisco Estuary Institute, Oakland, CA.
Summary: This website provides detailed information on *M. senhousia* in San Francisco Bay.
Available from: http://www.exoticsguide.org/species_pages/m_senhousia.html [Accessed 12 November 2006]
Kushner, R.B. 2003. Eelgrass habitat structure and the density-dependent mortality of an invasive bivalve. In Abstracts: Third International Conference on Marine Bioinvasions, March 16-19, 2003. Scripps Institution of Oceanography La Jolla, California
Summary: Report on predation of invasive mussel by another species and also the preferred habitat of the invasive mussel.
Available from: http://massbay.mit.edu/resources/pdf/MarinePDF/2003/MBI2003abs7.pdf [Accessed 5 November 2006]
Reusch, T.B.H. 1998. Native predators contribute to invasion resistance to the non-indigenous bivalve *Musculista senhousia* in southern California, USA. *Marine Ecology Progress Series*. 170: 159-168.
Summary: This paper discusses the impact of native predators in preventing establishment of *M. senhousia* in southern California.
Available from:
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General information
Allen, B.J. and Williams, S.L. 2003. Native eelgrass *Zostera marina* controls growth and reproduction of an invasive mussel through food limitation. *Marine Ecology Progress Series*. 254: 57-67.
Summary: This paper examines the complex relationship between *M. senhousia* and the native eelgrass (*Zostera marina*) in California.
Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2000. Asian mussel (*Musculista senhousia*). Marine Pest Infosheet 7. Centre for Research on Introduced Marine Pests, CSIRO Marine Research.
Summary: This fact sheet provides basic information about the invasive mussel *Musculista senhousia*.
Available from: http://www.marine.csiro.au/crimp/Reports/Infosht7_Musc0700S3.pdf [Accessed 6 November 2006]
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]
Creese, R., Hooker, S., De Luca, S. and Wharton, Y. 1997. Ecology and environmental impact of *Musculista senhousia* (Mollusca: Bivalvia: Mytilidae) in Tamaki Estuary, Auckland, New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 31: 225-236.
Summary: This paper discusses the impacts of *M. senhousia* in New Zealand.
Available from: http://www].rsnz.org/publish/nzjmfr/1997/21.pdf [Accessed 20 October 2006
Crooks, J. 1999. Scale-dependent effects of an introduced, habitat-modifying mussel in an urbanized wetland. In Abstracts: First National Conference on Marine Bioinvasions, January 24 -27, 1999. Massachusetts Institute of Technology, Cambridge, MA
Summary: Report into how abundance of mussel affect how they effect the ecosystem.
Available from: http://massbay.mit.edu/resources/pdf/MarinePDF/1999/MarineAbs3.pdf [Accessed 5 November 2006]
Crooks, J.A. 1996. The population ecology of an exotic mussel, *Musculista senhousia*, in a Southern California Bay. *Estuaries*. 19 (1): 42-50.
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Crooks, J.A. 1998. Habitat alteration and community-level effects of an exotic mussel, *Musculista senhousia*. *MEPS*. 162: 137-152.
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Crooks, J.A. and Khim, H.S. 1999. Architectural vs. biological effects of a habitat-altering, exotic mussel, *Musculista senhousia*. *Journal of Experimental Marine Biology and Ecology*. 240: 53-75.
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Summary: Report on the abundance of non indigenous species in Southern California.
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