Rhithropanopeus harrisii

System: Brackish

<table>
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<th>Kingdom</th>
<th>Phylum</th>
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<td>Animalia</td>
<td>Arthropoda</td>
<td>Malacostraca</td>
<td>Decapoda</td>
<td>Panopeidae</td>
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Common name
Brackwasserkrabbe (German), Zuiderzeekrabbetje (Dutch), Zuiderzee crab (English), white-fingered mud crab (English), estuarine mud crab (English), Harris mud crab (English), krabik amerykanski (Polish), Zuiderzeekrabbe (German), Østamerikansk brakvandskrabbe (Danish)

Synonym
Pilumnus harrisii, (Gould, 1841)
Pilumnus tridentatus, (Maitland, 1874)
Heteropanope tridentata, De Man J. G. (1892)
Rhithropanopeus harrisii, ssp. tridentatus (Buitendijk and Holtuis 1949)

Similar species

Summary
Rhithropanopeus harrisii is a small estuarine crab native to the Atlantic Coast of North America. It has invaded many locations in Europe and North America and is presumed to have dispersed mainly via oyster translocations and shipping. Anecdotal reports indicate that it can alter food webs, compete with native species, foul pipe systems, and be a vector of the white spot baculovirus.

Species Description
Rhithropanopeus harrisii, or the Harris mud crab, is a small euryhaline crab. It reaches approximately 2cm in carapace width as an adult and is greenish-brown or olive in colouration. It has white-tipped claws, unequal in size and dissimilar. The front of its carapace is almost straight, slightly notched, with its margin transversely grooved, appearing double when viewed from the front. Four anterolateral teeth (spines) line the side of its carapace between the eyestalks and the widest portion of the carapace. Its four walking legs are long, slender and sparsely hairy. (Williams 1984; Perry, 2007).

Notes
In Europe, Maitland (1874) initially described Rhithropanopeus harrisii as a native species, Pilumnus tridentatus. In 1949, Buitendijk and Holthus recognized the exotic origins of this crab and reclassified it as Rhithropanopeus harrisii ssp. tridentatus, a synonym which has often been used to designate this species in Europe (Christiansen, 1969; Wolff, 2005).
Lifecycle Stages
Eggs remain attached to the mother’s pleopods until they hatch. Ovigerous females exhibit a rhythmic pumping behaviour when hatching begins, which helps synchronize hatching and facilitates larval release (Forward and Lohmann, 1983). *Rhithropanopeus harrisii* develops in four zoeal larval stages and a megalopal post larval stage before reaching adulthood. Development averages 16 days (Cripe et al., 2003). Sexual maturity can be reached as early as the breeding season following birth, at a carapace width of 4.5mm for males and 4.4 to 5.5mm for females (Ryan, 1956; Turoboyski, 1973).

Uses
*Rhithropanopeus harrisii* has been used as a study organism in many developmental and physiological studies (e.g. Christiansen and Costlow, 1975; Kalber and Costlow, 1966). The crab has also been used to examine the effects of various pesticides on non-target crustacean species (Clare et al. 1992), including juvenile hormone analogues (JHA's), a pest control agent which mimics insect larval hormones (Cripe et al. 2003).

Habitat Description
*Rhithropanopeus harrisii* can be found in estuaries and quasi-freshwater lakes with salinities as low as 0.4 ppt (Keith, 2006). It prefers brackish waters and commonly inhabits shores with muddy or sandy substrates. It usually associates with structures providing shelter such as oyster reefs, vegetation, logs, or debris of some type. It is tolerant to a wide range of salinities rendering it capable of invading a variety of aquatic habitats (Williams 1984, Petersen, 2006, Roche and Torchin 2007).

Reproduction
Oviparous. Sexual. Males place spermatophores into the female’s sprematheca. Unlike most other crab species, *Rhithropanopeus harrisii* females do not moult immediately before copulation, which usually takes place during the summer months. Approximately three to four days after copulation, females bury themselves up to the eye stalks to lay their eggs. This behaviour facilitates the attachment of the eggs to the pleopods. Ovigerous females will then remain sheltered in debris, shells, or sediment. Females usually lay between 1200 and 4800 eggs at a time depending on their size. In the Kiel Canal, Germany, large females were observed to lay as many as 16,000 eggs (Turoboyski, 1973).

Nutrition
*Rhithropanopeus harrisii* is omnivorous and known to feed on mangrove and leaf detritus, bivalve molluscs, oligochaetes, and dead fish. Small crabs have been observed to feed on small crustaceans such as amphipods and copepods. (Williams, 1984; Karpinsky, 2005).
General Impacts
No study has yet quantified the impacts of *Rhithropanopeus harrisii*, but anecdotal reports in the scientific literature indicate that it can alter food webs, compete with and potentially displace native crabs, crayfish, as well as benthaphagous fishes (reviewed in Roche and Torchin 2007). In the Caspian Sea, where it has reached very high densities, the crab is responsible for fouling water intake pipes and causes economic loss to fishermen by spoiling fishes in gill nets (Zaitsev and Öztürk 2001). In Texas, the crab has become very abundant in almost freshwater reservoirs and is reported to foul PVC intakes in lakeside homes and clog the cooling system of a nuclear powerplant in Glenrose (Keith, 2006; Hildebrand, pers. comm.). Payen and Bonami (1979) also identified *R. harrisii* as a carrier of the white spot baculovirus, which causes disease in penaeid prawn species and the blue crab (*Callinectes sapidus*).

Management Info
**Preventative measures:** Transport in ballast water is thought to be the main vector of introduction for *Rhithropanopeus harrisii*. The GloBallast Programme has been established to reduce introductions of non-native species (such as *R. harrisii*) by providing funding and assistance to less-industrialized countries in order to reduce the transfer of harmful aquatic organisms and pathogens in the ballast water of ships. Implemented by the International Maritime Organization (IMO) with funding by the Global Environment Facility (GEF) and the United Nations Development Program (UNDP), this programme will facilitate the implementation of the newly adopted IMO Ballast Water Convention in developing countries (GloBallast, undated).

**Chemical:** Difluazuron, the active chemical in the pesticide Dimilin, has been experimentally used on *R. harrisii* (see McEnnulty *et al.*, 2001). It is lethal to hatching larvae in concentrations of 7-10ppb. It works by inhibiting chitin synthesis and has been found to be an effective way of controlling arthropods. However, it lacks specificity and may take several weeks to degrade in brackish water environments (Christiansen and Costlow 1980).

**Biological:** The rhizocephalan barnacle *Loxothylacus panopaei* parasitizes *R. harrisii* in its native range. Parasitic barnacles infect their crab hosts at the larval stage (cyprid or cypris larva), develop as an endoparasite, and then produce an external reproductive body called the externa. Rhizocephalans stunt growth in their hosts and cause castration in both males and females, preventing future reproduction. Alvarez *et al.* (1995) experimentally infected *R. harrisii* from the Chesapeake Bay with *L. panopaei* and found that parasitism had a significant effect on the survival of infected hosts. However, further studies are necessary to determine whether *L. panopaei* is a viable candidate for biological control of *R. harrisii* in its introduced range.

Pathway
Although not confirmed, *Rhithropanopeus harrisii* is thought to have been introduced accidentally along with Atlantic oysters *Crassostrea virginica* to the San Francisco Bay (Roche, 2007). Although only confirmed on a few occasions, transport of decapods in ships' ballast water is considered the most common and effective means of introduction of exotic decapods including *Rhithropanopeus harrisii* (Rodriguez, 2001). *Rhithropanopeus harrisii* are known to have dispersed by attaching to the hulls of ships. This however has declined since the advent of metallic hulls and antifouling paints (Rodriguez, 2001).
Principal source: Perry, 2007. *Rhithropanopeus harrisii*. USGS Nonindigenous Aquatic Species Database.


Williams, 1984. Shrimps, lobsters, and crabs of the Atlantic Coast of the Eastern United States, Maine to Florida. Smithsonian Institution Press, Washington, D.C.

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

Review: Dominique Roche MacGill University Canada

Publication date: 2008-01-11

ALIEN RANGE

| [1] ARAL SEA | [1] ATLANTIC - NORTHEAST |
| [1] UNITED KINGDOM | [4] UNITED STATES |

BIBLIOGRAPHY

53 references found for *Rhithropanopeus harrisii*

Management information


Summary: This study consists of infection experiments in the laboratory to test the effects of the barnacle parasite *Loxothylacus panopaei* on its host, *Rhithropanopeus harrisii*, from the Chesapeake Bay.


FULL ACCOUNT FOR: *Rhithropanopeus harrisii*

**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 Villizi, 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:


[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]

**Global Ballast Water Management Programme, undated. GloBallast Programme.**

**Summary:** This website outlines the directives of a program with the objectives of promoting the ?Removal of Barriers to the Effective Implementation of Ballast Water Control and Management Measures in Developing Countries? Available from: http://globallast.imo.org/index.asp?page=gef_interw_project.htm&menu=true

[Accessed 10 December 2007]


[Accessed 13 December 2007]

**General information**


**Summary:** This article discusses the ecology of the Aral Sea and how it has been impacted by the introduction of nonindigenous species, including the Harris mud crab.


**Summary:** This publication cites the introduction of *Rhithropanopeus harrisii* to the Aral Sea.


**Summary:** A publication reporting competition between introduced species, including *Rhithropanopeus harrisii*, and native benthic invertebrates and fishes in the Aral Sea.


**Summary:** This article (in Russian) cites the introduction of the Harris mud crab to the Aral Sea.


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 - crustaceans is available from:

Spanish:
La lista de especies del Sistema de informaci?n sobre especies invasoras en M?xico cuenta actualmente con informaci?n acerca de nombre cient?fico, familia, grupo y nombre com?n, a?n como ?bitat, estado de la invasi?n en m?xico, rutas de introducci?n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una lista directa a la p?gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci?n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci?n novedades, para conocer los cambios.

Especies invasoras - Crust?ceos es available from:


Summary: This study uses Rhithropanopeus harrisii to test the effects of fenoxycarb, a juvenile control hormone analogue, on non-target crustacean species.


Summary: This article documents the egg hatching process and life cycle of the Harris mud crab.


Summary: An analysis of the seasonal and spatial occurrence and tidal abundance of larvae of R. harrisii in the estuary of the Mondego River, Portugal.


Summary: This paper presents the biogeography, history, and some ecological consequences of the introduction of alien decapod species in Poland, with reference to other European countries.

Information on the occurrence of Rhithropanopeus harrisii in European introductions of the Harris mud crab. This database provides information about a few European introductions of the Harris mud crab. Gould, 1841. American Zoologist 6:221-229

Summary: This brief profile offers information concerning the introduction of the Harris mud crab to Britain. Available from: http://www.jncc.gov.uk/page-1710 [Accessed 14 December 2007] 


Summary: This brief profile offers information concerning the introduction of the Harris mud crab to Britain. Available from: http://www.jncc.gov.uk/page-1710 [Accessed 14 December 2007] 


Summary: A discussion of introduced species, including Rhithropanopeus harrisii, and their impacts in the Caspian Sea. Keith, D.E. undated. Occurrence of the Estuarine Mud Crab. Rhithropanopeus harrisii. in Texas Reservoirs


Summary: This article discusses worldwide loss of biodiversity due to invasive species, such as the Harris mud crab. Lepp?koski, E. and Olenin, S. 2000. Non-native species and rates of spread: lessons from the brackish Baltic Sea. Biological Invasions. Vol. 2: 151-163

Summary: This article discusses introductions of nonindigenous species to the Baltic Sea and provides a date for the discovery of Rhithropanopeus harrisii. Makarov A.K 1939. Certain new elements in the composition of the fauna of the Black Sea Limans as an effect of maritime navigation. C.R. (Doklady) Adacemy of Sciences of the USSR 23: 819-822


North European and Baltic Network on Invasive Alien Species (NOBANIS), undated. Rhithropanopeus harrisii.

Summary: This database provides information about a few European introductions of the Harris mud crab. Available from: http://www.tarleton.edu/~biology/MudCrap.html [Accessed May 29 2008]


North European and Baltic Network on Invasive Alien Species (NOBANIS), undated. Rhithropanopeus harrisii.

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Mok, V.S. 2001. Mud crabs (Xanthidae) in Chesapeake Bay: claw characteristics and predation on epifaunal bivalves. Invertebrate Biology. Vol. 120: 67-77

Summary: A comparison of claw mechanical strength between R. harrisii and E. depressus in the Chesapeake Bay and the Italian waters. Bollettino del Museo civico di Storio naturale di Venezia 46: 109-120


North European and Baltic Network on Invasive Alien Species (NOBANIS), undated. Rhithropanopeus harrisii.

Summary: This database provides information about a few European introductions of the Harris mud crab. Available from: http://www.tarleton.edu/~biology/MudCrap.html [Accessed May 29 2008]

Papov, V.E., Dgebuadze, Y.Y., Shiganova, A., Filippov, A.A., and Minchin, D. 2007. A risk assessment of biological invasions in the inland waterways of Europe: the Northern Invasion Corridor case study. Available from: http://www.tarleton.edu/~biology/MudCrap.html [Accessed May 29 2008]


Perry, H. 2007. Rhithropanopeus harrisii. USGS Nonindigenous Aquatic Species Database.


Summary: A genetic study with goals of inferring the direction of range expansion and attempting to trace the source population for introductions of R. harrisii on the Pacific coast of the US.


*Summary:* This source provides information on the invasion of *R. harrisii* in the Panama Canal and reviews previous introductions worldwide as well as reported impacts.


*Summary:* Several decapod introductions are discussed in the article along with vectors of introduction.


*Summary:* The authors of this article examine several introduced species in the Caspian Sea, including the Harris mud crab.


*Summary:* A review of non-indigenous aquatic species in the Netherlands.