

NOBANIS - Marine invasive species in Nordic waters - Fact Sheet

Rhithropanopeus harrisi

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Species description

Species name

Rhithropanopeus harrisi, (Gould, 1841) – Harris Mud Crab

Synonyms

Pilumnus tridentatus Maitland, 1874; *Heteropanope tridentata* De Man, 1892; *Pilumnopeus tridentatus* Balss, 1933; *Pilumnus harrisi* Gould, 1841; *Rhithropanopeus harrisi* ssp. *tridentatus* Buitendijk & Holthuis, 1949; *Panopeus wurdemannii* Gibbes, 1850.

Common names

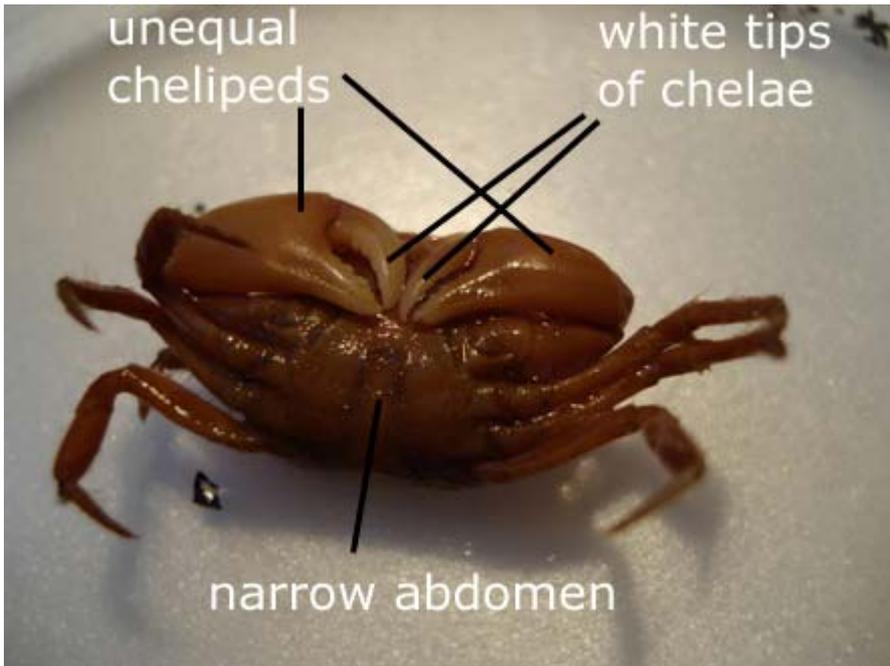
Harris mud crab, Estuarine mud crab (USA); Dwarf mud crab, White-fingered (or white-tipped) mud crab (UK); Østamerikansk brakvandskrabbe (DK); Brackwasserkrabbe, Zuiderzeekrabbe (DE); Zuiderzeekrabbetje, Brakwaterkrabbetje (NL); Krabik amerykanski (PL); Gollandsky crab (RU).

Taxonomic remarks

This species was described as a new species, *Pilumnus tridentatus* Maitland, 1874, from the Zuiderzee in the Netherlands and only synonymized with the American species *Rhithropanopeus harrisi* (Gould, 1841) in 1949 (Wolff, 2005). Some European authors consider the European crab a separate subspecies, *R. harrisi* ssp. *tridentatus* (Buitendijk & Holthuis, 1949; Turoboyski, 1973; Kidawa et al., 2004).

Identification

This is a small crab species with a maximum carapace width about 2-3 cm. Two characters distinguish this species from other crabs in Nordic waters: large, white-tipped claws of unequal size and shape, and an almost smooth anterior margin of the carapace, i.e. the margin between the eyes has no or a very indistinct median notch. Males are generally larger and have larger claws than females. The general body colour is greenish-brown.



Rhithropanopeus harrisi ♂ ventral



Rhithropanopeus harrisi ♀ ventral



Rhithropanopeus harrisii ♀ dorsal

Distribution

Native area

This species lives in estuarine and brackish waters of the east coast of North America, from New Brunswick (Canada) to the Gulf of Mexico (Roche & Torchin, 2007).

Introduced area

The introduction history of this species has been rather difficult to trace. This may be because it was considered a native species from the description of the European species in 1874 until its synonymization in 1949. The first European record dates back to before 1874 when it was described as a new species from the Zuiderzee in the Netherlands (Wolff, 2005). The first German record is from 1936 in the Kiel Canal connecting the North and Baltic Seas (Nehring, 2000; Gollasch & Nehring, 2006). It first appeared on the Baltic coast of Germany between 1948 and 1950. Since then it has spread to estuaries of several rivers, including the Eider, Elbe, Ems, Weser and on a few occasions even the German section of the Rhine. The increase in abundance has taken place chiefly during the 1990s (Nehring, 2000). There are a few Danish records from the harbour of Copenhagen in 1953 and 1954 (Rasmussen, 1958). The next record is from 2008, just south of Copenhagen, but recently *R. harrisii* has become established in south-eastern Denmark (Olesen & Tendal, 2009). In the Baltic it has been found in Poland since 1951 (Normant et al., 2004; Grabowski et al., 2005) and in Lithuania since 2000 (Bacevičius & Gasiūnaitė, 2008). It has not yet reached Swedish (Främmande Arter, 2006) or Finnish waters. In France it first appeared in 1955-1956 (Gouilletquer et al., 2002), in Portugal in 1989 (Gonçalves et al., 1995b), and in Spain in 1990 (Roche & Torchin, 2007). In the U.K. *R. harrisii* only occurs in one locality, Cardiff Docks in Wales, where it was first found in 1996 (Eno et al., 1997). Molecular studies have shown that several haplotypes occur in European populations that have not been found in native populations, and also that haplotype diversity is as high in European as in native populations (Projecto-Garcia et al., 2010).

Rhithropanopeus harrisii has been found in the Black Sea since 1936, in the Sea of Azov since 1948, in the Caspian Sea since 1959, in the Aral Sea since 1971, and in the Adriatic Sea since 1994. Finally it has been found on the French Mediterranean coast in 2000 and on the Tunisian coast in 2003 (Roche & Torchin, 2007).

The first record from the Pacific coast of the USA is from 1937, when it was found in San Francisco Bay. Presently it occurs in Oregon and California, but not south of San Francisco Bay. Established populations occur at low densities at few, distinctly separated localities. Molecular data indicate that the Pacific populations originate from a single event of introduction from the Atlantic coast of the USA (Petersen, 2006). Also genetic diversity is lower in the Pacific coast population than in the native range. *R. harrisii* was recently found in two man-made lagoons along the Panama Canal (Roche & Torchin, 2007). The first specimens had been found in 1969, but apparently the species was not established. In 2007 numerous specimens, including ovigerous females were found, and the species is now considered established and invasive (Roche et al., 2009).

Recently, in 2007, *R. harrisii* has also been introduced to Japan (Forward, 2009).

Vector

It may have been introduced to the west coast of the USA by transfer with oysters, *Crassostrea virginica* (Gmelin, 1791) (Roche & Torchin, 2007). Its association with international ports in most European countries indicates that it has been transferred with shipping, either as larvae in ballast water or as hull fouling. Rasmussen (1958) speculated that since it was found feeding on another alien species, the polychaete *Ficopomatus enigmaticus* (Fauvel, 1923), in the harbour of Copenhagen, it had been introduced with this worm from hull fouling.

Ecology

R. harrisii is a scavenger, feeding on detritus, algal material or small invertebrates, including amphipods, polychaetes and bivalves (Hegele-Drywa & Normant, 2009). *R. harrisii* is an osmoregulator, and at salinities between 1 and 27 ppt it is hyperosmotic; at higher salinities it is slightly hypoosmotic (Reisser & Forward, 1991). It can only survive short period in pure freshwater (Normant et al., 2004), but has been found in reservoirs in Texas with a salinity of only 0.4-0.5 ppt (see <http://www.tarleton.edu/Faculty/dekeith/MudCrab.html>). Similar results were found for Polish crabs that are adapted to constant low salinity (5-7 ppt) (Normant & Gibowicz, 2008). It is also tolerant to anoxia and to several pollutants (Normant et al., 2004). *R. harrisii* is eaten by eels, flounder and cormorants (Hegele-Drywa & Normant, 2009) and by round goby and perch (Bacevičius & Gasiūnaitė, 2008).

In its native range *R. harrisii* is often parasitized by the rhizocephalan *Loxothylacus panopaei* (Gissler, 1859) (Alvarez et al., 1995; Grozholz & Ruiz, 1995), which castrates the crab. The parasite appears to be an introduced species itself, originating in the Caribbean and the Gulf of Mexico (Hines et al., 1997). Parasite abundance is highest when salinity is above 15 ppt (Reisser & Forward, 1991). The parasite has apparently not been introduced with the crab anywhere. *Rhithropanopeus harrisii* has been used extensively to study effects of various pesticides used in agriculture (Christiansen et al., 1978; Christiansen & Costlow, 1982; Diamond et al., 1989; Celestial & McKenney, 1994; Nates & McKenney, 2000; Turberty & McKenney, 2005). As an estuarine species it is highly likely to be exposed to such chemicals when farmland runoff reaches estuarine waters (Diamond et al., 1989), and being an arthropod it is also likely that chemicals

aimed at insects, which are also arthropods, will also affect the mud crab (Christiansen et al., 1978; Celestial & McKenney, 1994).

Reproduction

Males are mature at a size of about 4 mm and females mature at slightly larger size (Alvarez et al., 1995). Females do not molt prior to mating (Turoboyski, 1973). In Poland ovigerous females appear in May or later, depending on temperature, and females are buried in the sand during egg laying to facilitate the attachment of the eggs to the pleopods (Turoboyski, 1973). Females usually produce between 1300 and 5000 eggs per brood (Turoboyski, 1973). Eggs are brooded for 15-19 days, and a female can produce up to 4 broods with a single mating (Morgan et al., 1983). Hatching larvae are released by pumping movements of the mother's abdomen (Forward et al., 1982; Forward & Bourla, 2008). This species goes through four zoea stages and one megalopa (Gonçalves et al., 1995; Nehring, 2000). The larvae remain within the estuaries where they hatch (Fitzgerald et al., 1998). Stage IV zoeae perform nocturnal vertical migrations, like many zooplankton species (Forward, 1985). This may be the mechanism responsible for retention of larvae inside the estuary with low salinity (Forward, 2009). Vertical movements can also be used to avoid predators, such as the ctenophore *Mnemiopsis leidyi* A. Agassiz, 1865 (Forward, 2009). The first crab stage is reached after 11 to 43 days, depending on temperature. Also, larval development time increased at very low (5 ppt) and very high (30 ppt) salinity (Gonçalves et al., 1995).

Impacts

Evidence for negative impacts is mostly anecdotal. It may alter ecosystem functioning by competing with native crabs, being a predator on native benthic invertebrates, and being a prey of native predators. In Polish waters, where there are no native crabs, it probably has impacted the original food web structure. Where it occurs at high densities it may also cause fouling of fishing gear and damage the catch. In Texas water reservoirs it has caused fouling problems of water pipes (see <http://www.tarleton.edu/Faculty/dekeith/MudCrab.html>). *R. harrisii* is host for the “white spot baculovirus”, which affects penaeid shrimps and blue crabs in its native region.

Management

Certain insecticides are lethal to larvae of *R. harrisii* at low concentrations (Christiansen et al., 1978), and it has been proposed to use these chemicals to control the crab. Biological control using the castrating rhizocephalan *Loxothylacus panopaei* has also been suggested (ISSG, 2008 – see: http://www.issg.org/database/species/management_info.asp?si=1217&fr=1&sts=&lang=EN). The latter measure should be used only within the native area of *R. harrisii* where the parasite already occurs.