

Distribution and abundance of *Neocrangon resima* (Rathbun, 1902) (Decapoda: Caridea: Crangonidae) collected during the TALUD XIV cruise in the Gulf of California, Mexico

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Abstract

A large population of *Neocrangon resima* (Rathbun, 1902) is reported for the northern Gulf of California, Mexico, in depths of 205-580 m, with environmental conditions varying from 6.21 to 11.29°C and 0.50 to 1.54 ml O₂/l. With a total of 33 specimens collected, this is the largest sample reported to date for the northern Gulf of California. The species had previously been reported from two localities. The distribution range in this area is increased by ca 1°30' of latitude to the south. Maximum and minimum estimated densities were of 2.7 and 54.0 orgs/ha, thus indicating that a relatively large population of *N. resima* occurs in the area.

Key words: Crangonidae, distribution, Gulf of California, Mexico.

Introduction

Crangonid shrimps are distributed worldwide in both shallow and deep waters (Chace, 1984; Wicksten, 1989; Hendrickx, 1995, 2012). Several species are of commercial importance and shallow-water species are mostly found in temperate waters (Holthuis, 1980). According to Holthuis (1993) and Komai (2004), the Crangonidae is comprised of 21 genera and to date 212 species (De Grave & Franssen, 2011). In total, 56 species of Crangonidae have been reported for the American coasts, 37 in the eastern Pacific (Hendrickx, 2012). Many shallow water species of crangonids originally were described in the genus *Crangon* Fabricius, 1798, and later transferred to new genera (e.g. *Lissocrangon* Curis & Carlton, 1977; *Mesocrangon*

Zarenkov, 1965; *Metacrangon* Zarenkov, 1965; *Neocrangon* Zarenkov, 1965) when species of this group were studied more thoroughly.

Seven species of deep-water (>200 m depth) crangonids have so far been reported in the Mexican Pacific (Hendrickx, 2012), six of them from shallow waters. Of these, five are known exclusively from the California Current area: *Crangon handi* (Kuris & Carlton, 1977), *Crangon holmesi* Rathbun, 1902, *Crangon nigromaculata* Lockington, 1877, *Mesocrangon spinosissimus* (Rathbun, 1907), and *Neocrangon resima* (Rathbun, 1902). The sixth species, *Mesocrangon munitella* (Walker, 1898), has been reported in both the California Current area and in the Gulf of California (Hendrickx, 1993). *Neocrangon zaca* (Chace, 1937), reported by Hendrickx (1993) for the California Current area and the Gulf of California, is a junior synonym of *Neocrangon*

resima (Wicksten, 1996). So far, there has been no reports of shallow water Crangonidae in SW Mexico (i.e., south of Banderas Bay).

The TALUD project, initiated in 1989 with very extensive sampling programs in 2000-2001 and from 2005 to 2011, is aimed at studying the biocenosis of habitats below the 200 m depth limit along the Pacific coast of Mexico. However, due to the presence of a very wide minimum oxygen zone (OMZ) in the area, particularly in the southern and central Gulf of California and off SW Mexico, severe hypoxia and anoxia exist, and sampling activities were performed in deeper water, below the 700 m depth limit, where the oxygen concentration progressively increases allowing for the presence of a distinct, species-rich invertebrate and fish community (see Hendrickx and Serrano, 2010; Serrano and Hendrickx, 2011). This study reports on the presence of a widely distributed population of *Neocrangon resima* (Rathbun, 1902) in the northern Gulf of California.

Materials and Methods

The material was obtained while sampling with the R/V "El Puma" of the Universidad Nacional Autónoma de México in the northern part of the Gulf of California, roughly between 28°10' and 29°10'N. A total of 30 stations were visited between the 5th and the 11th of April, 2011, with depth ranging from 148 to 1346 m. Specimens were collected in a 2.35 m wide by 0.95 m high standard benthic sledge operated during 30 minutes at an average hauling speed of 1.75 knots, and equipped with an outer collecting net of ca 5.5 cm (2 1/4") stretch mesh and an inner net of ca 2.0 cm (3/4") stretch mesh. Density was estimated using the swept area method (width x trawling distance of the gear). Sampling depth was estimated with a digital SIMRAD echo sounder. Epibenthic temperature and oxygen concentrations were measured ca 10 m above bottom level with a Seabird CTD-O₂ probe. Oxygen level were also double-checked with the Winkler method using water samples

collected in closing bottles near bottom.

The specimens examined are deposited in the invertebrate collection at the Mazatlán Marine Station, UNAM, in Mazatlán, Mexico (EMU), with their respective catalogue number. Abbreviations used are: CL, carapace length (posterior margin of orbit to mid-point of posterodorsal margin of carapace); St., sampling stations. A restricted synonymy is provided, including mostly contributions where the species is illustrated.

Results

Neocrangon resima (Rathbun, 1902)

Fig. 1

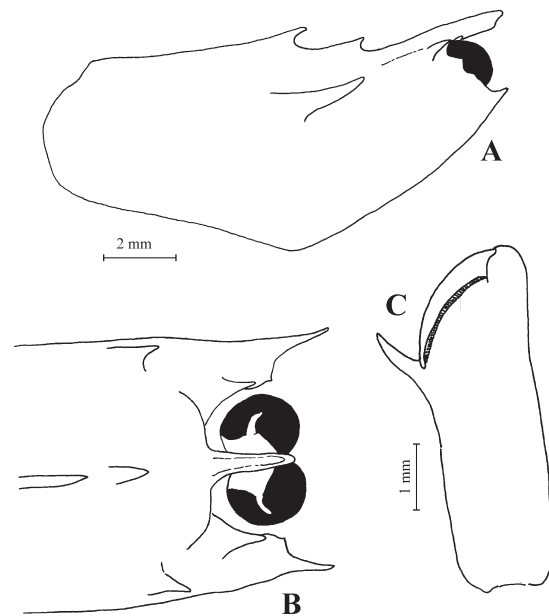


Figure 1. *Neocrangon resima* (Rathbun, 1902). A. Carapace, lateral view. B. Anterior part of carapace, dorsal view. C. Chela of left first pereopod, lateral view. Setae omitted.

Crangon resima Rathbun, 1902: 889; 1904: 124, fig. 65. - Kozloff, 1974: 164 (key).-Word and Charwat, 1976: 68 (key), 87 (text-fig.), 88.- Butler 1980: 97 (key).- Luke, 1977: 18 (catalogue).

Crango resima.- Schmitt, 1921: 96, fig. 64.- Goodwin, 1952: 394.

Crango zacae Chace, 1937: 136, text-fig. 9.

Crangon (*Neocrangon*) *resima*.- Zarenkov 1965: 1762.

Crangon (*Neocrangon*) *zacae*.- Zarenkov 1965: 1764.

Crangon zacae.- Word and Charwat, 1976: 93 (text-fig.), 94.- SIO, 1992: 100 (catalogue).
Neocrangon zacae.- Kuris and Carlton, 1977: 554.- Wicksten, 1980: 39.- Austin, 1985: 637 (list).- Hendrickx, 1993: 306 (list).
Neocrangon resima.- Kuris and Carlton, 1977: 554.- Austin, 1985: 637 (list).- Wicksten, 1996: 42, fig. 1 a-c; 2011: 159.- Wicksten and Hendrickx, 2003: 69 (list).- De Grave and Fransen, 2011: 999 (list).

Material examined: TALUD XIV (Figs. 2,3). St. 8 (28°17'06"N - 112°33'39"W), 8/April/2011, one female (CL 7.9 mm), 520-557 m, Agassiz dredge (EMU-9453). St. 10 (28°20'50"N - 112°11'40"W), six females (CL 6.9-9.0 mm), 8/April/2011, Agassiz dredge, 325-328 m (EMU-9454). St. 14 (28°36'14"N, 112°28'03"W), 8/April/2011, four females (CL 6.0-7.6 mm), benthic sledge, 305-316 m (EMU-9455). St. 19 (28°37'37"N - 112°41'05"W), 9/April/2011, one female (CL 6.0 mm), 560-580 m, benthic sledge (EMU-9456A). St. 20 (28°46'29"N - 112°45'40"W), 9/April/2011, 20 females (CL 6.0-9.3 mm), benthic sledge, 410-414 m (EMU-9457). St. 21 (29°00'53"N - 112°51'31"W), one female (CL 6.4 mm), 9/April/2011, benthic sledge, 412-415 m (EMU-9456B).

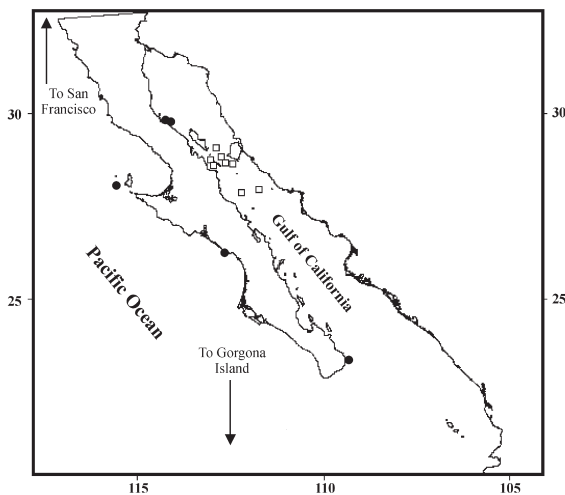


Figure 2. General distribution pattern of *Neocrangon resima* (Rathbun, 1902) along the coast of western America. Each dot off the coast of Mexico represent one sample. Squares □, material of the TALUD XIV. Circles ●, other records.

Distribution: The type locality of *Crangon resima* is off San Diego, California ("Albatross" St. 2935; 32°44'30"N - 117°23'0"W), in 124 fm depth (227 m); depth range, from 44 to 266 fm (81-487 m) (Rathbun, 1902). The type locality of *Crango zacae* is east of Cedros Island, west coast of Baja California, Mexico (28°13'N - 115°07'W), in 44 fm depth (81 m); additional material from Gorda Bank, east coast of Baja California Sur (Chace, 1937). The Scripps Institution of Oceanography catalogue reports one sample of *N. zacae* NW of Angel de la Guarda Island (29°43'54"N - 113°56'W) at 566-644 m depth (identified by M.K. Wicksten) (SIO, 1992). The general range of this species is from Monterey Bay, California, USA, to north of Gorgona Island, Colombia (Wicksten, 2011). Additional localities for Mexico reported in literature are San Domingo Point, west coast of Baja California (as *N. zacae*; Rathbun, 1902), and Conzag Bay, east coast of Baja California (Wicksten and Hendrickx, 2003) (Fig. 2). Word and Charwat (1976) provide a depth range of 73-183 m for *N. zacae* and of 60-227 for *N. resima*. The record of *N. resima* by Green and Butler (1988) for British Columbia is a misidentification and actually corresponds to *N. communis*.

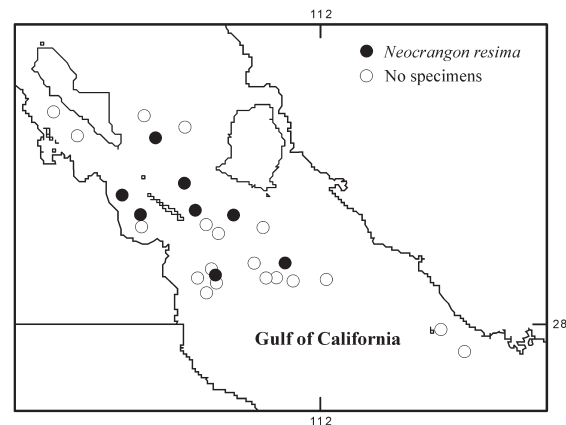


Figure 3. Localities where *Neocrangon resima* (Rathbun, 1902) was collected during the TALUD XIV cruise in the Gulf of California, Mexico.

Ecology: As noted previously, the general depth range of *N. resima* is from 60 to 644 m. The material collected during the TALUD XIV cruise was caught between 205 and 580 m. Epibenthic temperature and dissolved oxygen

concentration varied from 6.21 to 11.29 °C and 0.50 to 1.54 ml O₂/l, with most records (4 out of 6) in concentrations >1.0 ml O₂/l.

Remarks: The specimens examined belong to the genus *Neocrangon* as described by Zarenkov (1965). The characters provided by Wicksten (1996) to separate *N. resima* from the other species occurring in the region and her redescription of this species were used to identify the material examined. All specimens fit well with the description. Rostrum shape as well as position, size and number of teeth on carapace (Fig. 1) match illustrations provided by Schmitt (1921) and by Chace (1937, for *N. zaca*); they also lack a dorsal carina on the sixth abdominal somite, and the orientation of the dactyl with respect to the hand of the first cheliped is oblique (see Fig. 1). The plate (or carina) below the rostrum is relatively moderate in the specimens examined. According to Wicksten (1996), this character is variable in both *N. resima* and *N. communis* (Rathbun, 1899).

The 33 specimens examined represent the largest sample available to date for this species in the Gulf of California. However, no ovigerous female were observed. Considering the size of the sampling gear (2.35 m wide), the speed and duration of each haul (30 minutes), the density of *N. resima* is estimated between 2.7 and 54.0 org/ha. The material collected during this survey confirms the presence of a widely distributed and relatively large population of *N. resima* in deep-water in the northern Gulf of California. However, additional sampling in this area is needed to establish the exact boundaries of its distribution, its abundance and reproductive strategy.

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