

Rapid Communication

Presence of giant tiger shrimp *Penaeus monodon* Fabricius, 1798 on the Mexican coast of the Gulf of Mexico

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Abstract

Between June 2012 and January 2013, nine specimens of the giant tiger shrimp *Penaeus monodon* Fabricius, 1798 were caught off the Mexican Gulf coast. The average total length of these specimens was 28.1 cm. This is the first record of this invasive shrimp on the Mexican Gulf coast. The appearance of this shrimp species is a concern because of the effects it could produce on the Gulf coast ecosystem.

Key words: Giant tiger shrimp; *Penaeus monodon*; Mexican Gulf Coast; invasive; Mexico

Introduction

The giant tiger shrimp *Penaeus monodon* Fabricius, 1798 is the largest commercially exploited shrimp species in the world. Its natural distribution is the Indo-West Pacific, ranging from the eastern coast of Africa and the Arabian Peninsula, as far as Southeast Asia, the Sea of Japan and northern Australia (Holthuis 1980). Females can reach about 33 cm total length (TL), but are typically 25–30 cm TL and weigh 200–320 grams; males are slightly smaller at 20–25 cm TL and weigh 100–170 g (FAO 2012).

Giant tiger shrimp have been reported in the wild along the coasts of West Africa from Senegal to northern Angola (Knott et al. 2012), in South America from Colombia to Brazil, (Fausto-Filho 1987; Coelho et al. 2001; Santos and

Coelho 2002; Aguado and Sayegh 2007; Altuve et al. 2008; Gómez-Lemos and Campos 2008; Cintra et al. 2011), and Cuba, Puerto Rico, and Dominican Republic in the Caribbean (Knott et al. 2012; Gimenez Hurtado et al. 2013). Introductions of tiger shrimp into the southeastern USA are most likely due to escapement from aquaculture facilities following flooding by storms and hurricanes, or by migration from areas where tiger shrimp have previously become established in the wild. Although less likely, other pathways of introduction (e.g. ballast water discharge) are possible (Altuve et al. 2008; Knott et al. 2012).

This study documents the first reports of giant tiger shrimp on the Mexican coast. These shrimp were accidentally caught between February and November 2012 by a commercial trawling vessel and artisanal shrimp and gillnet fleet in Tamaulipas, Tabasco, and Campeche, Mexico.

Figure 1. Capture locations of nine specimens of giant tiger shrimp *Penaeus monodon* Fabricius, 1798 on the Mexican coast of the Gulf of Mexico.

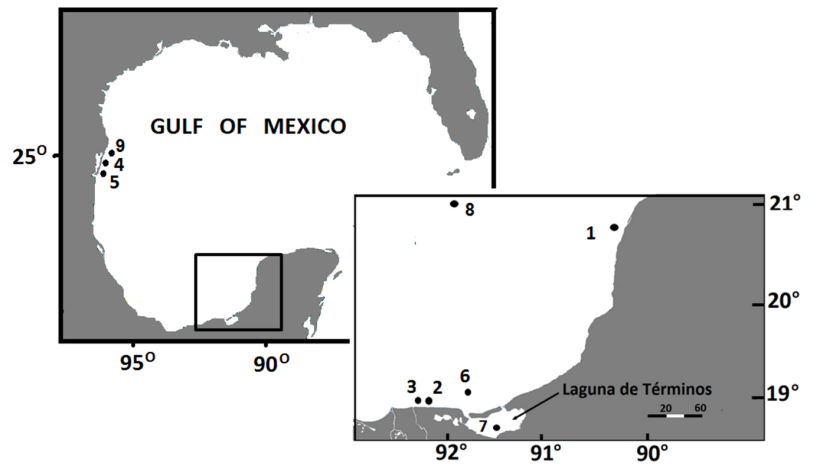


Table 1. Details of giant tiger shrimp captures. Total length (TL), wet weight (TW), and sex (f = female; m = male) were reported for some specimens; n.d. = no data.

No	Location	Date	TL (cm)	TW (g)	Sex	Fishing Gear
1	Isla Arena, Campeche, 20°44'18.94", 90°33'43.94"	25 June 2012	24.1	110.0	f	Gillnet
2	Colonia Emiliano Zapata, Campeche, 18°40'51.77", 92°17'05.99"	July 2012	n.d.	n.d.	n.d.	Shrimp trawl
3	San Pedro, Tabasco 18°39'48.18", 92°26'59.05"	August 2012	n.d.	n.d.	n.d.	Shrimp trawl
4	Tamaulipas coast 24°50'23.71", 97°28'15.25"	August 2012	30.7	220.0	f	Shrimp trawl
5	Barra Jesús Maria, Tamaulipas 24°18'05", 97°30'49.2"	22 August 2012	31.7	276.0	f	Shrimp trawl
6	In front of Ciudad del Carmen, Campeche Five phantoms 18°50'36.31", 91°51'13.29"	28 November 2012	25.0	147.0	f	Shrimp trawl
7	Laguna de Términos, Campeche 18°30'44.61", 91°47'48.65"	13 December 2012	29.0	189.3	f	Gillnet
8	Campeche Sound 20°54'45.82", 92°08'48.40"	20 December 2012	25.1	116.8	f	Shrimp trawl
9	North of Mezquital, Matamoros, Tamaulipas, Tamaulipas coast, 25°26'03", 96°54'52.2"	25 January 2013	29.4	189.0	f	Shrimp trawl

Material and methods

Between June 2012 and late January 2013, nine specimens of giant tiger shrimp *Penaeus monodon* were captured and reported by vessels and boats from industrial and artisanal fishery fleets (using a bottom trawl or gillnets) in the areas of the continental shelf and coastal lagoon of the states of Tamaulipas, Tabasco, and Campeche (Figure 1; Table 1). Six specimens were preserved in ice in a cold chamber until the vessels reached harbor. These specimens were identified using existing identification keys (Pérez-Farfante and Kensley 1997; Dall et al. 1990).

The sex of each specimen was determined based on the presence of petasma in males and thelycum in females. Total length (TL) was measured as the distance between the base of the rostrum and end of the telson using an ictiometer (± 0.05 mm) and calipers. Total wet weight (TW) was determined using an electronic balance (0.1 g accuracy).

The specimens were fixed with formaldehyde 10 % for 48 h, transferred to 70% ethanol, and then deposited in the Ichthyology and Aquatic Invertebrate Collection of the Centro de Investigación de Ciencias Ambientales of the Universidad Autónoma del Carmen under catalog number CI-CICA-UNACAR 0300.



Figure 2. Specimen of *Penaeus monodon* Fabricius, 1798 captured in November 2012 in front of Ciudad del Carmen, Campeche, México.

Results

The giant tiger shrimp specimens were rusty brown in color with the distinctive black and white banding across the back and on the tail. One specimen represented the rarely-seen color variant that has a conspicuous, wide, reddish-orange stripe along its back (Figure 2).

Information on size and sex was available for seven of the nine specimens captured at nine locations (Table 1). The individuals were between 24 and 32 cm TL. All specimens were female; however, none were ovigerous.

Discussion

The presence of giant tiger shrimp in locations on the Mexican coast of the Gulf of Mexico indicates that this species is now distributed almost throughout the entire Gulf. The pathways of introduction of giant tiger shrimp into Mexican waters are unclear. The most likely route is migration from the northern waters of the Gulf of Mexico where giant tiger shrimp have previously become established in the wild (Knott et al. 2012). In US Gulf waters from North Carolina to Texas, the number of reports of this species is high (314 from 2006–2011) (Knott et al. 2012). Another possible pathway of introduction is ballast water discharge but this has yet to be investigated.

The ecological impacts of tiger shrimp in areas where it has been introduced are poorly known. It is, however, a more aggressive predator of soft-bodied invertebrate benthic organisms than native shrimp. The possible ecological effects include: consumption of small

crabs, bivalves and gastropods; transmission of alien pathogens; competing with other species for space and food; interfering with the breeding behavior or breeding success of native shrimp species; and direct predation by *P. monodon* on native shrimp species (Marte 1980; Molnar et al. 2008; Knott et al 2012). Regarding the spread of alien pathogens, there is a concern that shrimp viruses associated with this species have infected native shrimp populations; for example, white spot syndrome virus (WSSV) was detected in *Litopenaeus setiferus* and *Farfantepenaeus aztecus* in the coastal zone of the South Atlantic Bight between Cape Hatteras, North Carolina, and Cape Canaveral, Florida (Chapman et al. 2004) and the same native species are susceptible to yellow head virus (Lightner et al. 1998).

It was not possible to conclude giant tiger shrimp is established in the study area along the Mexican coast of the Gulf of Mexico. The low frequency of *P. monodon* findings in the monitoring program of the artisanal and industrial shrimp fisheries in lagoon and coastal systems indicate the absence of a well-established population of giant tiger shrimp. As well, none of the specimens examined were carrying eggs. Additional sampling and long term monitoring are required to assess the potential impacts of the presence of *P. monodon* on the native shrimp species should it become established.

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