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A WESTERN RANGE EXTENSION FOR *CAPRELLA SCAURA* (AMPHIPODA: CAPRELLIDAE) IN THE ARANSAS BAY ECOSYSTEM, TEXAS

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Abstract: During March 2009, the skeleton shrimp *Caprella scaura* and *Paracaprella tenuis* (Amphipoda: Caprellidae) were collected from several locations throughout the Aransas Bay, Texas ecosystem from Texas Parks and Wildlife fishery—independent trawl and oyster dredge samples. This is a western range expansion for *C. scaura; P. tenuis* has been reported from this area before. Both species were exclusively associated with a bryozoan, *Bugula neritina*. Densities of both species ranged between 0.1–3.4 individuals per gram of attached bryozoans. A reproductive population is likely established since several sizes, including adult males and gravid females, were observed. No caprellids were observed after early April, which coincided with a reduction in bryozoan occurrence in our routine monthly samples. These collections represent the first documented occurrence of *C. scaura* west of Florida.

Key words: Caprellidae, *Caprella scaura*, *Paracaprella tenuis*, skeleton shrimp, amphipods

Introduction

Several species of amphipod from the family Caprellidae are known to occur in the Gulf of Mexico (GOM): *Caprella andreae*, *C. equilibra*, *C. penantis*, *C. scaura*, *Deutella incerta*, *Hemiaegina minuta*, *Paracaprella pusilla*, *P. tenuis*, and *Phtisica marina* (Foster et al. 2004b). Only 5 of these species have been recorded in Texas coastal waters near Port Aransas: *H. minuta, D. incerta, P. pusilla, P. tenuis,* and *C. equilibra* (Foster et al. 2004b). *Caprella scaura* was first documented by Templeton (1836) in the Indian Ocean near Mauritius. The species is widely distributed and has been documented in all oceans but the Arctic (Foster et al. 2004a). However, the first collections from coastal waters of the United States were recently documented in Charleston Harbor, South Carolina and St. Andrew Bay, Florida (Foster et al. 2004a). The only other western Atlantic collections occurred in the Virgin Islands, Puerto Rico and Brazil, where they have been associated with benthic substrates (McCain 1968).

Most caprellids are suspension feeders that cling to benthic substrates (i.e. macroalgae, seagrasses, bryozoans, and hydroids); however, some species have been collected from mobile substrates (i.e., *Sargassum* and sea turtles) (Keith 1969; Caine 1978; Takeuchi and Hirano 1995; Díaz et al. 2005). Several such substrates exist in Aransas and Mesquite Bays, Texas. Here, we present results indicating a western range extension for *C. scaura* in Aransas and Mesquite Bays, Texas, with density and identification information.

Materials and Methods

Collection Area

Aransas Bay is a major bay along the central Texas coast, located between San Antonio Bay and Corpus Christi Bay. The Aransas Bay ecosystem consists of 5 secondary bays (Copano Bay, Redfish Bay, St. Charles Bay, Carlos Bay and Mesquite Bay) and 2 tertiary bays (Mission Bay and Port Bay) that total 45,311 ha. Aransas Bay is connected to the GOM with an inlet at Port Aransas. The Guadalupe, San Antonio, Aransas and Mission Rivers contribute nearly all of the fresh water inflow to the bay. Habitats found in the bay system include: unconsolidated sediments, eastern oyster reefs, submerged seagrass meadows, emergent marsh, and mangrove stands. Macroalgae and seagrasses are well established there year round, although seagrass senescence typically begins mid—October, which results in a reduction of available above—ground substrates in these bays. *Sargassum*, floating brown algae, is present mostly during summer months when it accumulates on beach shorelines and enters the bays through Gulf passes (Texas Parks and Wildlife Department (TPWD) unpublished data). Bryozoans closely associated with hard substrates such as eastern oyster reefs have been collected year round, but at greater densities during spring months. Many species of sea turtles occur in the area; however, no turtles were captured in sample gear during this observation period. Most collections of caprellids were sampled in Aransas Bay proper with the exception of one collection in Mesquite Bay (Figure 1).

Sampling methodology

Bay trawls and oyster dredges were used to collect caprellid species during this study. The Coastal Fisheries Division of TPWD bay trawl and sampling procedures and gear specifications have been standardized since 1982. Bay trawls are 6.1 m long benthic otter trawls, with mesh that measures 38 mm stretched and is constructed of multifilament nylon. Trawl doors are 1.2 m long x 0.5 m wide and are constructed of 1.3 cm thick plywood with angle iron framework and iron runners. Trawls are pulled from the stern of research vessels at 4.8 k/h, completing one large circle in 10 minutes while

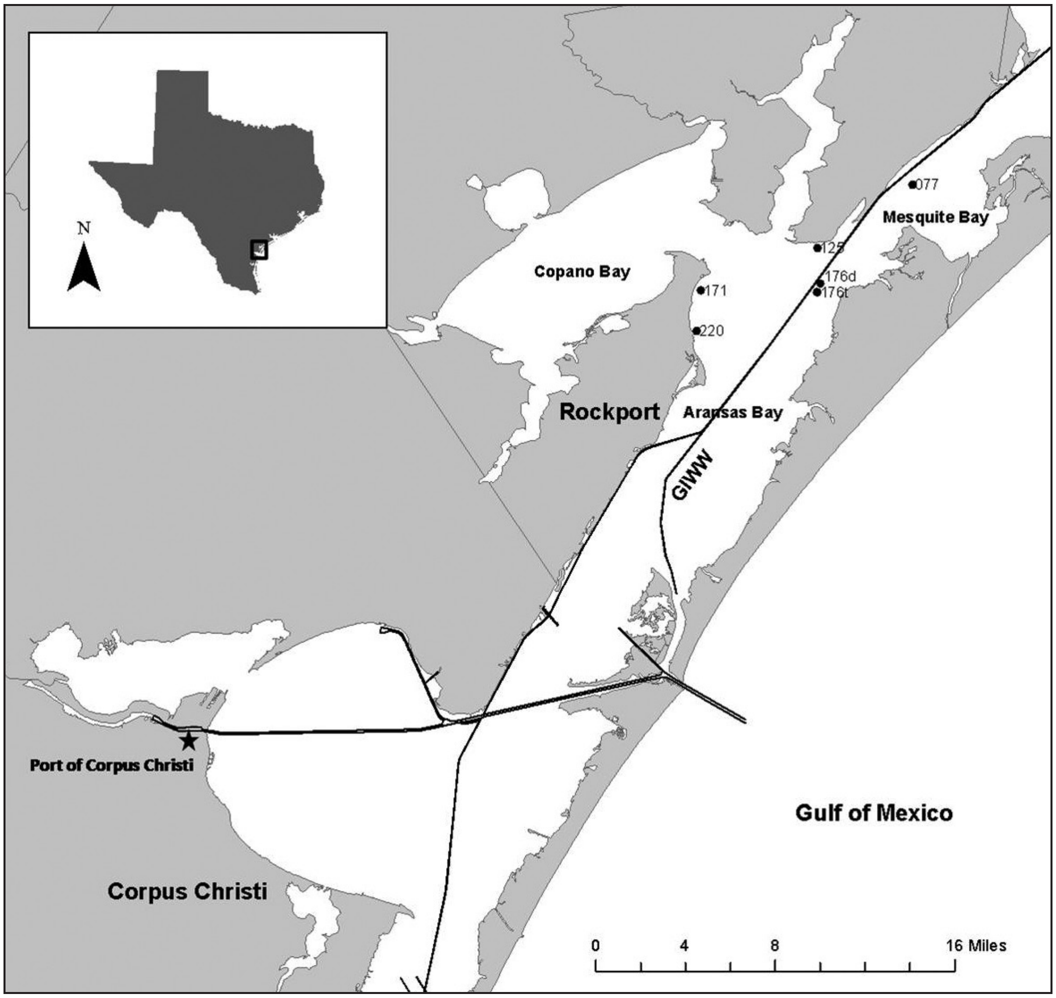

Figure 1. – *Collection area within the Aransas Bay Ecosystem, Texas, indicating proximity to the Port of Corpus Christi, Gulf Intracoastal Water Way (GIWW, black lines), and sample site locations.*

staying within one minute latitude by one minute longitude grids (Martinez–Adrande and Fisher 2010).

Similarly, TPWD oyster dredge sampling procedures and gear specifications have been standardized since 1985. Oyster dredges measure 0.5 m wide and 1.0 m tall. The dredge framework is constructed of 13 mm cold rolled steel round bar. The mesh bag is 356 mm deep and constructed of 76 mm stretched braided nylon solid core webbing. Dredges are towed from the stern of research vessels at 4.8 k/h for 30 sec, following the contour of the selected reef habitat (Martinez–Adrande and Fisher 2010).

Physicochemical, geographical, and sample–specific parameters were collected at each site. Water depth (m) was recorded using onboard sonar. Salinity, dissolved oxygen

TABLE 1. *Aransas Bay sample sites, date, location, and gear type used in collecting samples of* Bugula neritina *containing caprellids, with number of individuals and density of* Caprella scaura *and* Paracaprella tenuis *collected for each site and gear type.*

		Location			Species Present		Density	
Site	**Date**	**Latitude**	**Longitude**	**Gear**	***Caprella scaura***	***Paracaprella tenuis***	**n**	**n/g**
220	3/9/2009	28.06639°N	97.0308°W	oyster dredge	X		75	–[a]
125		28.11889°N	96.9417°W	bay trawl	X			3.43
176d[b]		28.09583°N	96.9397°W	oyster dredge	X			1.16
176t[c]		28.09028°N	96.9425°W	bay trawl	X			0.16
077		28.15889°N	96.8714°W	bay trawl	X	X		0.09
171[d]	4/7/2009	28.09278°N	97.0272°W	oyster dredge	X			1.27

[a] – no weight collected from *Bugula neritina*
[b] – dredge sample at site 176
[c] – trawl sample at site 176
[d] – collection was subsampled due to large amount of bryozoans

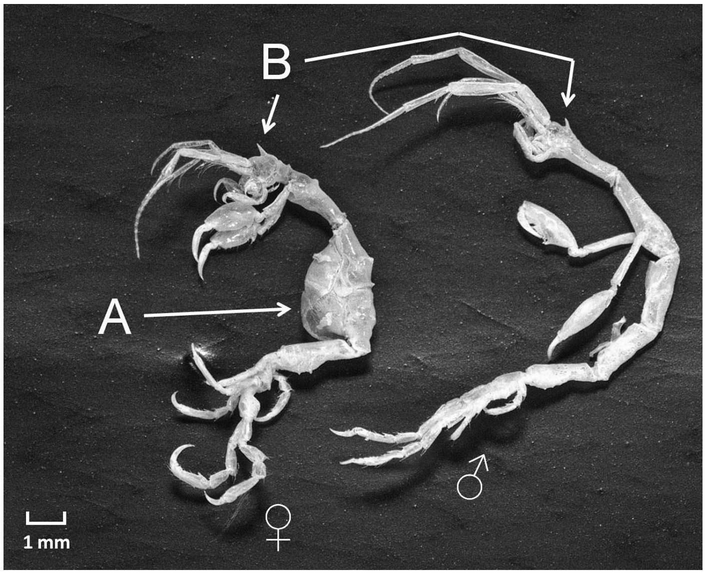

Figure 2. – *Dissecting scope photo of individuals taken from Aransas Bay study samples include a female (♀) and male (♂) Caprella scaura illustrating brood pouch of female (A), and presence of spine on head (B).*

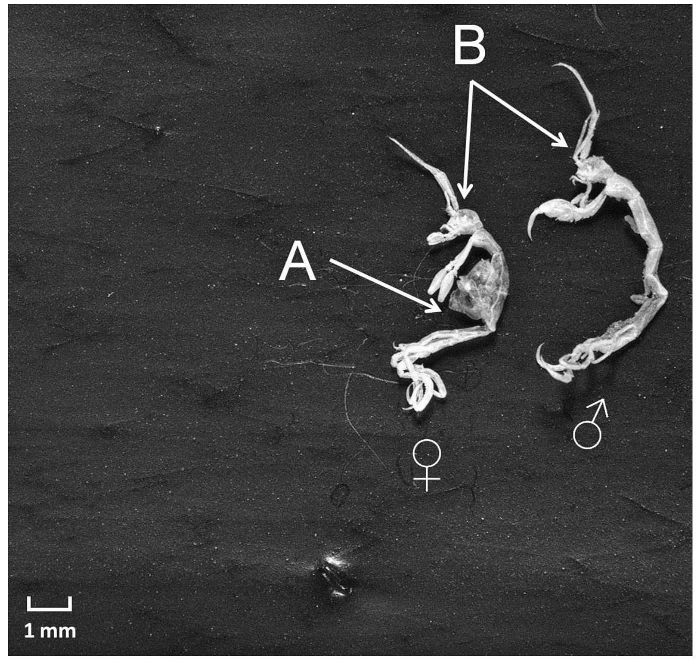

Figure 3. – *Dissecting scope photo of individuals taken from Aransas Bay study samples include a female (♀) and male (♂) Paracaprella tenuis illustrating brood pouch of female (A) and absence of spine on head (B).*

(mg/L), and water temperature (°C) were determined using a handheld multimeter within 15 cm of the substrate. Site code, date, coordinates (latitude and longitude), and collection gear were recorded.

Species, number collected, and calculated densities were also recorded, but because caprellids are difficult to sort in the field due to their clinging behavior, all substrates observed to have specimens were stored in labeled bags and placed on ice in the field. Sample collections were transported to the TPWD Rockport Marine Laboratory, Rockport, Texas. Once in the laboratory, samples were placed in sorting trays and all caprellids were identified and counted. Foster et al. (2004b) was used to key species and identifications were cross—referenced with McCain (1968) and Krapp et al. (2006). After identification, voucher specimens were sent to specialists at the University of Southern Mississippi, Gulf Coast Research Laboratory, Ocean Springs, MS for confirmation. Densities of attached caprellids were calculated as the number of individuals per wet weight of attached substrate (g). Sex was determined by the presence of brood pouches on gravid females and the morphology of the second gnathopods and anterior pereonites on males. Gender of juveniles was indistinguishable.

Subsampling was conducted for a single sample (site # 171; Table 1) which contained a large quantity of bryozoans and caprellids. The methods employed for the subsample consisted of weighing a portion of bryozoans from the sample, removing all caprellids from that portion and counting them. The remaining unsorted bryozoans were then weighed, and the caprellid count from the sorted portion was extrapolated to the unsorted portion.

Results

Caprellids were first collected in trawl samples on 9 March 2009 and observed in samples through 7 April 2009. During that period of time, 30 bay trawl and 30 dredge samples were collected. All caprellids collected during the observation period were attached to the bryozoan, *Bugula neritina*. Caprellids were observed in 11% of the bay trawls containing *B. neritina* and 30% of the oyster dredge samples containing *B. neritina*. Physicochemical measurements ranged from 15.8 – 22.3°C, 28.3 – 29.6 and 5.6 – 8.2 mg/L for water temperature, salinity, and dissolved oxygen, respectively.

Specimens were identified as *C. scaura* and *P. tenuis*. Of the samples containing caprellids, specimens of *C. scaura* were collected at all locations and *P. tenuis* was only collected at the Mesquite Bay site #077 (Figure 1). Both sexes, including gravid females were present in all samples. Densities of caprellids ranged between 0.1 — 3.4 individuals per gram of *B. neritina* (Table 1).

Distinguishing characteristics separating *C. scaura* from *P. tenuis* are quite noticeable. Adult males of *C. scaura* are much larger than those of *P. tenuis* (Figures 2, 3). Both sexes of *C. scaura* have a pronounced anteriorly directed spine on the cephalon where *P. tenuis* lacks any protrusion. *Paracaprella tenuis* has a distinct notch on the center of the palm of gnathopod 2 in the male, whereas *C. scaura* does not. *Caprella scaura* males have much longer antennae, head/pereonite 1 and pereonite 2 than *P. tenuis* (Figures 2, 3). Lastly, placement of gnathopod 2 is located posteriorly on pereonite 2 on male *C. scaura*, whereas it is located more anteriorly on pereonite 2 for male *P. tenuis* (McCain 1968, Foster et al. 2004b; Figures 2, 3).

Discussion

Other accounts of *C. scaura* and *P. tenuis* have noted no habitat selection (McCain 1968; Foster et al. 2004a; Foster et al. 2004b; Díaz et al. 2005; Krapp et al. 2006). However, all caprellids collected during this observation period were only associated with *B. neritina*. No caprellids were observed after early April, which coincided with a reduction in the presence of bryozoans in monthly bay trawls and oyster dredges. The use of bryozoans as habitat by caprellids may have been the mode of transportation and later introduction to the Aransas Bay ecosystem for these species.

Pederson and Peterson (2002) determined bryozoans to be an important transport mechanism for mobile benthos and young fishes in Biloxi Bay, Mississippi, with *P. tenuis* noted as one of the three most dominant species. Similarly, Keith (1971) found *Caprella californica* on *B. neritina* at significantly greater frequencies than on macroalgae. Another possible mode of expansion for *C. scaura* could have come from drifting sargassum by way of the GOM Loop Current, in combination with the seasonal southeast prevailing winds (Gower et al. 2006). However, during this study caprellids were only observed to be associated with bryozoan colonies. It is more likely an introduction occurred by way of ship hull fouling or ballast release of bryozoans. Aransas Bay is adjacent to the Port of Corpus Christi, which is the nation's fifth largest port based on combined domestic and foreign trade tonnage (American Association of Port Authorities 2011).

At the time of manuscript submission, TPWD staff had collected an additional 640 trawl and dredge samples in the Aransas Bay ecosystem without observation of caprellids. During that time, the Texas coast received ample amounts of precipitation, resulting in a reduction of mean bay salinity from 34.0 to 14.0 (TPWD unpublished data). Similarly, collection of *B. neritina* has decreased since the last observation of caprellids. Winston (1977) described *B. neritina* as weakly euryhaline, not tolerating salinities below 18.0. It seems likely that *B. neritina* prefer or require greater salinities than those the estuarine environment can consistently provide. Because observations of caprellids only occurred in conjunction with *B. neritina*, it is likely that *C. scaura* and *P. tenuis* abundance was indirectly affected by lack of suitable habitat.

Observations noted in this study represent a range extension for *C. scaura* to the western GOM and provide valuable information regarding the distribution and abundance of both *C. scaura* and *P. tenuis* as there is no historical record of either species having been previously identified in the area based on TPWD's sampling program of more than 25 years. Because their occurrence has diminished, neither caprellid observed in Aransas Bay likely poses an immediate threat to other marine organisms occupying a similar habitat. The year round sampling conducted by TPWD will provide additional opportunities to monitor the occurrence of these and other caprellids along the entire Texas coast.

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