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# New Records of Demersal Fishes in the Northwest of Mexico

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## ABSTRACT

Bigeye bass *Pronotogrammus eos* and speckled scorpionfish *Pontinus sierra* were observed for the first time in the west coast of the Baja California Peninsula, Mexico, associated to soft bottoms and were captured as part of the by catch of the shrimp fishery north of Magdalena Bay. This finding provides the evidence of the presence of these species approximately 650 and 550 km farther north to that previously reported for *Pronotogrammus eos* and *Pontinus sierra* in the eastern tropical Pacific, respectively. Previous records of larvae of *P. eos* and juveniles of *P. sierra* on the west coast of Baja California peninsula, together with the adult individual records presented herein may indicate a gradual process of colonization by both species in the area. Morphometric and meristic data are presented and the possible causes of their occurrence in the northeastern Pacific are discussed.

**Key words:** *Pontinus sierra*, *Pronotogrammus eos*, by catch, El-Niño, Northernmost record

## INTRODUCTION

In the last decade, significantly increased findings of eastern tropical Pacific fish fauna have occurred in the temperate region of the northwest Pacific (Lea and Rosenblatt, 2000; Allen and Groce, 2001; Pondella and Craig, 2001; Shane, 2001; Rosales-Casián, 2004 among many others). The latitudinal boundaries of the eastern tropical Pacific (ETP) are well known to occur around 25°N near Magdalena Bay, Mexico, to around 5°S, in the vicinity of Cabo Blanco, in northern Peru, delimited by a strong temperature gradient (Mora and Robertson, 2005). The northern limit of the ETP lies in the Californian biogeographic province (sometimes referred to as the San Diegan Province), which primarily extends from Magdalena Bay, south of Baja California peninsula (BCP), to Point Conception, California (*sensu* Hastings, 2000; Horn *et al*., 2006), which is a region characterized by warm-temperate waters rarely below 10°C or over 25°C (Briggs, 1995).

On the west coast of the BCP an interannual variability pattern associated with El-Niño Southern Oscillation (ENSO) has been identified, which can cause anomalous warm sea temperatures, an increase in the mean sea level and the sinking of thermocline (Durazo and Baumgartner, 2002; Lavaniegos *et al*., 2002). This oceanographic pattern promotes ideal conditions

for the dispersal of marine tropical species towards higher latitudes (Lea and Rosenblatt, 2000; Allen and Groce, 2001; Pondella and Craig, 2001; Shane, 2001; Rosales-Casián, 2004).

This study presents the first records of the bigeye bass, *Pronotogrammus eos* Gilbert, 1890 and the speckled scorpionfish, *Pontinus sierra* Gilbert, 1890, in the Californian biogeographic Province. Both species have been occasionally caught as by-catch in the ETP shrimp fisheries (Heemstra, 1995; Poss, 1995; Amézcua-Linares, 1996; Aguilar-Palomino *et al*., 2001; Pedraza *et al*., 2002).

The genus *Pronotogrammus* (Percoidei: Serranidae) is endemic to the ETP (Robertson and Allen, 2008), where it is represented by two species: *P. eos* (Gilbert, 1890) and *P. multifasciatus* (Gill, 1863). According to Fitch (1982), *P. eos* needs taxonomic reallocation, because its head and jaws are not fully scaled as those of *P. multifasciatus*. *Pronotogrammus eos* is characterized by an elongated oval body that is silvery pink, with two dark stripes on the neck, light yellow pelvic fins, pectoral fins located near the origin of the anal fin, bifurcate caudal fin rays with sharpened tips, eyes that are exceptionally large (diameter = 12-16% of standard length) and very elongated branchial spines (Bussing and López, 1994; Heemstra, 1995; Robertson and Allen, 2008). Previous distribution range for *P. eos* was known to be from the southwestern and central eastern Gulf of California to Panama, including Cocos Island (Heemstra, 1995; Robertson and Allen, 2008), commonly found on sandy bottoms and near shells at depths of 80 to 325 m, reaching up to 210 mm in total length (Robertson and Allen, 2008).

The *Pontinus* genus (Scorpaenoidei: Scorpaenidae) shows a worldwide distribution and is represented in the ETP by five nominal valid species [*Pontinus clemensi* Fitch, 1955, *P. furcirhinus* Garman, 1899, *P. sierra* (Gilbert, 1890), *P. strigatus* Heller and Snodgrass, 1903 and *P. vaughani* Barnhart and Hubbs, 1946] and one undescribed taxa (Robertson and Allen, 2008).

*Pontinus* are distinctive from other scorpionfish genera for their dorsal rays count: XI+I, 9-10; anal rays III, 5 and pectoral rays 15~20, which are all unbranched; the swim bladder is present; the second preopercular spine is usually reduced or absent; catenoid scales; scaly cheek, postorbital area and occiput, with no occipital pit; and teeth on dentary, vomer, premaxillary, pharyngeal and palatine bones (Eschmeyer, 1965). The characteristic color of *P. sierra* is light-red with grayish-green conspicuous dorsal spots, while the ventral surface of head, oral cavity and pharynx is bright white (Bussing and López, 1994; Poss, 1995; Robertson and Allen, 2008). This species reaches 24.5 cm TL (Amézcua-Linares, 1996) and its previously known distribution range spaned from the southwest and central regions of the Gulf of California (Poss, 1995) to northern Peru (06°02'S, 81°12'W; Chirichigno and Cornejo, 2001), in a usual depth range of from 20 to 273 m (Aguilar-Palomino *et al*., 2001; Robertson and Allen, 2008), although there is a record of 700 m depth (Pedraza *et al*., 2002).

The objective of this study is to report on the first records of bigeye bass and speckled scorpionfish in the Californian biogeographic Province, which are capture records that represent significant extensions of their known, normal distributions.

## MATERIALS AND METHODS

*Pronotogrammus eos* and *Pontinus sierra* were captured as part of the by-catch of the shrimp fishery on the western coast of BCP, on March 2005. After collection, specimens were fixed in a 10% formalin solution buffered with sodium borate prior to permanent preservation in 70% ethyl alcohol. Species were identification and their distribution range determined using fish guides and keys for the region (Bussing and López, 1994; Heemstra, 1995; Poss, 1995; Robertson and Allen,

2008). Specimens were measured using a caliper (±0.01 mm) and weighed to the nearest 0.01 g (formalin weight) using an digital scale. Finally, some specimens were cataloged and deposited in the fish collection of Universidad Autónoma de Baja California (CI-UABC) in Ensenada, Baja California, Mexico.

## RESULTS

Four individuals (115-202 mm TL and 15-72 g) of the bigeye bass, *Pronotogrammus eos* were collected on the west coast of BCP off their known distribution range (Fig. 1). Three specimens were collected in March 2005 south of Magdalena Bay (23.3645°N, 110.3387°W) and another specimen was caught in front San Juanico Bay (25.7807°N, 113.3361°W). This record extends the distribution range known for this species in about 650 km. The main diagnostic meristic counts and measurements (in mm) of the specimen are shown in Table 1.

A total of 10 individuals of the speckled scorpionfish, *Pontinus sierra* were collected on the west coast of BCP in March 2005 (Fig. 2): 1 specimen at 23.3645°N/ 110.338°W, 3 specimens at 113.5728°N/25.8617°W, 2 specimens at 23.3645°N/110.338°W, 2 specimens at

Table 1: Morphometric and meristic characteristics of four specimens of bigeye bass, *Pronotogrammus eos* and ten specimens of speckled scorpionfish, *Pontinus sierra*, from the Pacific coast of the Baja California peninsula, Mexico

| Characteristics | The bigeye bass (UABC-2316) | The speckled scorpionfish (UABC-2318) |
|---|---|---|
| **Meristic** | | |
| Dorsal fin | X,15 | XII,9 |
| Anal fin | III,8 | III,5 |
| Pectoral fins | 17 | 17 |
| Pelvic fins | – | I,5 |
| Gill Rakers | 40 | 15-19 |
| **Morphometric** | | |
| Total length (mm) | 115-202 | 100-222 |
| Standard length (mm) | 80-147 | 88-174 |
| Maximum body height* | 32.5-35.6 | 23.9-32.3 |
| Head length* | 36.3-42.2 | 39.8-48.9 |
| Upper mandible length* | 25.8-23.0 | 18.2-22.8 |
| Lower mandible length* | 16.5-17.7 | 17.0-22.0 |
| Interorbital distance* | 7.2-8.8 | 2.3-4.6 |
| Ocular diameter* | 2.3-12.3 | 10.2-12.7 |
| Caudal peduncle height* | 10-11.6 | 5.7-9.2 |
| Weight (g) | 15-72 | 41-117 |

*Percentage (%) of the standard length

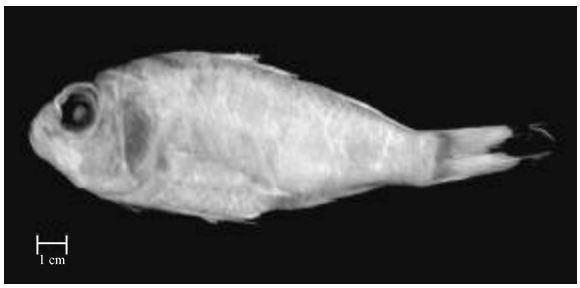


Fig. 1: External appearance of bigeye bass, *Pronotogrammus eos* (UABC-2316)

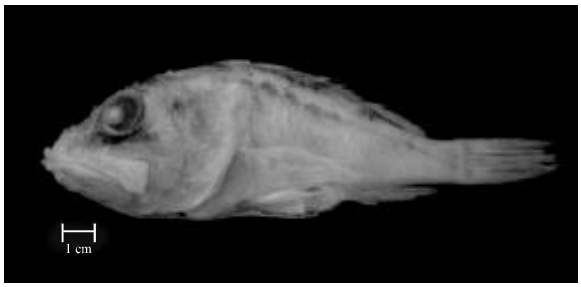


Fig. 2: External appearance of the speckled scorpionfish, *Pontinus sierra* (UABC-2318)

110.0864°N/23.9164°W and 2 specimens at 25.7969°N/ 113.3361°W. The northernmost site is located north of Magdalena Bay, about 550 km farther north of the species reported distribution. The specimens caught (100-222 mm TL and 41-117 g) included adults and juveniles. The main meristic and morphometric (in mm) data of the specimen are shown in Table 1.

## DISCUSSION

*Pronotogrammus eos* and *Pontinus sierra* are principal components of the tropical fish fauna and are commonly caught as by-catch in the shrimp fishery of the ETP (Heemstra, 1995; Poss, 1995; Amézcua-Linares, 1996; Aguilar-Palomino *et al*., 2001; Pedraza *et al*., 2002). The lack of information about the fish fauna inhabiting the west coast of BCP is widely known, except for studies in coastal lagoons and bays (De la Cruz-Agüero *et al*., 1996; De la Cruz-Agüero and Cota-Goméz, 1998). However, there are no records of *Pronotogrammus eos* and *Pontinus sierra* in the checklists reported by these studies neither in the historical records of the mostly artisanal shrimp fishery by-catch and the regional fish fishery (Mathews and Espinoza, 1975; Ehrhardt *et al*., 1982). In addition, local fishermen had never caught bigeye bass or speckled scorpionfish or nor shown any knowledge of these species.

Moser (1996) reported larvae of *Pronotogrammus eos* on the outer coast of Baja California Sur (23°36'N), while Moser *et al*. (1977) collected pelagic juveniles of *Pontinus sierra* on a single midwater trawl station on the outer coast between Magdalena Bay and Cabo San Lucas in 1959. Information of larval duration period are unknown for these species; however, there is wide evidence of currents being an extremely important mechanism in the dispersion of this species during this phase to other areas, mainly during ENSO events, when warm waters flow northward (Lea and Rosenblatt, 2000; Allen and Groce, 2001; Victor *et al*., 2001).

There is enough evidence pointing at changes in the distribution of fish fauna under the influence of warm water masses in short periods associated with ENSO, extending their presence northward. Then, conditions are created that favor increased abundance and support the establishment of breeding populations in the southern California Bight only after the sustained warming trend in the region over the last quarter of the 20th century (Sturm and Horn, 2001).

Another potential reason the appearance of the bigeye bass and the speckled scorpionfish outside their typical distribution range is the rising of the seawater temperature caused by the global climate change. In the last decades the number of new records of tropical fish fauna in temperate regions has increased significantly throughout the world and most of them have been related to global warming (North Sea: Quero, 1998; Beare *et al*., 2004; Perry *et al*., 2005; Dulvy *et al*., 2008; Hiddink and Hofstede, 2008; Cornish coast of the UK: Stebbing *et al*., 2002;

Gulf of Cádiz: Juárez *et al.*, 2006; Northwest of Galicia (NW Spain): Bañon *et al.*, 2002; Bañon, 2004; Adriatic Sea: Dulčić and Grbec, 2000; Dulčić, 2002; Uruguayan coast: Segura *et al.*, 2009; Golfo Nuevo, Argentina: Venerus *et al.*, 2007). Arvedlund (2009) noted that new records, supported by population dynamics parameters, as well as biotic and abiotic factors, may represent indicators of climate change.

Perry *et al.* (2005) have shown that the climate change in the North Sea is having detectable impacts on marine fish distributions, mainly in species whose life history traits are associated with smaller body sizes, faster maturation and smaller sizes at maturity. Also, Juárez *et al.* (2006) indicated that the record of *Selene dorsalis* (Carangidae) in the Gulf of Cadiz along with other records in Portuguese waters may indicate a shift in the northern distribution limit of subtropical and tropical species, which may be related to local warming episodes of the water bodies water that make the area an optimal habitat for certain fish species. Horn *et al.* (2006), in a biogeographical analysis of Californian coastal fish, conclude that the addition of tropical and subtropical species appear to correspond with the trend of global climate change.

In the southern Gulf of California some authors have noted the possibility of climate change influencing the dispersal of tropical species towards higher latitudes (Tavera *et al.*, 2005; De la Cruz-Agüero *et al.*, 2007). However, the regular presence of ENSO conditions along the Pacific coast makes it difficult to separate the effects of ENSO from those of climate change. A time series study of the northeastern Pacific by Smith *et al.* (2001) indicates warming of the coastal ocean off Oregon and suggests a modulation of the ENSO effects by the Pacific Decadal Oscillation that could be masking evidence for the secular climate change over the 40 year oceanographic data series.

The records of larvae of *P. eos* and juveniles of *P. sierra* on the west coast of the BCP (Moser *et al.*, 1977; Moser, 1996), together with records of adult individuals presented in this study may indicate a gradual process of colonization by both species of the warm-temperate water Californian province. It seems that the longitudinal (North-South) orientation of the ETP shoreline, the narrow continental shelf and the few oceanic islands (Victor *et al.*, 2001; Robertson and Allen, 2008), coupled with the ENSO events and the trend of global climate change, provide ideal conditions for these tropical fish to expand their distribution areas outside the boundaries of their native region.

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