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Record of *Rhonciscus crocro* (Cuvier, 1830) (Haemulidae: Haemulinae) in the Usumacinta River, Mexico

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Abstract

This paper documents the occurrence and range extension of *Rhonciscus crocro* (Cuvier 1830) more than 370 km, from the coastline of the Gulf of Mexico, the largest distance reported in freshwater for this species. Despite the commercial interest, information on the biological aspects, abundance, and distribution of this species in the Usumacinta River is scarce. The IUCN Red List classifies this species within the criteria of data deficient. Specimens were collected from artisanal fisheries. This species is distinguished from its congeners by its short pectoral fins do not reach the ends of the pelvic fins and by the smaller scales in the longitudinal. This new record expands the geographical distribution and size of this species. Current research reports meristic and morphometric data of eleven organisms, ranging from 22.1 to 41.9 cm of total length, increasing the known size range of this species.

Keywords: Diadromous, Distribution, Burro Grunt, Floodplain, Range expansion.

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Introduction

The subfamily Haemulinae Gill, 1885 is composed of 92 valid marine fish species mostly from tropical and subtropical shallow waters in Western Atlantic, Eastern Pacific, and Indian oceans (Parenti 2019; Fricke et al. 2020). *Rhonciscus crocro* (Cuvier, 1830), commonly known as Burro grunt, is found in shallow coastal waters, representing an important component in the artisanal fisheries of the Tabasco coast (SAGARPA 2015). Despite the commercial interest, information on the biological aspects, abundance, and distribution of this species in the Usumacinta River is scarce. The IUCN Red List classifies this species within the criteria of data deficient (DD) (Lindeman et al. 2019). This study documents the record of *R. crocro* in 320 km upstream waters of the Usumacinta River, based on eleven collected specimens, revealing range extension of this species in freshwater environment.

Material and Methods

Eleven *R. crocro* specimens were collected from artisanal fisheries during in March 2019 in at sites of the Usumacinta River at Tenosique municipality, Tabasco, Mexico (Chaculji: 17°29'25"N, 91°26'21"W and El Copo: 17°33'50"N, 91°29'38"W) (Fig. 1). Fishing gears used were trawl nets and harpoon guns. Chaculji and El Copo transects of the Usumacinta River have a depth of 5-9 m- and an approximate width of 300 m; transects are characterized by low currents, water presented high concentration of suspended solids with low transparency (<20 cm), sediments are composed of sand and gravel whit medium-high concentration of mud (Fig. 2). The

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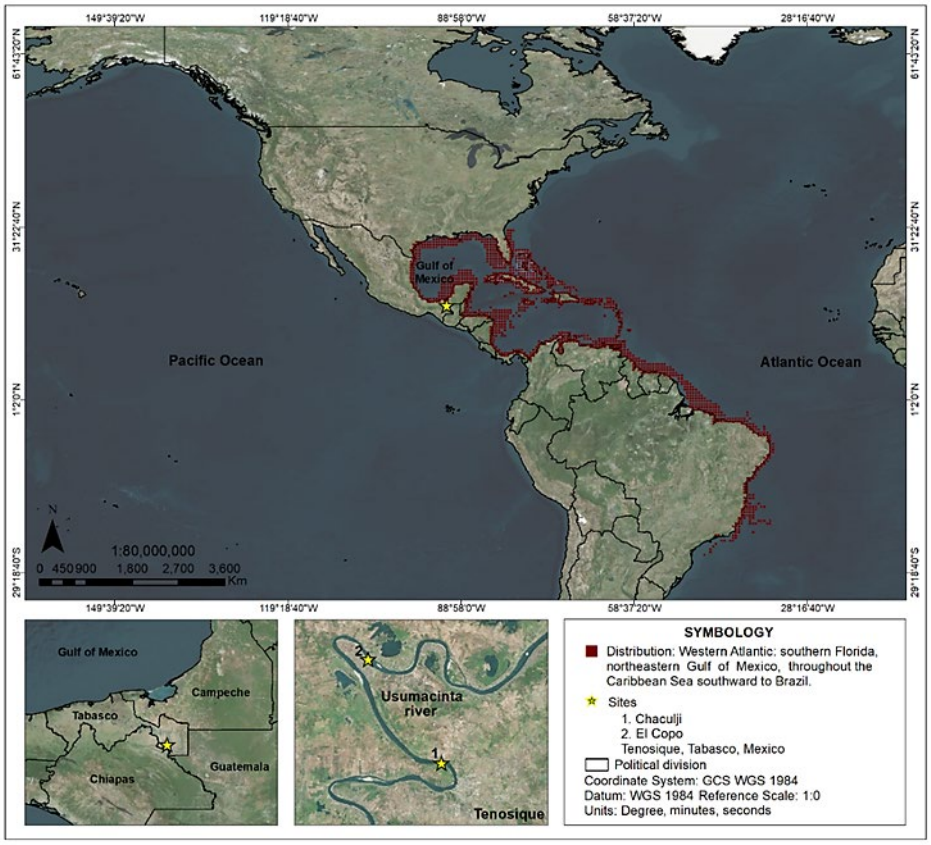

Figure 1. Geographic distribution of *Rhonciscus crocro*. Red squares indicate previous records and yellow stars indicate the new records.

Figure 2. Habitat where specimens were collected on the town of Chaculji, South of Mexico, Usumacinta River.

specimens were deposited and cataloged in the ichthyologic collection of El Colegio de la Frontera Sur (ECOSC). Species identification was based on the taxonomic data provided by Lindeman and Toxey (2002). Meristic and morphometric characteristics of each specimen were taken based on the criteria proposed by Pequeño et al. (2011) (Fig. 3).

Results

Rhonciscus crocro (Cuvier, 1830)

Materials examined: ECOSC-14491-ECOSC-14494-7: 7 specimens (sex undetermined), 28.5-41.9 cm TL; Tenosique, Tabasco, Mexico, Usumacinta river; El Copo, location: 17°33'50"N and 91°29'38"W), 20 m a.s.l;

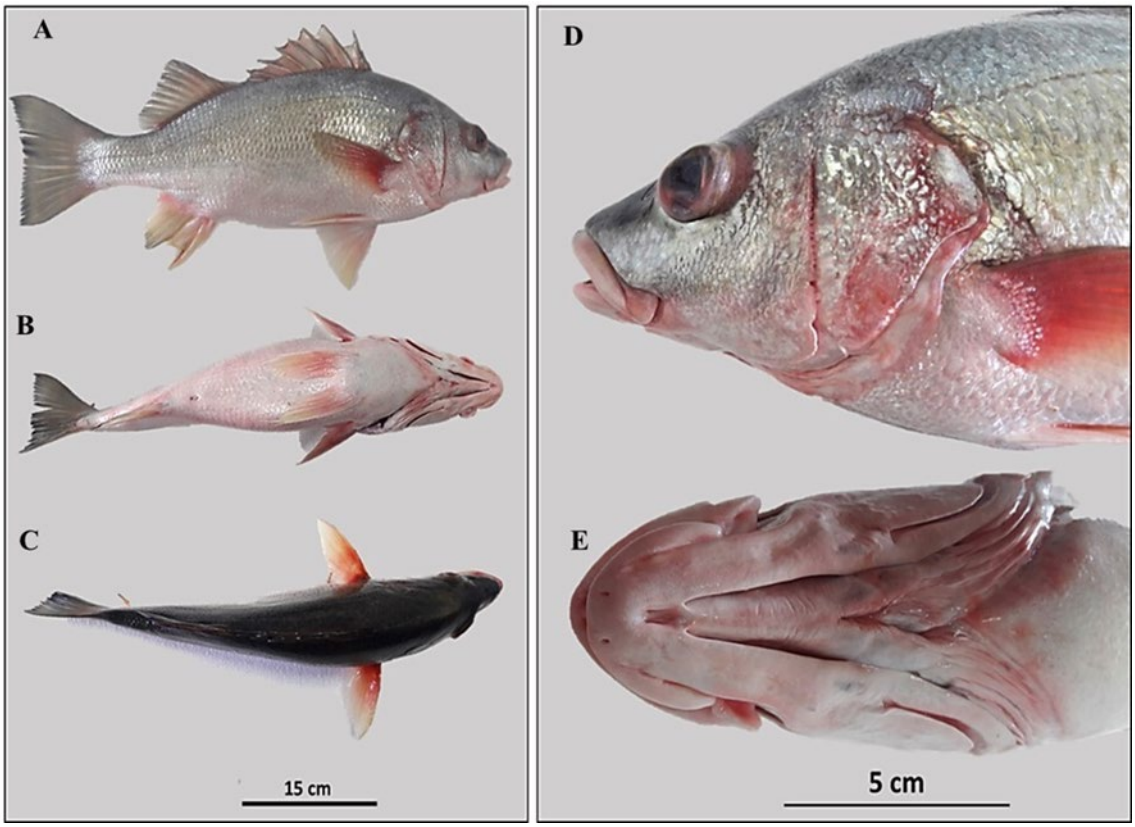

Figure 3. *Rhonciscus crocro*. **A.** Compressed body in lateral view, **B.** Ventral view, **C.** Dorsal view, **D.** Head, preopercle with posterior margin slightly concave and serrated, **E.** ventral view of chin with 2 pores.

01 March 2019; Raúl E. Hernández-Gómez; Ignacio Valenzuela-Cordova. —ECOSC-14493-1-ECOSC-14493-4: 4 specimens (sex undetermined), 22.1-36.1 cm TL; Tenosique, Tabasco, Mexico; Chaculji, location: 17°29'25''N; 91°26'21''W; 20 m a.s.l; 01 March 2019; Raúl E. Hernández-Gómez; Ignacio Valenzuela-Cordova.

Identification. The genus *Rhonciscus* can be distinguished from other genera by the combination of following characters: pointed snout, chin with 2 pores anteriorly, preoperculum with posterior margin slightly concave and serrated, dorsal fin with XIII spines and 12 rays, moderately long pectoral fins with 16 soft rays, pelvic fins with I spine and 4 rays located below the base of pectoral fins, and anal fin with III hard spines and 7 rays.

Rhonciscus crocro is distinguished from its congeners by having short pectoral fins do not reach ends of pelvic fins and by the smaller scales in longitudinal series 53 to 55 longitudinal scales more than in others species. Having a slim elongated body and a long and pointed snout. Predorsal profile convex which gives impression that head directed slightly downwards. Having a short maxilla not reaching a vertical line of posterior margin of eye, but reaches or exceeds anterior margin of eye (Bussing 1998). It has a dark olive body above, silver below; sides with dark punctuation; fins are more or less dark; soft dorsal fin with narrow black margin (Lindeman and Toxey 2002). (Fig. 3; Tables 1, 2).

Discussion

Rhonciscus crocro can be found from southern Florida, U.S., to Brazil in the Atlantic Ocean, including the Gulf of Mexico. In Mexico, this species has historically been recorded in the coast of Tamaulipas, Veracruz (Castillo-Rivera et al. 2011), Campeche, and Tabasco (Miller et al. 2009; Castro-Aguirre et al. 1999; McLarney et al. 2010; Castillo-Pérez 2016). The presence of *R. crocro* within the Usumacinta River, Tabasco, Mexico has also

Table 1. Meristic and Morphometric data of *Rhonciscus crocro* (n=7) from the EL Copo location of the Usumacinta River.

Biometry (cm)	*Rhonciscus crocro*						
	ECOSC-14494-1	ECOSC-14494-2	ECOSC-14494-3	ECOSC-14494-4	ECOSC-14494-5	ECOSC-14494-6	ECOSC-14494-7
Total length	29.9	32.7	28.5	38.7	39	39.5	41.9
Total weight	276	376	268	634	588	738	872
Head length	7.3	7.6	7.1	9.1	9	9.5	9.9
Snout length	3.6	3.2	2.7	4.0	3.5	4.7	4
Upper jaw length	3.3	3.6	3.2	4.3	4.4	4.6	4.7
Orbital diameter	1.8	1.8	1.5	1.9	2.0	2.0	2.0
Interorbital distance	0.9	1.0	1.0	1.0	1.0	1.0	1.1
Maxillary width	2.6	3.1	2.7	4.0	3.5	4.7	4.0
Predorsal length	9.1	10.3	9.1	12.5	12	12.5	13.5
Preanal length	16.7	17.6	15.2	20.5	20.5	21.6	22.2
Pre-pelvic length	9.7	9.9	9.2	12.3	12	12.3	13.2
Base length of dorsal fin	12.2	13.8	11.9	16.5	16.5	16.5	17.7
Base length of anal fin	3.4	3.6	3.2	4.6	4.4	4.4	4.6
Pelvic fin length	5.1	5.6	5.1	7.1	6.6	6.5	7.1
Pectoral fin length	4.8	6.6	5.2	7	6.5	6.6	7.6
Caudal peduncle length	3.6	4.4	3.7	5.2	5	5.2	5.5
Caudal peduncle width	2.5	2.6	2.4	3.2	3.2	3.4	3.5
Body width	7.6	8.3	7.7	9.3	10.4	11.2	11.3
Anal spines length							
1st	1.7	2.0	1.9	2.0	2.4	2.1	2.6
2nd	4.6	4.9	4.6	5.6	5.6	5.1	5.6
3rd	3.3	3.4	3.5	3.6	3.7	3.7	4.2
Lenght of first dorsal spine							
I.	0.6	0.9	0.9	0.9	0.9	0.9	1.0
II	1.3	1.8	1.4	1.6	1.7	1.7	1.6
III	2.3	2.9	2.9	3.1	3	2.4	3.1
IV	3.1	4.2	3.6	4.4	4.1	4.1	4.1
V	3.3	4.1	4.7	4.5	4.3	4.2	4.4
Number of spines							
Dorsal	13	13	13	13	13	13	13
Anal	3	3	3	3	3	3	3
Pelvic	1	1	1	1	1	1	1
Number of rays							
Dorsal	12	12	12	12	12	12	12
Anal	7	7	7	7	7	7	7
Pectoral	16	16	16	16	16	16	16
Pelvic	4	4	4	4	4	4	4

previously been confirmed (Castro-Aguirre et al. 1999). *Rhonciscus crocro* have been recorded 100 miles (160.93 km) from the river mouth (Courtenay and Sahlman 1978; Froeze and Pauly 2019). Castro-Aguirre et al. (1999) recorded this species at the Usumacinta River in Montecristo, Emiliano Zapata municipality, in Tabasco, Mexico, distances from river mouth is 250 km approximately. We document the presence of the species in the Usumacinta River more than 370 km from the coastline of the Gulf of Mexico, the largest distance reported in freshwater for this species so far.

The fish family Haemulidae is divided in two subfamilies, Haemulinae and Plectorhunchinae (Nelson 2006). Within the subfamily Haemulinae there are species in the coastal waters of the Gulf of Mexico, such as

Table 2. Morphometric data of *Rhonciscus crocro* (n=4) from the Chaculji location of the Usumacinta River.

Biometry (cm)	*Rhonciscus crocro*			
	ECOSC-14493-1	ECOSC-14493-2	ECOSC-14493-3	ECOSC-14493-4
Total length	23.7	22.1	36.1	36.1
Standard length	19.3	17.7	28.9	29.5
Total weight	136	114	554	522
Head length	5.5	4.2	9.1	9.0
Snout length	2.1	2.0	3.8	4.0
Upper jaw length	2.7	2.2	4.2	4.1
Orbital diameter	1.5	1.3	1.8	1.9
Interorbital distance	0.8	0.7	1.1	1.1
Maxillary width	2.1	2.0	3.8	4.4
Predorsal length	7.5	6.9	12.1	11.2
Preanal length	12.9	11.5	19.2	19.3
Pre-pelvic length	7.7	6.6	11.3	10.8
Base length of dorsal fin	9.6	9.0	15.8	15.2
Base length of anal fin	3.1	2.5	4.2	4.3
Pelvic fin length	4.3	4.1	7.1	6.5
Pectoral fin length	3.8	4.0	6.6	5.5
Caudal peduncle length	3.2	3.0	4.5	5.0
Caudal peduncle width	2.2	1.9	2.9	2.8
Body width	5.9	5.7	9.9	9.5
Anal spines length				
1st	1.9	1.7	2.1	2.1
2nd	4.2	4.1	5.1	5.4
3rd	2.6	2.5	3.6	3.7
Length of first dorsal spine				
I	0.6	0.6	1.1	0.8
II	1.1	1.7	1.7	1.9
III	1.8	1.9	3.1	2.9
IV	2.6	2.6	3.7	4
V	2.8	2.9	3.9	4.2
Number of spines				
Dorsal	13	13	13	13
Anal	3	3	3	3
Pelvic	1	1	1	1
Number of rays				
Dorsal	12	12	12	12
Anal	7	7	7	7
Pectoral	16	16	16	16
Pelvic	4	4	4	4

Anisotremus virginicus, *Haemulon aurolineatum* and *Orthopristis chrysoptera* which occasionally penetrate inland waters. However, there are no records of distances of the occurrences. Castro-Aguirre et al. (1999) points out that the incursion of these species into inland waters is related with their feeding habits; however, several details of its biology and ecology are unknown.

Previous total length records of *R. crocro* reached 20, 35.5, and 36 cm total length for Costa Rica and Mexico, respectively (Miller et al. 2009; McLarney et al. 2010; Castillo-Pérez 2016). Lindeman and Toxe (2002), recorded a maximum length of 33 cm, commonly 20 cm in the coastal zone of Gulf of Mexico and Caribbean

Sea. Robins and Ray (1986) recorded 38 cm TL specimens for the North American Coast. In Motagua River, Izabal, Guatemala; and in the Mamanguape river estuary, Brazil, sizes less than 4.6 cm LT and 16.0 cm standard length have been recorded respectively (Miller et al. 2009; Oliveira and Pessanha 2014). Current paper recorded juvenile and adult specimens with sizes from 22.1 to 41.9 cm LT.

Since the family Haemulidae: Haemulinae is principally marine and *R. crocro* is found in estuaries but not in the open sea, and because no one has found or described the larvae, McLarney et al. (2010) conclude that *R. crocro* is probably amphidromous, though it could be catadromous. However, Castro-Aguirre et al. (1999) and Lorion et al. (2011) even assume that *R. crocro* is an obligate diadromous. The diadromy is assumed based on the presence in tismiches, or mass upstream migrations of juvenile fishes that occur in coastal rivers (Lorion et al. 2011). The migration of this species upstream could be associated with food availability in the riverine area, used for growth and/or reproduction purposes. The daily feeding of migratory species represents one of the most important mechanisms of connectivity between ecosystems transferring energy through organic matter, nutrients, as well as biomass transport (Tavera et al. 2018).

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