

## Some information on reproduction and embryonic development of the lesser guitarfish *Zapteryx brevirostris* in Southern Brazil

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*Individuals of Zapteryx brevirostris were caught from August 2003 to September 2004 using bottom trawl nets in a bay located in Southern Brazil. Total length ranged from 42.8 to 47.3 cm in males and 44.1 to 52.2 cm in females. Females with early developing embryos were captured in August 2003 and September 2004, suggesting that gestation occurs mainly in the spring. Length-weight relationship of the 45 embryos was allometric, and embryos' total length did not reach the estimated newborn length. The data suggested that the studied area is used by Z. brevirostris during the gestation period.*

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**Key words:** Chondrichthyes, Elasmobranchii, Rhinobatidae, reproductive biology

### INTRODUCTION

Guitarfishes are distributed mostly along tropical coastal waters of the Atlantic, Indian and Pacific Oceans. Some species can reach moderate to large size, and its members are important components of fishing activities in the Atlantic-Mediterranean region (SECK *et al.*, 2004; CHAVES *et al.*, 2003; VOOREN *et al.*, 2005; COSTA & CHAVES, 2006). Coupled with aggressive commercialized fishing and the high capture ratio of pregnant females and adult males, some guitarfishes are considered to be endangered (LESSA & VOOREN, 2000; SERENA, 2005).

The lesser guitarfish *Zapteryx brevirostris* (Müller & Henle, 1841) is distributed along the coastal waters from eastern Brazil to northeastern Argentina (FIGUEIREDO, 1977). The species is incidentally caught by artisanal fisheries, and because of its low abundance in captures and relatively small size – maximum length of approximately 65 cm (BATISTA, 1987) – the species has low commercial value (SANTOS *et al.*, 2006). In the coastal zone of Paraná state (Southern Brazil), *Rhinobatos horkelli*, *R. percellens*, and *Z. brevirostris* were both considered bycatch associated to the shrimp trawl fisheries (CHAVES *et al.*, 2003).

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Despite the wide distribution and abundance in the Brazilian coast, reproductive aspects of *Z. brevirostris* are poorly known. Some aspects of sexual development (BATISTA, 1987), fecundity and embryonic development (BATISTA, 1991) were reported for specimens off an inlet in Rio de Janeiro State, Southeastern Brazil, while population structure was described in the adjacent continental shelf of Paranaguá Bay, Southern Brazil (SANTOS *et al.*, 2006).

This paper aims to report biological observations on *Z. brevirostris* captured in a bay located in Southern Brazil. Resulting data was compared with previous information on lesser guitarfish reproduction along the Brazilian coast as reported by BATISTA (1991).

## MATERIAL AND METHODS

Nine trawl operations of five minutes at two knots' speed were performed monthly from August 2003 to September 2004 using bottom trawl nets (bag with mesh of 3.0 cm between opposite knots) in Ubatuba-Enseada bay in the city of São Francisco do Sul, Southern Brazil (26° 11' S; 48° 29' W) (Fig. 1). The samples were taken at a depth range of 5 to 12 m along the coastline.

Captured specimens were measured (total length), weighed registered by sex. In males, sexual maturity was determined by the condition

and length of the specimen's claspers according to HAZIN *et al.* (2001). Conversely females, the conditions of ovaries and the morphology of the reproductive tract were used to determine the sexual maturity of the females. Uterine fecundity was determined by counting embryos in pregnant females. Forty-five embryos were removed, measured and weighed after blotting.

## RESULTS AND DISCUSSION

Of the 21 *Zapteryx brevirostris* captured, 17 were pregnant females and four were adult males. Mean total length was  $44.4 \pm 2.0$  cm (range, 42.8 – 47.3 cm) in males and  $48.4 \pm 2.2$  cm (range, 44.1 – 52.2 cm) in females. Mean weight was  $590.2 \pm 245.1$  g (range, 410 – 952.2 g) in males and  $799.0 \pm 132.0$  g (range, 580.1 – 1,124.6 g) in females.

Registered males were of smaller size than the females, confirming observations of *Z. brevirostris* from the adjacent continental shelf of Paranaguá Bay, Southern Brazil (SANTOS *et al.*, 2006), as well as for *Z. brevirostris* captured in an inlet in Southeastern Brazil (SILVA, 1987). Despite the fact that a small number of individuals were captured, this phenomenon was also reported for other elasmobranch species, such as guitarfishes of the genus *Rhinobatos* (WENBIN & SHUYUAN, 1993; SECK *et al.*, 2004), stingrays (SNELSON *et al.*, 1988), carcharhinids (SAÏDI *et al.*, 2005), and triakids

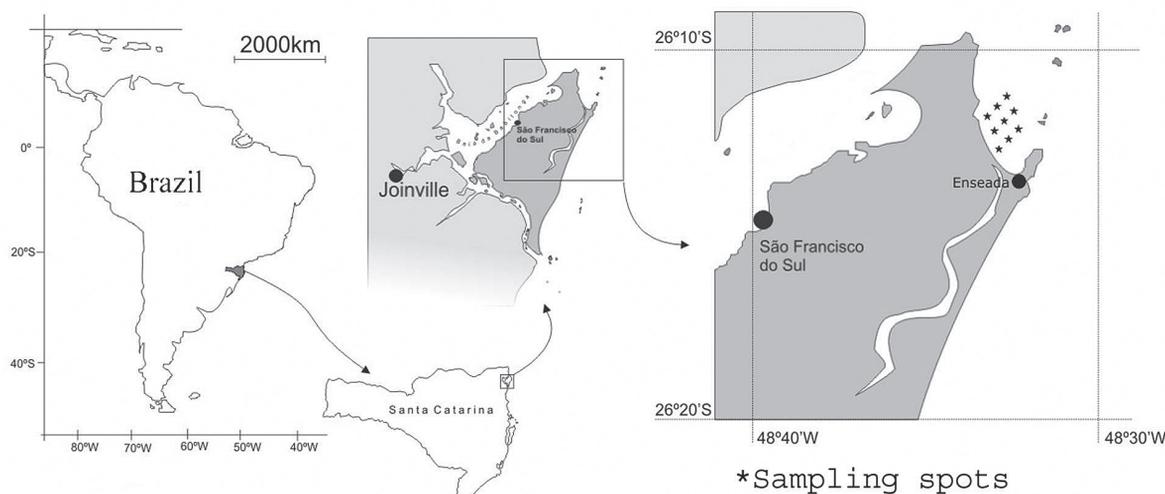


Fig.1. Study site at Ubatuba-Enseada bay, São Francisco do Sul, Southern Brazil

Table 1. Month of catch, numbers, minimum and maximum total length registered and uterine content of gravid females of *Zapteryx brevirostris* caught in Ubatuba-Enseada bay, coast of Santa Catarina, Southern Brazil

Month of catch	Number	Total length (min – max)	Uterine content
August 2003	2	49.0 – 50.3 cm	Early developing embryos
September 2003	7	44.1 – 49.3 cm	4 to 9 embryos
October 2003	3	47.2 – 47.9 cm	6 to 9 embryos
September 2004	5	46.0 – 52.2 cm	Early developing embryos

(CAPAPÉ *et al.*, 2005). According to MELLINGER (1989), the fact that males matured in size classes smaller than females, and the adult females were larger and heavier than adult males, is practically a rule for elasmobranch species.

BATISTA (1991) observed that the embryonic development of *Z. brevirostris* captured in Southeastern Brazil was not synchronized, however part of the population showed a slight synchrony from May to August/September. Females with early developing embryos were captured in Ubatuba-Enseada bay in August 2003 and September 2004, supporting the conclusion that gestation occurs mainly in the in Spring (Table 1). Despite the fact that the total length of pregnant females showed similar patterns reported by BATISTA (1987), observations on reproductive cycle could not be clearly delineated due to an insufficient number of individuals captured.

There are only a few published accounts of lesser guitarfish embryonic development along the Brazilian coast. BATISTA (1987) examined 13

embryos of *Z. brevirostris* captured in an inlet in Southeastern Brazil, reporting embryo length from 11 to 153 mm. The largest embryo was registered in the month of August. From 100 mm total length the embryos display juvenile features and begins the formation of the internal vitelinic sac, which will be full just before birth. GONZALEZ (2004) reported six newborns of a female of *Z. brevirostris* in captivity in November 2002, ranging from 115 to 130 mm. In Ubatuba-Enseada bay, 45 embryos of seven gravid females were examined, ranging from 29 to 65 mm, and the growth of the aplacental viviparous embryos was allometric (Fig. 2). The fact that all embryos measured did not reached the estimated full-term length (100 mm according to BATISTA, 1987 and 115 according to GONZALEZ, 2004), suggests that the parturition probably occurs in late spring or in summer (December). In addition, COSTA & CHAVES (2006) and our personal observations on *Z. brevirostris* captured at Ipanema beach in 2006 (Paraná state, Southern

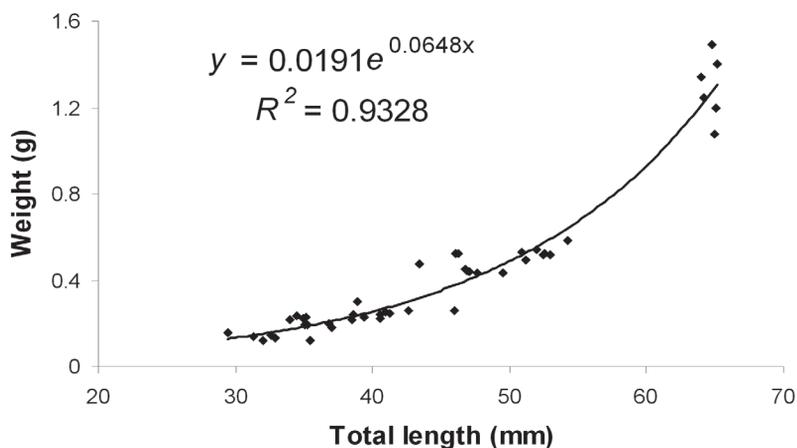


Fig.2. Plot of total length (mm) vs. weight (g) from 45 embryos of *Z. brevirostris* captured in Ubatuba-Enseada bay, Southern Brazil, in August 2003 and September 2004

Brazil), indicated that full-term embryos in this coastal region occur mainly in the beginning of summer.

In our sample, females outnumbered males in agreement with SANTOS *et al.* (2006), probably as a result of sexual spatial segregation in the reproductive period (LESSA *et al.*, 1986; VILLAVICENCIO-GARAYZAR, 1995). The approaching of guitarfish females to the shore could be the result of searching for nursery areas to expel their embryos (LESSA *et al.*, 1986; BATISTA, 1987; BATISTA, 1991; VILLAVICENCIO-GARAYZAR, 1995).

### CONCLUSIONS

At present, reproductive data on *Z. brevirostris* is insufficient to conclude whether the Ubatuba-Enseada bay is indeed a nursery area. However as several elasmobranch populations'

capture in nearby areas seem to use the Southern coast of Brazil for the procreation of the reproductive cycle (COSTA & CHAVES, 2006), this hypothesis should not be discarded. In fact, the life cycle of some guitarfish involves nearby estuarine environments and the deeper zones of the shelf itself (LESSA *et al.*, 1986; SANTOS *et al.*, 2006).

It is important to note that, although the artisanal trawl fisheries and the bycatch associated to it capture incidentally few individual guitarfish in Southern Brazil, the majority of species captured are pregnant females, indicating that the reproductive cycle is in fact exposed to commercial fisheries' impact. Other observations on Atlantic coast elasmobranch populations reflect the identical problem (SILVA & LESSA, 1991; VOOREN & KLIPPEL, 2005; VOOREN *et al.*, 2005).

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## Saznanja o reprodukciji i razvoju embrija malog ražopsa *Zapteryx brevirostris* u južnom Brazilu

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### SAŽETAK

Ulovljene su jedinke malog ražopsa, *Zapteryx brevirostris* tijekom razdoblja od kolovoza 2003. do rujna 2004. pomoću pridnenih kočarskih mreža u zaljevu Ubatuba-Enseada, São Francisco do Sul, južni Brazil.

Ukupna duljina se kretala od 42.8 do 47.3 cm kod mužjaka, te od 44.1 do 52.2 cm kod ženki. Primjerci ženki su sadržavali embrije u ranom razvoju navodeći na zaključak da se gestacija odvija pretežito tijekom proljeća. Maseno-duljinski odnos 45 embrija je alometričan iako ukupna duljina embrija nije dosegla procijenjenu duljinu primjeraka novog okota. Podaci upućuju na zaključak da *Z. brevirostris* nastanjuje istraživano područje tijekom gestacije.

**Ključne riječi:** Chondrichthyes, hrskavičnjače, Rhinobatidae, reproduktivna biologija

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