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RECORD OF PREGNANT FEMALES OF *Pseudobatos horkelii* (MULLER & HENLE, 1841), A CRITICALLY ENDANGERED GUITARFISH OFF SW ATLANTIC

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ABSTRACT

In this article, the capture of two pregnant females of the Brazilian Guitarfish, *Pseudobatos horkelii*, is recorded. Although the species is Critically Endangered and it capture is prohibited, the illegal catches occur nevertheless.

Key words: Chondrichthyes, Pseudobatidae, fishes, predatory fishing.

RESUMEN

Registro de hembras gestantes de *Pseudobatos horkelii* (Muller & Henle, 1841), una raya guitarra en peligro crítico aguas afuera del Atlántico Sudoccidental. En este artículo se registra la captura de dos hembras gestantes de la raya viola, *Pseudobatos horkelii*. Aunque la especie está en Peligro Crítico de extinción y su pesca está prohibida, las capturas continúan ocurriendo de forma ilegal.

Palabras clave: Condrictios, Elasmobranquios, peces, pesca depredadora.

The Family Rhinobatidae comprises six genera with 45 species (Nelson, 2016), one of these species is the guitarfish *Pseudobatos horkelii* (Muller and Henle, 1841), which can be found from the coast of the state of Bahia in Brazil, to Uruguay and Argentina (Compagno, 1999; Menni and Stehmann, 2000). In general, this species inhabits benthic environments of the continental shelf, on sandy or muddy bottoms and occurs throughout the year, being a resident species (Vooren, 1997). The southern shelf is the only area within its geographic distribution with a high abundance of this species (Vooren and Klippel, 2005). *Pseudobatos horkelii* is a yolk sac viviparous species (Lessa et al., 1986; Wourms, 1988), i.e., the embryo develops mainly through the yolk available in the mature oocyte, but other nutritional sources have recently been discovered (Wosnick et al., 2022). On the continental shelf of southern Brazil, the reproductive cycle is synchronized at the population level, so that adult females give birth at the same time of the year. The time of birth corresponds to the months of February and March, when females are able to copulate soon after giving birth, and a new pregnancy occurs (Vooren and Klippel, 2005).

Pseudobatos horkelii is globally classified by the International Union for Conservation of Nature (Pollom et al., 2020) as "Critically Endangered" (CR), the same status for the Brazilian regional assessment. According to the Ministry of Environment (MMA), the capture of *P. horkelii* is prohibited by National Legislation (Law nº 10.683) in the States of Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul (IBAMA, 2004), though some studies show these catches using molecular approaches (De Franco *et al*., 2012; Alvarenga et al., 2021). Even so, either by accidental or illegal capture, individuals continue to be captured. Thus, it is of utmost importance to create, implement, and maintain projects resulting from networked partnerships between the academic community and environmental protection agencies, which aim at the conservation of this and other endangered species. The extension project ICB/FURG in partnership with the Environmental Patrol of the Military Brigade (PATRAM) - PROPESP registration number EXT109 - "Implementation of the regulations prohibiting fishing and landing of endangered species of Chondrichthyes in the State of Rio Grande do Sul", represents a collaboration to formalize the production

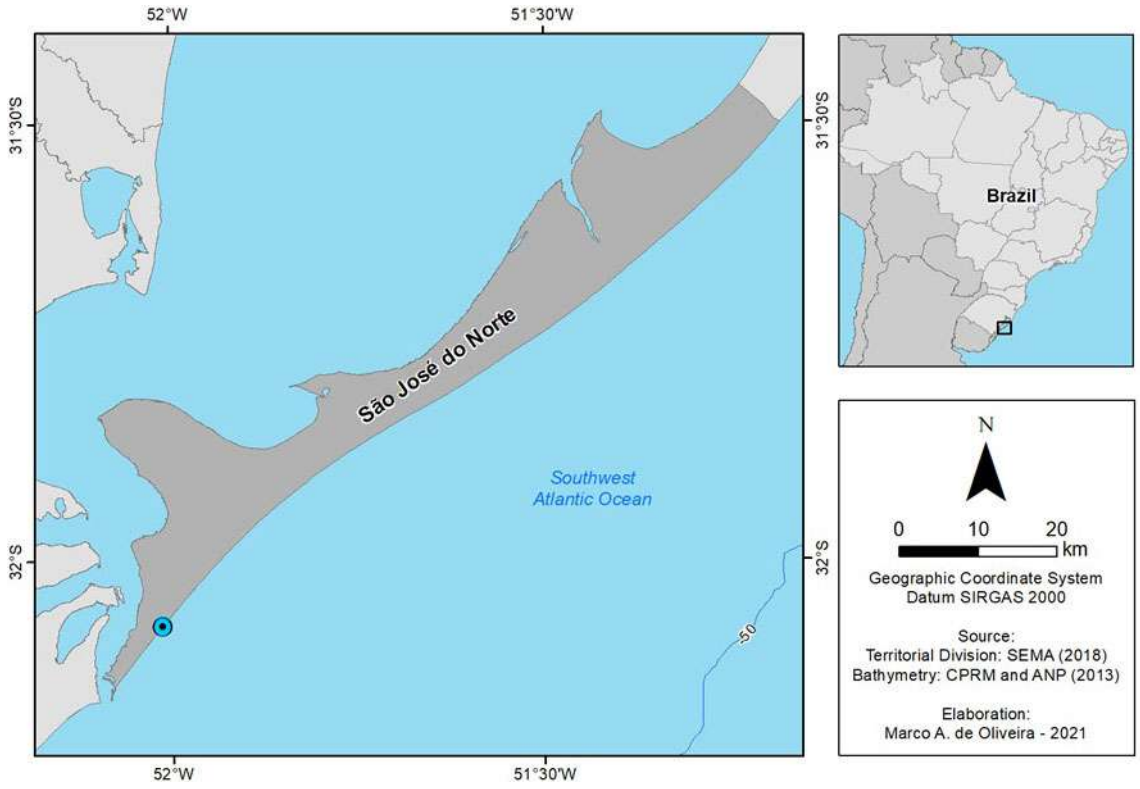

Fig. 1. Map of the study area, Mar Grosso beach in the municipality of São José do Norte, Rio Grande do Sul, Brazil, where the capture of about 10 tons of *Pseudobatos horkelii* was carried out on 12/22/2018.

Table 1. Measured variables with their respective values. Total length (CT), liver weight (LW), digestive tract weight (DTW), follicle diameter (FD), ovary weight (OW) and total weight (TW). *P. horkelii* specimens collected on 12/22/2018 at mar grosso beach, in the city of São José do Norte, Brazil.

Specimens	CT (cm)	LW (g)	DTW (g)	FD (cm)	OW (g)	TW (g)
#1	117.0	181	83	3.5	110.3	5630
#2	113.0	202	80	3.5	L: 17.9; R: 60.4	4780

of technical reports of species identification to detect the capture of endangered species. The objective of this work is to record an illegal and intentional fishing event where there was a massive capture of pregnant females of *P. horkelii*, in the South of Rio Grande do Sul, in Southern Brazil, SW Atlantic.

The seizure occurred on 12/22/2018 in the city of São José do Norte (32º 00' 53" S and 52º 02' 30" W) (Fig. 1), the number of specimens of *P. horkelii* found was 2,134, totaling approximately 10,000 kg. The fishing gear was a bottom trawl, which was pulled manually from a motor boat. Once landed, the

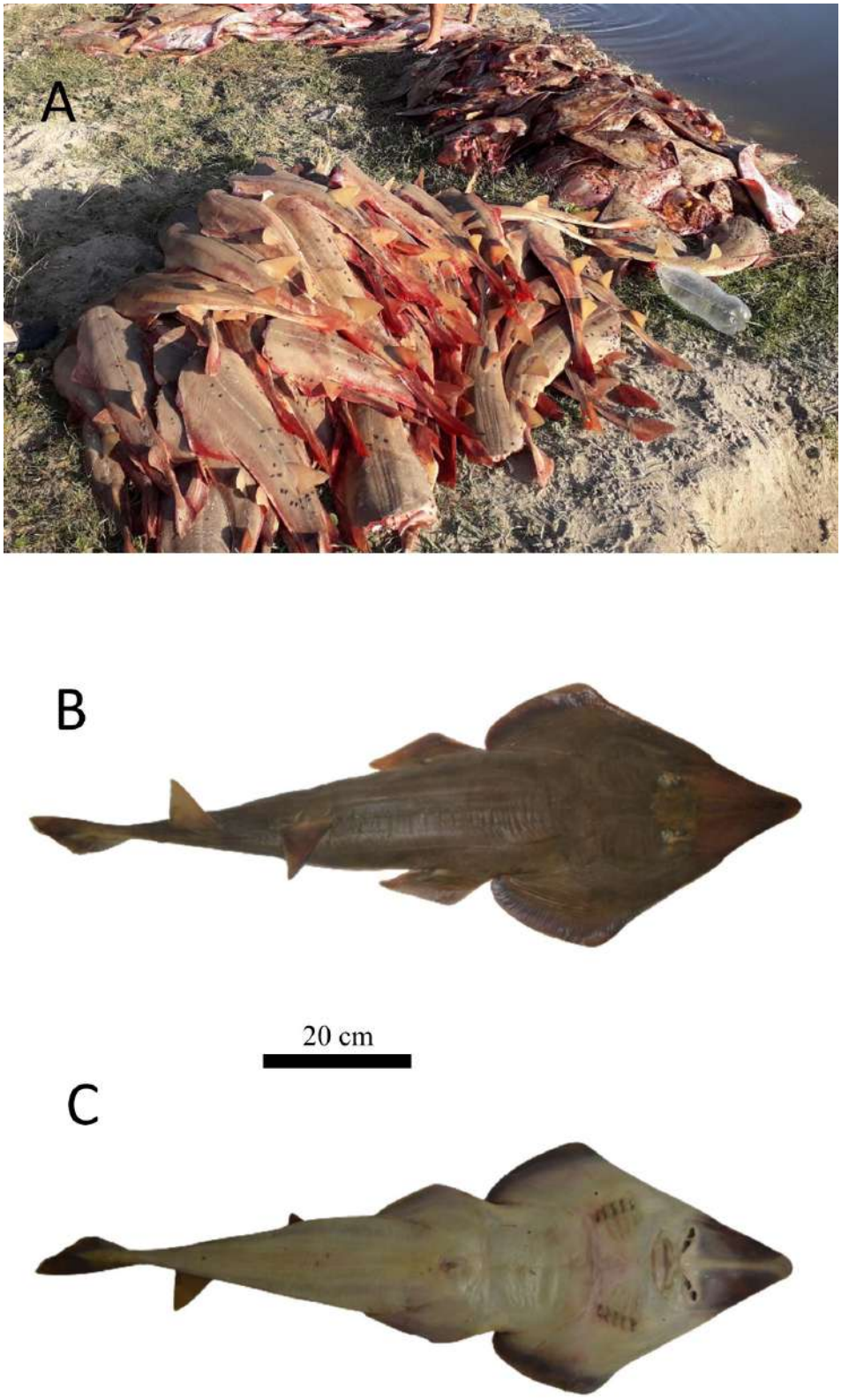

Fig. 2. Moment when part of the *Pseudobatos horkelii* catch was collected. A total of 2,134 specimens were captured (A). Dorsal view of pregnant female of *Pseudobatos horkelii* (B). Ventral view of pregnant female of *P. horkelii* (C).

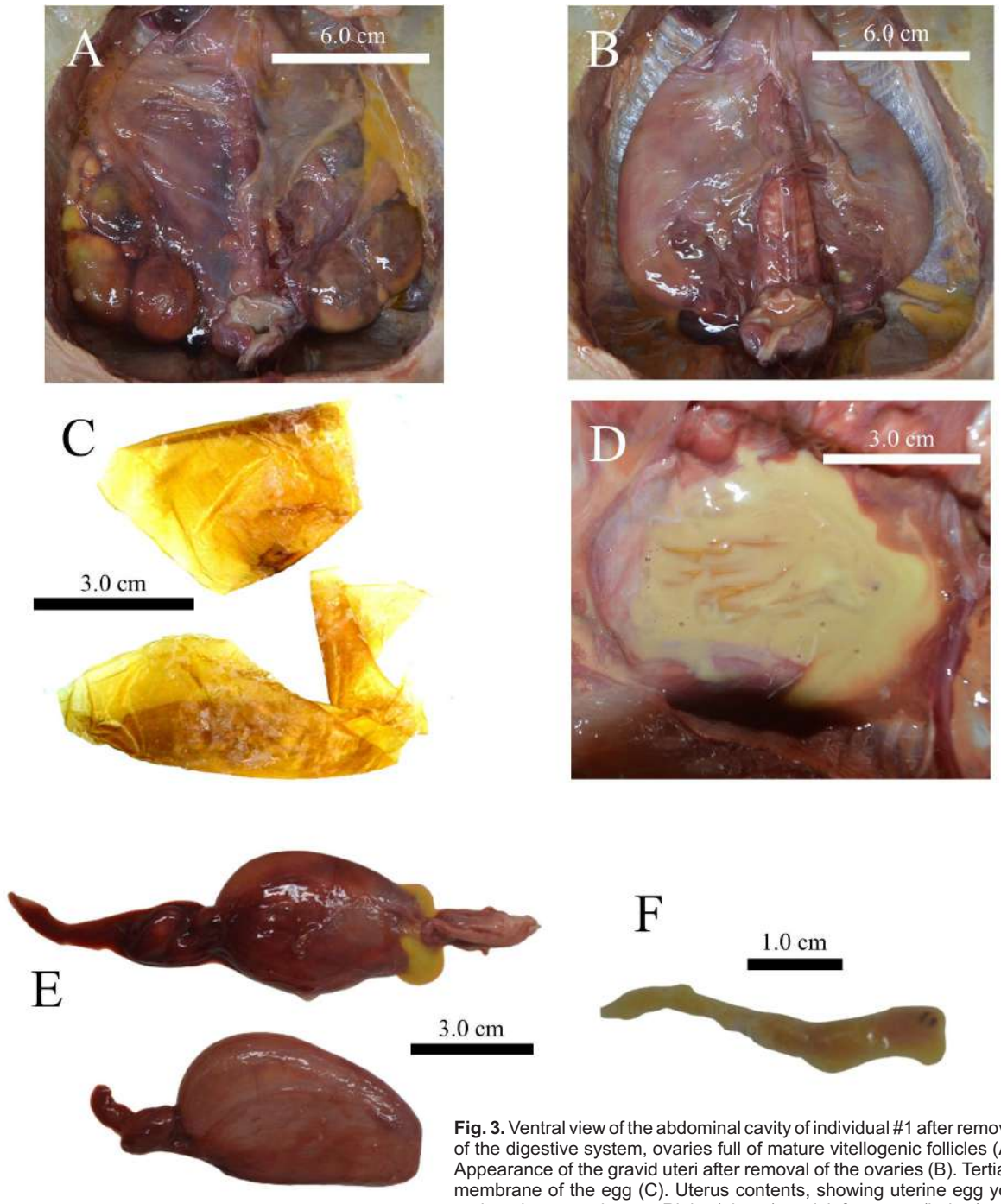

Fig. 3. Ventral view of the abdominal cavity of individual #1 after removal of the digestive system, ovaries full of mature vitellogenic follicles (A). Appearance of the gravid uteri after removal of the ovaries (B). Tertiary membrane of the egg (C). Uterus contents, showing uterine egg yolk and tertiary membrane. Right (above) and left uterus (below), the anterior region of the oviduct is oriented to the left, where the oviductal glands can be seen (E). Embryo removed from one of the uteri, showing external branchial filaments and without pigmentation (F).

specimens were removed from the net and immediately placed on a track for transport and marketing moment when the seizure occurred. On March 1, 2019, PATRAM donated two of the seized individuals for species identification and biological sampling. The specimens were taken to the Morphology II laboratory at the Instituto de Ciências Biológicas, FURG, for further analysis. Taxonomic identification of individuals followed Vooren and Klippel (2005). Biological sampling included the record of total

length, total weight, liver weight, digestive tract weight, diameter of pre-ovulatory follicles and ovarian weight (Table 1). Females were identified as specimens #1 and #2. The total weight of female #1 was 5.63 kg and female #2 weighed 4.78 kg. Female #1 had three preovulatory vitellogenic follicles with a diameter of 3.5 cm, in each ovary. The combined weight of the ovaries was 110.3 g. The individual weight of the ovaries was not available as the follicles dissolved during extraction and manipulation; however, the contents were included in the use of petri dish. In individual, the left ovary was 17.9 g (one vitellogenic follicle 3.5 cm in diameter and seven smaller 1.0 cm each). The right ovary weighed 60.4 g (three large follicles 3.5 cm in diameter each and six smaller ones). One embryo was in individual #2, but it was already in a state of decomposition (Fig. 3, F).

The results found show that the specimens sampled are adult individuals (Lessa et al., 1986). The species comes close to the coast with the objective of reproduction, since the young are born in this region (Vooren and Klippel, 2005). Thus, exorbitant catches like this one, demonstrate that *P. horkelii*, a Critically Endangered species, continues to be over captured, even during the reproductive period, in the southern coast of Brazil, were females migrate in warmer month for parturition.

Pseudobatos horkelii is a viviparous species, and in comparison to oviparous species, the viviparous reproduction of those species depending solely on a yolk sac, and tends to be associated with a more moderate reproductive rate (Wourms, 1988). The specificity of the lower reproductive rate of this species coupled with its dependence on coastal areas for reproductive purposes, continuously increases the vulnerability of the local population (Vooren and Klippel, 2005). In addition, although actual legislation avoids the capture and landing of this species, illegal catches are still a fact, as is the case in the present report.

The guitarfishes have been steadily declining over time. In 2014, the group was identified as one of the most susceptible elasmobranch families to fisheries, along with sawfishes (Dulvy et al., 2014). It is evident that these fishes are highly vulnerable in shallow coastal ecosystems, as they are easily accessible to intensive fishing practices. This could be the primary reason why the vast majority of guitarfishes populations are facing severe threats all over their distribution areas (Moore, 2017).

Once fish populations collapse, potential stock recovery is a time-consuming process, even if fishing pressure is reduced (Hutching and Reynolds, 2004). Furthermore, at a global level, substantial declines in guitarfishes populations have already been documented, along with the disappearance of some species elsewhere (Carlisle et al., 2007; Diop and Dossa, 2011). The partnership between scientists and conservation-focused organizations represents a valuable synergy that combines scientific knowledge, practical resources, and field efforts to effectively safeguard critically threatened species as the guitarfishes.

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