

Size and sex compositions, length–weight relationship, and occurrence of the Brazilian sharpnose shark, *Rhizoprionodon lalandii*, caught by artisanal fishery from southeastern Brazil

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Abstract

Although the Brazilian sharpnose shark, *Rhizoprionodon lalandii* (Muller and Henle, 1839), is an inshore species widely distributed in the Western Atlantic from Panama to Uruguay, there is little available information on its biology. During a long-term study of small coastal sharks caught by gill net fisheries in southeastern Brazil (PROJETO CAÇÃO), 3643 specimens of *R. lalandii* were examined, comprising 61.3% of the total sharks, and including all sizes classes, from 30 to 78.5 cm TL, and weights from 100 to 2950 g. The length–weight relationships were not significantly different between sexes. Overall sex ratio favoured the males slightly at the rate of 1.3:1. Sex ratios, however, did differ significantly between season and size classes. This species occurred in this area all year long. Three seasonal size-class occurrence patterns were recognized: (1) between October and March, the juveniles were more frequent; (2) from April to July, adults were most common; and (3) from August to September, neonates were most numerically abundant. Such patterns were associated with reproductive tactics that may reduce intra-specific and inter-specific competition with hammerhead shark neonates (*Sphyrna lewini*), probably result in reduced natural mortality of the offspring during their first few months.

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1. Introduction

The genus *Rhizoprionodon* is represented worldwide by seven species of small coastal carcharhinid sharks (Compagno, 1984). Because of their abundance

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and habits, these sharks are caught in several parts of the world although few studies have considered their local importance (e.g. Sadowsky, 1967; Cody and Avent, 1980; Lessa, 1986; Kasim, 1991; Grace and Henwood, 1997; Castillo-Géniz et al., 1998).

In the western Atlantic, three species have been recorded; *R. terraenovae*, known from western North Atlantic, but probably also found in tropical western South Atlantic; *R. porosus*, from central U.S. coast, western North Atlantic to Uruguay, including Brazil; and *R. lalandii*, from Panama to Uruguay, including Brazil (Figueiredo, 1977; Compagno, 1984).

The Caribbean sharpnose, *R. terraenovae* is probably the best known of all *Rhizoprionodon*, diverse aspects of their biology and population dynamics have been studied: (e.g., Parsons, 1983, 1985; Branstetter, 1987; Castro and Wourms, 1993; Pratt, 1993; Cortés, 1995; Márques-Farias and Castillo-Géniz, 1998; Gelslechter et al., 1999; Carlson and Baremore, 2003 and Loefer and Sedberry, 2003). In contrast, there are few biological studies on Atlantic and Brazilian sharpnose sharks. About the first, *R. porosus*, Mattos et al. (2001) investigated their reproduction in Pernambuco coast, north Brazil and Silva and Almeida (2001) their feeding habits in Maranhão, north Brazil.

The Brazilian sharpnose shark, *Rhizoprionodon lalandii*, is a placental viviparous species that reaches a maximum total length of 80 cm. In Brazilian waters it is an important resource in artisanal fisheries along the coast, especially in the southeast and south areas (Figueiredo, 1977). Nevertheless, little information is available on its basic biology and quantitative fishery aspects for its entire distribution. Sadowsky (1967) examined 6141 Brazilian coastal sharks caught by gill nets in the south off São Paulo state. According to him, *R. lalandii* was the third most abundant species (about 12% of the total catch) and occurred throughout the year in large schools segregated by sex. Some reproductive aspects on *R. lalandii* have been investigated at two locations off the Brazilian coast. Based on 314 specimens collected in the Rio de Janeiro (southeast coast), Ferreira (1988) reported that the species attain sexual maturity between 60 and 65 cm total length, and the females give birth in winter. Lessa (1988) examined 294 sharks in Maranhão (north coast), and affirmed that *R. lalandii* reach sexual maturity between 52 and 56 cm of the total length and that the occurrence of an annual reproductive cycle in these waters has not been clearly

demonstrated. Additionally, Lima et al. (2000) studied feeding habits of this species in Santa Catarina, located in the south Brazilian coast.

Springer (1967) stated that sharks migrate to specific places where the females lay eggs or give birth. These nursery areas are usually located in shallow, energy rich coastal areas where the young find abundant food and have little predation by larger sharks (Branstetter, 1990; Castro, 1993). Bass (1978) divided nursery areas into primary and secondary kinds: primary nurseries are those in which parturition occurs and where the young live for a short time, while secondary nurseries are those in which the juveniles occur after leaving the primary nursery and before reaching maturity. For some species of carcharhinid sharks primary and secondary nurseries can occur in the same area (Snelson et al., 1984; Simpfendorfer and Milward, 1993).

An appropriate management of Brazilian sharpnose demands more consistent knowledge on their population biology including the identification of nursery areas. In this paper, we estimate the numerical importance of *R. lalandii* in total catch of sharks by artisanal fisheries from southeastern Brazil, and present data on size and sex structure, length–weight relationship and occurrence of this species.

2. Materials and methods

Specimens were obtained weekly from artisanal fisheries operating along the south coast of São Paulo State, southeastern Brazil (Fig. 1) and landing at the Fishermen's Beach, Itanhaém city (24° 11'S; 46° 48'W) between July 1996 and June 1999. The fishing fleet comprised 12 small motorized boats (4–10 m long), using monofilament gill nets with 1500 m length and stretched mesh sizes of 7, 12 and 14 cm on average. The nets are set within an area of 2–12 nautical miles from the shore, in waters between 6 and 30 m deep.

All sharks collected were sexed, measured (total length – TL, in cm), weighed (total weight – W, in g) and their maturity assessed according to definitions provided in previous studies (Castro, 1993; Simpfendorfer and Milward, 1993). To evaluate differences in sex ratio, a χ^2 -test was used for the entire sample, and for subsets divided seasonally or by length classes. Size–frequency distributions of males and females were compared using a two-sample

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