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Presence of Franciscana Dolphin (*Pontoporia blainvillei*) Remains in the Stomach of a Tiger Shark (*Galeocerdo cuvieri*) Captured in Southeastern Brazil

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Abstract

The franciscana dolphin, *Pontoporia blainvillei*, inhabits the coastal Atlantic waters of South America (~18º-42º S). This paper reports the presence of *P. blainvillei* in the stomach of a tiger shark, *Galeocerdo cuvieri*, captured in southeastern Brazil. On 15 March 2003, the shark specimen, 4.0 m and 400 kg male, was captured in a bottom-set gill net placed approximately 2.2 nautical miles from the coastline and 15 m deep. The caudal peduncle keels and fin were entangled in the lower frame line; however, the net mesh, as well as the frame line, were not damaged by this capture. Analysis of the tiger shark stomach contents revealed the presence of an entire head belonging to a franciscana dolphin and some fish species. The present record is the first report of interactions between this species of shark and franciscana dolphins in Brazilian waters. The tiger shark is a voracius predator and its capture characteristics, with lower frame line involvement without net mesh damage, and preys recovered from its stomach, may indicate an opportunistic feeding activity. The shark could have been held in the frame line while feeding upon the fishes and the franciscana that were enmeshed. Further reports are necessary to determine if shark predation on franciscana dolphin is an important factor in its natural mortality in southeastern Brazil, where this species also is affected by coastal fisheries.

Key Words: *Pontoporia blainvillei*, *Galeocerdo cuvieri*, predation, stomach content, southeastern Brazil, franciscana dolphin, tigershark

Introduction

The franciscana dolphin, *Pontoporia blainvillei*, inhabits the coastal Atlantic waters of South America from Brazil (~18º S) to Argentina (~042º S) (Crespo et al., 1998; Siciliano, 1994). Its preferred habitat is the upper continental shelf, within 30 nautical miles from the coastline or depths of up to 30 m (Praderi et al., 1989); however, in southeastern Brazil, the species seems to be restricted up to 5-10 nmi away, in waters up to 15-20 m deep (Di Beneditto et al., 2001a, 2001b).

The franciscana dolphin has been largely affected by fisheries along its distributional range (Di Beneditto et al., 2001b; Ott et al., 2002; Praderi et al., 1989; Siciliano, 1994) and is considered the most threatened small cetacean species in Brazilian waters (IBAMA, 2001). Besides incidental capture in fisheries, shark and killer whale (*Orcinus orca*) attacks also could be responsible for its mortality (Monzón et al., 1994; Ott & Danilewicz, 1998; Praderi, 1985).

The tiger shark (*Galeocerdo cuvieri*) inhabits coastal, as well as offshore, waters and also can be found in river estuaries (Compagno, 1984). It is a pelagic species that swims very fast and occurs in the tropical and subtropical waters of the main oceans (Figueiredo, 1977). Its diet is composed of crabs; other fishes, including sharks and rays; turtles; seabirds; and marine mammals (Compagno, 1984; Figueiredo, 1977; Rathbaun & Rathbaun, 1984; Rosas et al., 1992). Along southeastern Brazil, long-line is regularly used to capture the tiger shark, but it cannot be considered as an important fishing resource in this region (Di Beneditto et al., 1998).

This paper reports the presence of franciscana dolphin in the stomach of a tiger shark captured in southeastern Brazil.

Materials and Methods

Located in southeastern Brazil, the Rio de Janeiro State has the third longest coastline in Brazil (636 km) and is the third largest fish producer (Di Beneditto et al., 1998). The Atafona village (21º 37' S; 041º 01' W), situated in the mouth of the major river run-off of Rio de Janeiro State,

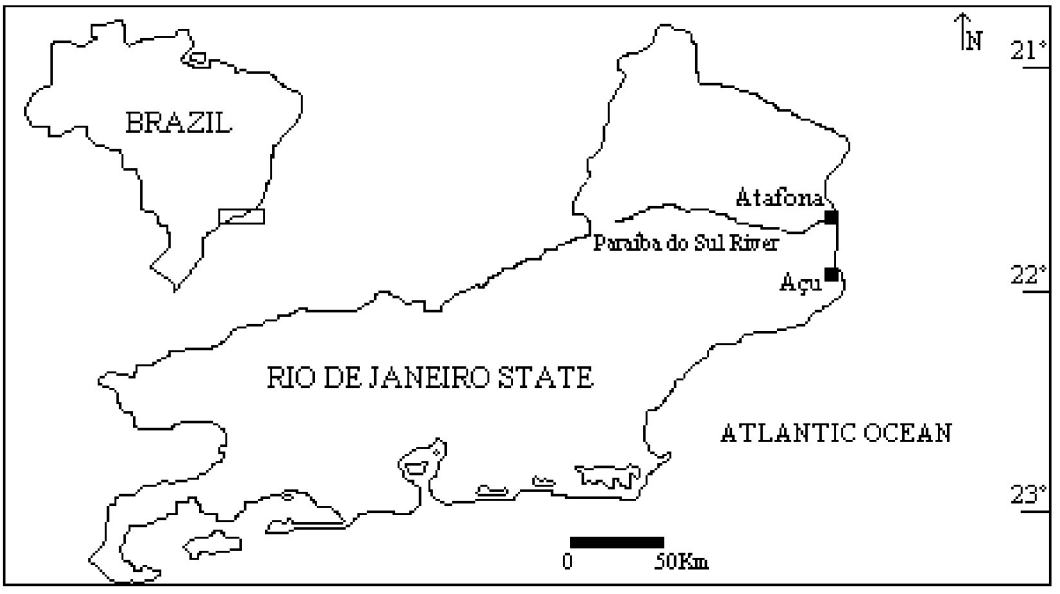

Figure 1. Rio de Janeiro State, southeastern Brazil, indicating Paraíba do Sul River and Atafona and Açu Villages

Paraíba do Sul River, is the most representative harbour in terms of gillnet fisheries along the coast (Di Beneditto, 2001) (Figure 1).

On 15 March 2003, fishermen based at this harbour captured a tiger shark specimen. The species was identified by photographs taken by the fishermen and teeth analysis, according to methods used by Compagno (1984). Information about the fishing gear, fishing ground, and other target species were obtained through interviews with the fishermen and direct observation.

In the local fish markets, all sharks are commercialised without a head and eviscerated (Di Beneditto et al., 1998). On removing the viscera of this specimen, it was possible to observe its stomach contents. The photographs of the prey items taken by the local fishermen were used by the author to identify the consumed prey, following Figueiredo & Menezes (1978), Menezes & Figueiredo (1980), and Jefferson et al. (1993).

Results

The tiger shark male specimen was 4.0 m long and weighed 400 kg, approximately, and was captured in a bottom-set gill net which was 2,900 m in length, 5 m in height, and had a 12-cm mesh (stretched between opposite knots). The twine material was nylon monofilament that was 0.6 mm thick. In relation to fishing grounds, the net was placed near Açu Village (21º 55' S, 040º 59' W) (Figure 1), approximately 2.2 nmi from the coastline and 15 m deep.

According to information from fishermen, the net was deployed at sea in late afternoon on 14 March, and it was removed the next morning. The tiger shark was already dead when the net was hauled. The keels positioned on each side of its caudal peduncle, as well as the pointed caudal fin, were entangled in the lower frame line; however, the fishing gear mesh and the frame line did not suffer damage from this capture. Other fish species caught during this fishery were small shark species, ladyfish (*Elops saurus*), white-mouth croaker (*Micropogonias furnieri*), weakfishes (genus *Cynoscion*), and other small sciaenids, totaling around 200 kg.

Analysis of the tiger shark's stomach contents revealed the presence of an entire head belonging to a franciscana dolphin. Many wounds and scars caused by shark bites were present on the whole head. Other remains regarding to this dolphin were not observed. Fish species also were recorded in the shark's stomachs such as ladyfish, American harvestfish (*Peprilus paru*), and small sciaenids.

Discussion

The present record is the first report of interactions between sharks and franciscana dolphins in Brazilian waters. Pilleri (1971), Brownell (1975), and Praderi (1985) had already reported this kind of interaction along the Uruguayan coast (~33º-34º S), mentioning that the sevengill shark (*Notorynchus cepedianus*), hammerhead shark (*Sphyrna* spp), sand tiger shark (*Eugomphodus*

taurus), and tiger shark are predators of franciscana dolphins caught in gillnets set for sharks, and probably on free-swimming dolphins. In Argentina (~35º-40ºS), Monzón et al. (1994) also recorded shark bites from a requiem shark (*Carcharhinus* sp.) and sand tiger shark on franciscana dolphins incidentally caught. The authors suggested that shark attacks could be an important factor in the natural mortality of this species.

Shark predation on marine mammals has been recorded in the study area. On 5 August 1989, the head and remains of a leopard seal (*Hydrurga leptonyx*) were found in the stomach of a tiger shark captured on a long-line (Rosas et al., 1992); however, according to the leopard seal's distributional range, the authors presumed that it could have been eaten further south of Rio de Janeiro State. In February 1995, a marine tucuxi (*Sotalia fluviatilis*) was incidentally caught in a surface-set gill net placed near Açu Village; on its belly were observed many fresh wounds, probably caused by shark bites (pers. obs.).

The tiger shark is a voracious predator, and according to its length and weight, this specimen was an adult (Compagno, 1984). Its capture characteristics, with lower frame line entanglement without net mesh damage; stomach contents, with species usually caught in the same fishery; and the dolphin's head, could indicate that the shark was held in the frame line while feeding upon the fishes and the franciscana dolphin that already were enmeshed.

Monzón et al. (1994) analysed scars caused by shark attacks on franciscana dolphins from the Argentine coast, verifying that attacks usually happened out of visual and sonorous dolphins' perception and that the tail fin was more affected than the dorsal and pectoral ones. The above description and the fact that only the dolphin's head was recorded in the present study, supports the hypothesis of predation on already enmeshed preys. Meanwhile, free-swimming dolphins also can be preyed upon by this shark in the study region, as well as by other species that occur in the same area (e.g., sandbar shark [*Carcharhinus plumbeus*] and blacktip shark [*C. limbatus*] (Di Beneditto et al., 1998).

Further research is necessary to determine if shark predation on franciscana dolphin is an important factor in its natural mortality in southeastern Brazil, where this species also is affected by incidental captures in fisheries.

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