

SURVIVAL DUE TO VITELLINE RESERVE OF A FINNED NEONATE OF *Carcharias taurus* IN SOUTHERN OF BRAZIL

Luis Gustavo CARDOSO¹; Carolus Maria VOOREN²; Manuel HAIMOVICI³

ABSTRACT

A neonate of *Carcharias taurus* with mutilated fins was caught during commercial fishing with monofilament nylon bottom gillnets on the continental shelf of southern Brazil. The individual, a 100-cm long male, had the lobes of the first dorsal and two pectoral fins, probably cut clean with a knife and the wounds were healing process. The specimen probably was captured by the first time as a neonate and survival may only have happened due to the yolk reserve it was born with. In southern Brazil, where it was recaptured, landings of *C. taurus* have been forbidden by law since 1998. This case highlights the need for measures to enforce the landing of shark carcasses with attached fins to avoid finning and restrain the illegal fishing of protected species.

Key words: Commercial fishing; protected specie; conservation

SOBREVIVÊNCIA DEVIDO À RESERVA VITELÍNICA DE UM NEONATO DE *Carcharias taurus* VÍTIMA DE “FINNING” NO SUL DO BRASIL

RESUMO

Um neonato de *Carcharias taurus*, com as nadadeiras mutiladas, foi capturado durante a pesca comercial com redes de emalhe de fundo na plataforma continental do sul do Brasil. O indivíduo, um macho com comprimento total de 100 cm, teve os lobos da nadadeira dorsal e das duas nadadeiras peitorais retiradas, provavelmente, com cortes limpos de faca e as bases das nadadeiras já estavam em processo de cicatrização. O espécime provavelmente foi capturado pela primeira vez como neonato e a sobrevivência só foi possível devido à reserva de vitelo com a qual nasceu. No sul do Brasil, onde o neonato foi recapturado, desembarques de *C. taurus* estão proibidos por lei desde 1998. O presente caso evidencia a necessidade de medidas para obrigar o desembarque de carcaças de tubarões com suas nadadeiras para prevenir o “finning” e coibir a pesca ilegal de espécies protegidas.

Palavras-chave: Pesca comercial; espécie protegida; conservação

Nota Científica: Recebida em 13/08/2010 – Aprovada em 10/01/2011

¹ Universidade Federal do Rio Grande – FURG, Curso de Pós-Graduação em Oceanografia Biológica. e-mail: euvoapabv@yahoo.com.br

² Universidade Federal do Rio Grande – FURG, Instituto de Oceanografia, Laboratório de Elasmobrânquios e Aves Marinhas. e-mail: doccmv@furg.br

³ Universidade Federal do Rio Grande – FURG, Instituto de Oceanografia, Laboratório de Recursos Pesqueiros Demersais e Cefalópodes. e-mail: docmhm@furg.br

Address/Endereço: Universidade Federal do Rio Grande. Caixa Postal 474 – CEP: 96.201-900 - Rio Grande – RS - Brazil

INTRODUCTION

Most elasmobranchii have slow growth, late maturity and low fecundity resulting in very low resilience to fishing mortality (CAMHI *et al.*, 1998). In southern Brazil, they were abundant, but very high catches in the 1980's and the early 1990's reduced their abundance drastically. At that time, they represented between 10 and 14% of the total landings in Rio Grande; however, in 2008, they represented only 1% of the landings (IBAMA/CEPERG, 2009).

In the 1980's, *Carcharias taurus* was the target of important coastal fisheries with gillnets, and big catches were frequently made in beach trawl fisheries. Neonates and young-of-the-year of this species were incidentally caught in these fisheries (VOOREN *et al.*, 2005). In the 1990's, however, its abundance declined sharply. It has not been caught in beach fisheries (VOOREN *et al.*, 2005) and has occurred in only three out of 43 monitored fishing trips on the Passo de Torres fleet (GALINA, 2006). Several species, including *C. taurus*, have had the legal status of endangered species in Rio Grande do Sul state since 2005 (VOOREN and KLIPPEL, 2005a) and the species has been on IUCN's red list since 2007 (CHIARAMONTE *et al.*, 2007).

This paper aims at reporting the capture of a living finned neonate *C. taurus* on the Southern Atlantic continental shelf and to highlight the need for legal measures to protect this species of sharks.

MATERIAL AND METHODS

A mutilated juvenile of *Carcharias taurus* was caught in July 2009 at the depth of 21 m off southern Brazil (30°53'S, 50°27'W) during commercial fishing with monofilament nylon bottom gillnets with stretched mesh of 100 mm between opposed knots. The specimen was brought onboard and photographed by the first author who was onboard to collect data as part of the fishery description situated in Passo de Torres, Santa Catarina, Brazil.

The main objective of the observer on the trip was to collect scientific data to describe the fishing operations and measure the length frequencies of the main target species (*Cynoscion guatucupa*, *Urophycis brasiliensis* and *Pomatomus saltatrix*).

Therefore the total length (TL) of the individual was not measured *in situ* and was estimated by a graphic software *Image Tool version 3.0* (VILCOX *et al.*, 2002) from the photograph in Figure 1A, using the known width of the rubber boot (7 cm) in the bottom left-hand corner of the photograph as a size reference.

The trip was taken on the 22 m long, 360 HP's fishing boat that left Passo de Torres on July 15th and returned on August 1st, 2009.

RESULTS

The captured individual was a male (Figure 1 D) of 100 cm TL between the snout and the end of the stretched caudal fin (Figure 1 A). The animal had the first dorsal fin and the distal parts of the pectoral fins amputated but the second dorsal fin, the anal fin, the caudal fin and the pelvic fins were normally conformed (Figure 1).

The specimen was identified as *C. taurus* due to its gray back, with small dark spots irregularly distributed, the same size of the base of the two dorsal fins and the anal fin besides the position of the first dorsal fin that was located far behind the pectoral fins and just ahead to the origin of pelvic fins (Figure 1) (VOOREN *et al.*, 2003).

DISCUSSION

Several evidences indicate that the animal under analysis was finned before being released after the first catch. The bases of the three lacking fins were normally positioned when the pictures were compared with the descriptions made by BIGELOW and SCHROEDER (1948). Besides, congenital deformities in sharks involving the lack of more than one fin were not reported in the literature (SAÏDI *et al.*, 2006). The neat linear shape of the cuts and the similar state of healing of all three cuts are evidence of the fact that each fin had been removed by one single cut and that the three fins had been cut off in rapid succession, probably with a knife (Figure 1).

This removal of the fins is in accordance with the standard manner of harvesting shark fins as described by ROSE (1998). In Brazil, shark fins are a valuable fishery product landed and sold separately, usually by the crew. Finning of all sharks occurs along catch sorting and evisceration

of the stocked catch (VOOREN *et al.*, 2003). In *C. taurus*, as shown by BIGELOW and SCHROEDER (1948), the size of the lower lobe of the caudal fin and of the second dorsal, pelvic and anal fins are similar to that of the first dorsal fin. The

conclusion is that this individual of *C. taurus* had previously been caught, had its pectoral fins and first dorsal fin harvested, was subsequently discarded alive at sea and had survived until its recapture on July 27th, 2009.

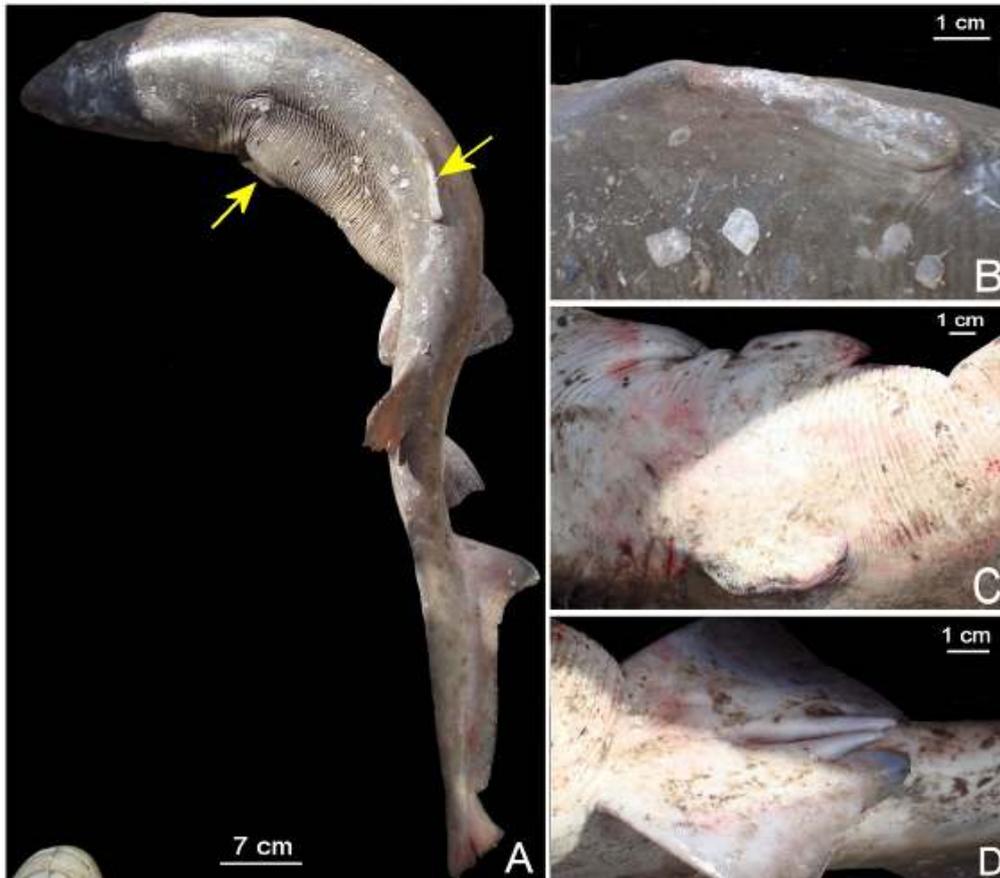


Figure 1. A: The partially finned neonate of the sand tiger shark *Carcharias taurus* on its recapture on July 27th, 2009 in southern Brazil. Yellow arrows indicate the mutilated fins. B: The first dorsal fin had been cut off at its base. C: The pectoral fins had been cut off at their bases. D: The pelvic fins and the claspers of the partially finned neonate. Photograph by Luis Gustavo Cardoso

The total length of full-term embryos and neonates of *C. taurus* from South Africa, southern Brazil and the Atlantic coast of the USA varies between 89 and 100 cm (BIGELOW and SCHROEDER, 1948; BASS *et al.*, 1975; GILMORE, 1993; VOOREN *et al.*, 2005). It was inferred that the 100 cm long *C. taurus* - that was recaptured - was first caught shortly after its birth.

C. taurus embryonic development is characterized for stages of nutrition from yolk supplies, embryophagy, oophagy and a pre-

parturition metabolic stage. In the last nourishment stage and immediately after hatching *C. taurus* embryos digests consumed yolk that is packed in the stomach (GILMORE *et al.*, 2005). Off southern Brazil, an 89 cm long neonate of *C. taurus* was caught by bottom trawl on November 2nd, 1992 at 2 km from the shore. In that trawl catch, there was no adult female that could have aborted a full-term embryo during capture. The neonate of *C. taurus* was classified as just born because its stomach was full of thick liquid (Figure 2) which was identified as fresh

undigested yolk because of its creamy consistency and its uniform pale greenish yellow color, similar to that of the yolk in the ova and the embryonic yolk sac of *C. taurus* (GILMORE *et al.*, 2005; VOOREN *et al.*, 2005). The presence of yolk in the

stomach of the November 1992 neonate is a confirmation of the hypothesis stated by BASS *et al.* (1975) and SPRINGER (1948), that the young of *C. taurus* are born with yolk in the stomach for an initial food supply after birth.

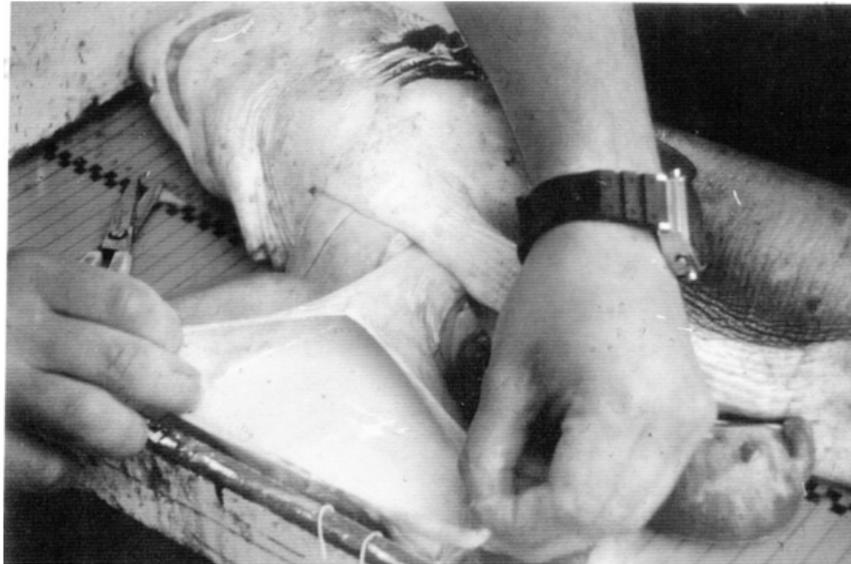


Figure 2. The open stomach of a neonate of the sand tiger shark *Carcharias taurus*, with a view of the yolk mass in it. Southern Brazil, 2 November 1992. Photograph by Carolus Maria Vooren

Off the Atlantic coast of the USA, parturition of *C. taurus* takes place from February to April, *i.e.*, from northern winter to early spring (GILMORE *et al.*, 2005). Full-term embryos of *C. taurus* were recorded in July 1972 off South Africa (BASS *et al.*, 1975). Whereas one neonate was caught off southern Brazil on November 1992, there is an evidence that parturition of *C. taurus* takes place in winter and early spring in the South Atlantic, as well as in the North Atlantic.

In view of the aforementioned parturition season of *C. taurus* in the South Atlantic, it is inferred that the finned neonate that was captured on July 27th, 2009 had probably been born earlier in that same month. On July 27th, the healing of the finning cuts appeared to be in progress (Figure 1). Thus, the finned neonate had remained at liberty during two or three weeks. In free-swimming sharks such as *C. taurus*, the pectoral fins are the apparatus used for generating lift and for rapidly controlling the speed and the direction of swimming (VIDELER, 1993). Therefore, with the loss of the pectoral fins, the shark loses the agility that it needs for the successful pursuit of

small fishes, which are the main food of *C. taurus* (BIGELOW and SCHROEDER, 1948). It is likely that during its few weeks at liberty the finned neonate had survived only because of the yolk reserve with which it was born. If the shark had not been recaptured and killed, it would have died from starvation after exhausting its neonatal yolk reserve.

In Rio Grande do Sul state, where the finned neonate of *C. taurus* was recaptured and where it presumably had been finned, *C. taurus* has the legal status of an endangered species since 2002; it means that fishing and selling this species are prohibited (VOOREN and KLIPPEL, 2005a). The landing of shark carcasses with fins has been enforced to prevent landings of protected species since 1998 (IBAMA, 1998). There are well-established morphological criteria for the identification of carcasses (VOOREN *et al.*, 2003). However, the routine identification of shark fins is difficult. It explains why a neonate of *C. taurus* was finned in Rio Grande do Sul in 2009 in spite of the legal status of this species. The finning of a legally protected species highlights the need

for measures that encourage the landing of shark carcasses with its attached fins, as recommended by MUSICK *et al.* (2000) and VOOREN and KLIPPEL (2005b), so that the law that protects endangered shark species may be more easily enforced.

REFERENCES

- BASS, A. J.; D'AUBREY, J.D.; KISTNASAMY, N. 1975 Sharks of the east coast of Southern Africa. IV. The families Odontaspidae, Scapanorhynchidae, Isuridae, Cetrhinidae, Alopiidae, Orectolobidae and Rhinodontidae. *Investigational Report, Durban*, 39: 1-103.
- BIGELOW, H.B. and SCHROEDER, W.C. 1948 Sharks. *Memoir Sears Foundation for Marine Research*, New Haven USA, 1: 59-576.
- CAMHI, M.; FOWLER, S.L.; MUSICK, J.A.; BRÄUTIGAM, A.; FORDHAM, S.V. 1998 Sharks and their Relatives - Ecology and Conservation. IUCN/SSC Shark Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. iv + 39 pp.
- CHIARAMONTE, G.; DOMINGO, A.; SOTO, J. 2007 *Carcharias taurus* (Southwest Atlantic Subpopulation). In: IUCN 2009. IUCN Red List of Threatened Species. Version 2009.1.
- GALINA A.B. 2006 A distribuição espacial e a composição das capturas de elasmobrânquios pela frota de emalhe de Passo de Torres - SC, na costa sul do Brasil, no verão de 2004/2005. Rio Grande, 66p. (Dissertação de Mestrado em Ocenografia Biológica, FURG).
- GILMORE, R.G. 1993 Reproductive biology of lamnoid sharks. *Environmental Biology of Fishes*, Dordrecht, 38: 95-114.
- GILMORE, R.G.; PUTZ, O.; DODRILL, J.W. 2005 Oophagy, intrauterine cannibalism and reproductive strategy in Lamnoid sharks. In: HAMLETT, W.C. (Ed.) *Reproductive biology of Chondrichthyes*. Science Publishers, Inc. Enfield (NH), USA. p.435-462
- IBAMA 1998 Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. Portaria nº 121, de 24 de Agosto. Disponível em: <http://ibama2.ibama.gov.br/cnia2/renima/cnia/lema/lema_texto/IBAMA/PT0121-240898.PDF> Acesso em: 15 out. 2010.
- IBAMA/CEPERG 2009 Desembarque de pescado no Rio Grande do Sul: 2008. Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis; Centro de Pesquisa e Gestão dos Recursos Pesqueiros Lagunares e Estuarinos; Projeto Estatística Pesqueira. Rio Grande. 45p.
- MUSICK, J.A.; BURGESS, G.; CAILLIET, G.; CAMHI, M.; FORDHAM, S. 2000. Management of sharks and their relatives (Elasmobranchii). *Fisheries*, Bethesda USA, 25(3): 9-13.
- ROSE, D. 1998 *Shark fisheries and trade in the Americas*, Volume 1: North America. Washington: TRAFFIC North America. 143p.
- SPRINGER, S. 1948 Oviphagous Embryos of the Sand Shark, *Carcharias taurus*. *Copeia*, Lawrence, 3: 153-157
- SAÏDI, B.; BRADA, M.N.; MAROUANI, S.; GUÉLORGET, O.; CAPAPÉ C. 2006 Atypical characteristics of an albino embryo of *Carcharhinus plumbeus* (Chondrichthyes: Carcharhinidae) from the Gulf of Gabès (southern Tunisia, Mediterranean). *Acta Adriatica*, Split, Croatia, 47(2): 167-174.
- VIDELER, J.J. 1993 *Fish swimming*. New York: Chapman & Hall. 254p.
- VILCOX, D.; DOVE, B.; MACDAVID, D.; GREER, D. 2002 Image Tool for Windows version 3.0. The University of Texas Health Science Center in San Antonio.
- VOOREN, C.M.; NAVES, L.C.; ROMAY, A.F.L. 2003 Guia para a identificação de tubarões e raias em desembarques da pesca no Rio Grande do Sul. *Documentos Técnicos de Oceanografia*, Rio Grande, 12: 1-54.
- VOOREN, C.M.; KLIPPEL, S.; GALINA, A.B. 2005 Os elasmobrânquios das águas costeiras da Plataforma Sul. In: VOOREN, C.M. and KLIPPEL, S. (Eds.) *Ações para a conservação de tubarões e raias no sul do Brasil*. Igaré. Porto Alegre, Cap. 7. p.113-120.
- VOOREN, C.M. and KLIPPEL, S. 2005a Ações para a conservação de tubarões e raias na

Plataforma Sul. In: VOOREN, C.M. and KLIPPEL, S. (Eds.) *Ações para a conservação de tubarões e raias no sul do Brasil*. Porto Alegre: Igaré. Cap. 14. p.229-246

VOOREN, C.M. and KLIPPEL, S. 2005b Diretrizes para a conservação de espécies ameaçadas de elasmobrânquios. In: VOOREN, C.M. and KLIPPEL, S. (Eds.) *Ações para a conservação de tubarões e raias no sul do Brasil*. Igaré: Porto Alegre. Cap. 13. p.213-228.