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# Inter-annual resighting of a southern right whale (*Eubalaena australis*) in Brazilian waters.

Authors:

Paulo A.C. Flores<sup>1,2</sup>; José T. Palazzo Jr.<sup>1</sup>; Karina R. Groch<sup>1,3</sup> and Paulo H. Ott<sup>4,5,6</sup>

Affiliations and addresses:

<sup>1</sup> International Wildlife Coalition / Brasil, P.O. Box 5087, Florianópolis, SC, 88040-970, Brasil.

<sup>2</sup> Laboratório de Dinâmica Populacional, Pós-Graduação em Zoologia, PUCRS, Av. Ipiranga 6681, prédio 12, sala 254, Porto Alegre, RS, 90619-900, Brasil.

<sup>3</sup> PPG Biologia Animal, Universidade Federal do Rio Grande do Sul, Prédio 12105, Sala 325, Paulo Gama s/nº, Porto Alegre, RS, 90040-060, Brasil.

<sup>4</sup> Grupo de Estudos de Mamíferos Aquáticos do Rio Grande do Sul (GEMARS). R. Felipe Neri, 382/203, Porto Alegre, RS, 90440-150, Brasil.

<sup>5</sup> Centro de Estudos Costeiros Limnológicos e Marinhos da Universidade Federal do Rio Grande do Sul (CECLIMAR/UFRGS). Av. Tramandai, 976, Praia do Imbé, RS, 95625-000, Brasil.

<sup>6</sup> PPG Genética e Biologia Molecular, UFRGS, P.O. Box 15053, Porto Alegre, RS, 91501-970, Brasil.

## **ABSTRACT**

Individual photo-identification studies of southern right whales (*Eubalaena australis*) during their nursing season have been undertaken along the southern Brazilian coast from fixed-wing aircraft from 1987 to 1994, and 1997. Photo-identification data were also obtained from a small inflatable boat from 1995 to 1998 and from helicopter in

1998. Surveys had unequal area coverage and photographic effort over the years. The present catalogue includes 85 right whales identified based on natural marks. Although three adult females (mother/calf pairs) photographed off Laguna, Santa Catarina (~ 28°29'S, 48°45'W), Brazil, were matched with previously photographed individuals from Península Valdés, Argentina (~ 42°30'S, 63°30'W) (Best, 1993), there have been no reported inter-annual resighting within Brazilian waters. An adult female accompanied by a calf photographed in Santa Catarina in 1995 was resighted in 1998 with another calf within the same stretch of coast (27°52'-28°31'S). During the 1995 season the mother/calf pair was sighted on six occasions within a 20km range from September to October. In 1998 the mother and calf pair were sighted four times in an interval of 39 days from August to September, along 70km of coast. This represents the first resighting of a southern right whale along the Brazilian coast and indicates that at least some females in this area could present the same three year return and calving interval reported for other Southern Hemisphere calving grounds (*e.g.* Argentina and South Africa).

KEY WORDS: SOUTHERN RIGHT WHALE, *EUBALAENA AUSTRALIS*, DISTRIBUTION, SURVEY - COMBINED, SOUTHERN BRAZIL.

## INTRODUCTION

Southern right whales (*Eubalaena australis*) were heavily depleted off Brazil by whaling, from New England and USA fleets in the 18<sup>th</sup> and 19<sup>th</sup> centuries (Du Pasquier 1986 and Townsend 1935) and by coastal whaling stations which operated along the coast of Santa Catarina starting in the late 18<sup>th</sup> century (Ellis 1969; International Wildlife Coalition/Brasil 1999; Palazzo and Carter 1983). Despite the international ban on the capture of this species in 1935, coastal whaling continued until 1973 (Ellis 1969; International Wildlife Coalition/Brasil 1999; Palazzo and Carter 1983). Illegal Russian fleets also hunted right whales off Brazil until 1972 (Center for Russian Environmental Policy 1996, Tormosov *et al.* 1998).

The current distribution of southern right whales in Brazilian waters is from southern Rio Grande do Sul state (~ 33°45'S) to the Abrolhos Bank, Bahia state (~15° 54'S to 19°35'S), during the species calving and nursing period from May to December (International Wildlife Coalition/Brasil 1999; Lodi *et al.* 1996; Pinedo and Castello 1979, Santos *et al.* 2001). The main aggregation areas are waters of Santa Catarina state particularly the central-southern coast from Santa Catarina Island (~27° 30'S) to Santa Marta Cape (~28° 36'S) (Fig. 1). Peak abundance of

right whales in these waters is from August to October (Groch 2000; Palazzo and Flores 1996; Simões-Lopes *et al.* 1992).

Research efforts to assess the surviving southern right whale population off Santa Catarina began in 1982, when the Brazilian calving grounds there were found to be still in use by the species (Câmara and Palazzo 1986). Since then, surveys have been carried out on a seasonal basis and field data relayed to the proper management authorities, in order to develop adequate protective measures (International Wildlife Coalition/Brasil 1999).

Best *et al.* (1993) reported matches of adult females of southern right whales between Santa Catarina off Laguna (~ 28°29'S, 48°45'W), Brazil, with previously photographed individuals from Península Valdés, Argentina (~ 42°30'S, 63°30'W). However, until recently no inter-annual resightings of individual right whales within Brazilian waters were recorded. Here we report the first such resighting and comment on residence period, range movements and calving interval of the species in southern Brazil.

## **METHODS**

Aerial surveys and photo-identification of southern right whales were conducted along the Rio Grande do Sul and Santa Catarina coast from fixed-wing aircraft during August and September in 1987, 1988, 1990 (Simões-Lopes *et al.* 1992), 1992 to 1994, and 1997. Starting in 1998, a helicopter has been employed for the aerial surveys. Survey effort varied over the years in both number of flights and the extent of area covered. In 1987, 1988 and 1997 the surveys were made from northern Santa Catarina Coast (~26°12'S) to central Rio Grande do Sul (~29°55'S), while from 1992 to 1994, and 1998 flights were restricted from Santa Catarina Island (~27°30'S) to Jaguaruna (~28°44'S) in Santa Catarina state (Fig. 1). At least two researchers were aboard the aircrafts each survey acting as observers or whale spotters; for each whale encountered one observer recorded data while the other took the photographs, except in 1997 when just one researcher took both responsibilities.

Both the fixed-winged aircraft and helicopter surveys followed the coastline at about 500m from shore and altitudes of approximately 300-400m. Once whales were located, the aircraft descend to about 100m whenever conditions allowed and photographs were collected. Photo-identification techniques followed the methods described by Payne *et al.* (1983) and Kraus *et al.* (1986). Additionally, from 1995 to 1998 photographs were taken from a 5.7m rigid-hull inflatable boat powered by a 25hp outboard engine during biopsy efforts. The photographic materials from both aerial and boat efforts are still under analysis.

Together with the boat base photo-identification efforts, starting in 1998, skin samples from free-ranging right whales have been collected using a crossbow and a biopsy dart similar to that described in detail by Brown *et al.* (1991). Tissue samples were stored in 100% ethanol while in the field and placed at  $-20^{\circ}\text{C}$  for long-term storage. Total genomic DNA was extracted from skin tissue using a SDS-NaCl-Ethanol method described by Medrano *et al.* (1990). The gender of the individuals was determined by amplification, using polymerase chain reaction, of homologous regions of the X and Y chromosomes (Zfx/Zfy) (Shaw *et al.* submitted).

## RESULTS AND DISCUSSION

As of 1998 the photo-identification catalogue comprises at least 85 individual right whales, including 61 adult females (Table 1). The preliminary photographic analysis resulted in one inter-year match within our catalogue (Fig. 2). An adult female with very distinctive marks, called "Queixinho", was photographed from boat accompanied by a male calf sexed by pictures of the genital region according to the methods in Payne *et al.* (1983) in Santa Catarina in 1995 (Fig. 2a) (Palazzo and Flores 1996). It was then resighted in 1998 with another male calf (molecular sex determination) within the same stretch of coast ( $\sim 27^{\circ}52'$  to  $28^{\circ}31'S$ ) both from boat (Fig. 2b and 2c) and aircraft (Fig. 2d). During the 1995 whale season the mother/calf pair was sighted on six different occasions within a period 30 days from September to October with a maximum movement range of 20km (Palazzo and Flores 1996). Three years later, this mother with the new calf was sighted four times in an interval of 39 days from August to September. This time the range of sightings extended along 70km of coast (Fig. 1).

The residency period of this adult female in Santa Catarina in both years (1995 and 1998) was smaller than those previously reported for other calving/breeding grounds of the species in the South Hemisphere. Rowntree *et al.* (in press) report a residence time for mother/calf pairs of 15 to 170 days off Argentina (mean 77 days). In Australia, residence periods for mother/calf pairs ranged from 89 days (Bannister 1990) to 118 days with a mean of 70.9 days (Burnell and Bryden 1997). However, the distances between first and last sightings of this adult female within seasons in Brazilian waters were similar to the average in Australia (90km) reported by Bannister (1990).

These data for Santa Catarina are preliminary and based on a single individual sighted in two different years and therefore further analysis is clearly needed to elucidate the residence period and movement patterns of southern right whales in Brazilian waters. Nonetheless, these data represent the first resighting of a southern right whale along the Brazilian coast and indicate that at least some females in this area present the same three year

return and calving interval as reported for Argentina (*e.g.* Payne 1986), South Africa (*e.g.* Best 1990) and Australia (Bannister 1990).

The increased effort from both boat and aerial surveys starting in 1999 as well as more detailed analysis of photographs taken in previous years are likely to increase the number of right whales resighted in waters off Santa Catarina and should provide valuable information for understanding the occurrence patterns of individuals in this area. Furthermore, the recent implementation of a biopsy sampling program will allow the genetic characterization of this population, and contribute to a better understanding of its relationship to other right whale populations in the Southern Hemisphere.

An important final note is that the sightings of this adult female accompanied by a calf in both years occurred within an Environmental Protection Area of Right Whales, a Federal sanctuary created in September 2000 covering 1,560km<sup>2</sup>, reaffirming the importance of this calving and nursing region for the conservation of the species in Brazilian waters.

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Table 1: Preliminary analysis of data on photo identification of right whales *Eubalaena australis* in southern Brazil from 1987 to 1998.

Year	Area surveyed	Platform	No. of whales photo-identified*
1987	Santa Catarina, Rio Grande do Sul	Fixed-winged Aircraft	20 (09)
1988	Santa Catarina, Rio Grande do Sul	Fixed-winged Aircraft	15 (08)
1992	Santa Catarina	Fixed-winged Aircraft	08 (10)
1994	Santa Catarina	Fixed-winged Aircraft	11 (06)
1997	Santa Catarina, Rio Grande do Sul	Fixed-winged Aircraft, Inflatable boat	10 (09)
1998	Santa Catarina	Helicopter, Inflatable boat	12 (12)
Total			85 (64)

\* The number between brackets refers to adult females.