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Southern right whale on the coast of Rio de Janeiro State, Brazil: conflict between conservation and human activity

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Between 1993 and 2005, 68 sightings of southern right whales were recorded along 400 km of coastline between Paraty Bay (23°13'S 44°42'W) and Macaé (22°22'S 41°47'W), Rio de Janeiro State, south-eastern Brazilian coast. Mother/calf pairs represented 66.1% of sightings. Only solitary individuals showed a distinct pattern of occurrence. Females with calf did not show a distinct pattern of occurrence suggesting their widespread distribution in the area. Analysis of the records and detailed accounts of the sightings of southern right whales reveal that there exist conflicts between the animals and human activities such as harassment and collision with boats during attempted rescues, accidental entanglement in fishing nets and intentional mortality, which may have a bearing in the conservation of the species in Brazilian waters.

INTRODUCTION

Sightings of the southern right whale (*Eubalaena australis*) have been reported along a 3845 km stretch of the Brazilian coast, extending from Forte Beach (12°35'S), (Baracho et al., 2002) to Hermenegildo (33°40'S) (Greig et al., 2001). They are mostly concentrated off the coast of Santa Catarina State (27°–28°S), a well recognized breeding area for *E. australis* in the western South Atlantic (Groch et al., 2005).

Historical references to *E. australis* in the State of Rio de Janeiro are rare. A 1785 painting entitled *Pesca da Baleia* by Leandro Joaquim, depicts scenes of whale hunting in Guanabara Bay. The species may not be fully identified but some distinct morphological characteristics resemble southern right whales. The historical presence of *E. australis* in Guanabara Bay was confirmed by Miranda-Ribeiro (1931), who described a cervical section found in excavations in the city area of Botafogo.

Lodi et al. (1996) and Santos et al. (2001) provided records of southern right whale sightings and strandings in the south-eastern Brazilian coastal area from 1936 to 2000. The aim of the present study is to up-date the information available on *E. australis* in the state of Rio de Janeiro.

MATERIALS AND METHODS

Individual reports of southern right whale sightings were gathered through opportunistic observations. Additional research was conducted in newspaper articles and television broadcasts which record sightings of *Eubalaena australis*. These records were validated through the analysis of their respective media archives.

Principal component analysis (PCA) was used to explore the distribution of southern right whale sightings in time and space. Records of solitary individuals and females with calf were separately grouped in months and regional areas of occurrence (South from 23°13'S 44°42'W to 23°02'S 43°41'W, Centre from 22°06'S 43°45'W to 22°57'S 43°04'W and North from 22°55'S 42°30'W to 22°22'S 41°47'W). Data were log transformed [y=log(x+1)] and then subjected to the PCA analysis.

RESULTS AND DISCUSSION

Between September 1993 and September 2005 (but excluding the years of 1994 and 1997), 68 sightings of southern right whales were recorded along 400 km of coastline between Paraty Bay and Macaé (Table 1). A significant number of sightings (75%) were reported from the year 2000 onwards and, of these, the majority (80.8%) were made during the months of July, August and September.

Mother/calf pairs represented 66.1% of sightings. The majority (68.7%) of sightings recorded in Arraial do Cabo were of single individuals (N=23). The largest numbers of single individuals registered were at the beginning of the migratory season (June to August: 78.2%) and at the end of the season (December: 17.3%).

Principal component analysis explained 100% of the data variability. The first axis explained 89% of the variance whereas the second axis explained the remaining 11% of the variance. A strong polarity between the northern and the southern and central areas was observed on the first axis. Southern and central areas were further separated in the second principal component. All solitary individuals occurred in the northern area regardless of their month of occurrence. Females with calf were half-way between the central and the northern and the southern and northern areas in June and July, respectively. In August and mostly in September, females with calf clustered in the southern area, and in October in the central area (Figure 1).

Only solitary individuals (probably males and/or young) showed a distinct pattern of occurrence. Females with calf

Table 1. *Monthly sightings of southern right whales, along the coast of Rio de Janeiro State by area. Sightings (N=68) occurred between 1993 and 2005 (percentages are shown in parentheses).*

Area/Year	June	July	August	September	October	December	Total
South Baía de Paraty (23°13'S 44°42'W) - Barra de Guaratiba (23°02'S 43°41'W) 1993–2003		2	7	6	1		16 (23.6)
Centre Recreio dos Bandeirantes (22°06'S 43°45'W) - Itaipuaçu (22°57'S 43°04'W) 1995–2004	2		4	4	3		13 (19.1)
North Saquarema (22°55'S 42°30'W) - Macaé (22°22´S 41°47´W) 1995–2005	3	14	15	3		4	39 (57.3)
Total	5 (7.4)	16 (23.5)	26 (38.2)	13 (19.1)	4 (5.9)	4 (5.9)	68 (100)

did not show a distinct pattern of occurrence suggesting their widespread distribution in the area; this may be important for conservation.

Analysis of the records and detailed accounts of the sightings of southern right whales reveal that there exist conflicts between the animals and human activities. Mother/calf pairs spend most of their time in areas in the surf zone. Such behaviour may give the false impression that the whales are stuck on sand banks and, in an attempt to help the animals, local people try to push them towards the open sea using boats and aircraft. Such actions place the animals at great risk of collision with boats. There were 27 instances in which whales were deliberately harassed by people, restraining their natural behaviour. This is a high frequency (59.2%) risk along the central coastal area of Rio de Janeiro because of the high human population density. Animals also are injured and often killed following entrapment in fishing nets (N=3).

On 16 January 2004, a juvenile whale of ~8 m in length became lodged on the Boqueirão Beach, Saquarema. The animal was finally rescued after four hours of effort and released in an apparently debilitated state. The following day, the animal was found dead, some 6 km north of Boqueirão Beach. The animal apparently died from multiple stab wounds inflicted by members of the local population who wanted to eat the meat. According to Kenney (2002), this calf was less than one year old and should not have been separated from its mother, who either abandoned her calf or died.

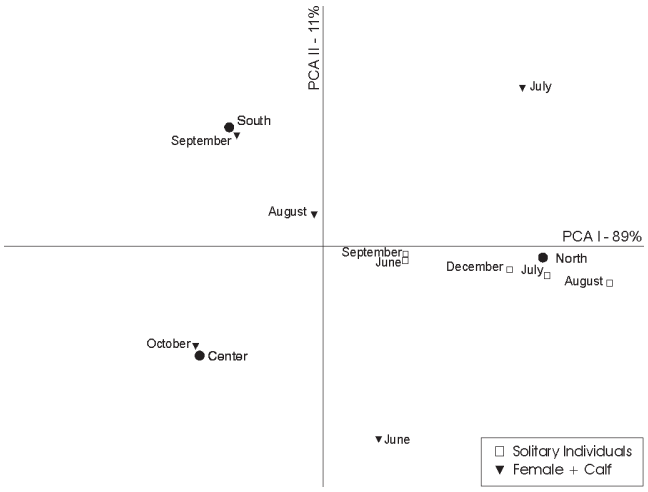

Figure 1. Factorial plan of the principal component analysis indicating the distribution of southern right whale sightings in time and space along the Rio de Janeiro coast.

The survival of southern right whales along the Brazilian coast is still threatened by many detrimental events similar to those described above. *Eubalaena australis* must still be considered as one of the most endangered cetacean species, being under constant anthropogenic pressure from entanglement in fishing nets, collision with boats, harassment by tourists, and from the overall coastal habitat degradation (Instituto Brasileiro do Meio Ambiente, 2001).

In contrast, it is estimated that the growth rate of the population of whales that utilize the south coast of the State of Santa Catarina is 30% per year (Groch et al., 2005). Thus, it might be expected that the population of *E. australis* could increase sufficiently to permit a gradual recovery on previously used habitats of the Brazilian coast in a similar manner to that reported for Argentina (Rowntree et al., 2001). However, it is likely that the risks imposed on this species from human activities will increase in the future, concomitant with an increase in population density in coastal areas.

Considering that the southern right whale is included in the National List of Endangered Brazilian Species (Portaria Instituto Brasileiro do Meio Ambiente no. 03, 27 May 2003), the present report demonstrates the urgent need to increase the knowledge and awareness of the local population regarding whale conservation in south-east Brazil. In order to avoid escalation of conflicts between human activities and conservation objectives especially considering the potential recuperation of the right whale population off the coast of Rio de Janeiro, it is vital to build a greater awareness and a positive attitude among local human populations.

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