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Analysis of residence patterns of Sperm whales (*Physeter macrocephalus*) in Azores islands using opportunistic data

E-36

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INTRODUCTION

Sperm Whales are known to have a very wide geographical range. This species tend to migrate periodically, returning to the same place over the years. They are one of the main targets of the Whale Watching operations in the Azores Islands.

The aim of this study is to analyse the residence patterns of Sperm Whales in two selected areas of the Azores islands.

METHODS

From 2005 to 2012 photographs from different opportunistic sources were pooled together in a common database catalogue developed by the MONICET project (www.monicet.net).

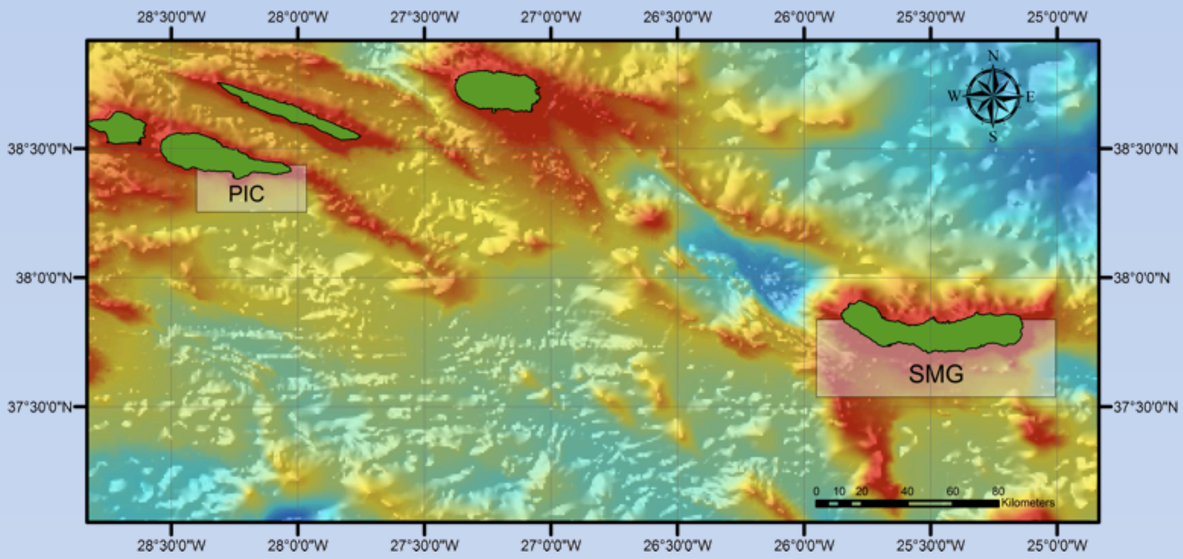

Figure 1. Map of the two selected areas for the study. PIC: Pico Island; SMG: São Miguel.

Animals were individually identified using photo-identification methods. Sighting and resighting rates were calculated to study temporal patterns.

Residence times were analysed by using SOCPROG 2.4 software (1). The Lagged Identification Rates (LIR) were plotted against time lag, and a series of population models were fitted. Moreover the population exchange rates between the two islands were estimated through the Transitions probabilities (TP). An extra outside area was included.

LIR: The probability that an individual that was identified in one area at time t, would be identified in the same area at time τ+t later.

TP: The probabilities than an individual, say, in area A moves to area B between sampling periods.

RESULTS

A total of 1133 photographs of 590 different individuals were obtained during the entire period of study. A relatively high number of individuals were resighted (Table 1) .

Table1. Sightings and resightings rates of Sperm Whales on São Miguel and Pico Island.

	N_T	Resighted >1 (%)	Resighted >5 (%)	Resighted >10 (%)
SMG	199	23,12	6,03	0,50
PIC	391	26,60	7,16	3,84

Table 2. Mean residence times (days) obtained from the best fitting population model. (*)Values with a very high Standard Error

	Population size	Residence time IN	Residence time OUT
SMG	30.86	14.13	44.82
PIC	19.94	4.12*	5.12*

Sperm whales seem to spend more time in SMG than in PIC (time IN), however they also spend more time outside the study area in SMG (time OUT) (Table2). Analysis showed very low probabilities of moving from Pico to São Miguel and vice versa. The data collected do not support a significant exchange of population between the two areas.

The continuous Increase of the number of new individuals with the number of identifications, suggest the existence of an open population, or, a larger population of which not all individuals are identified (Figure 2).

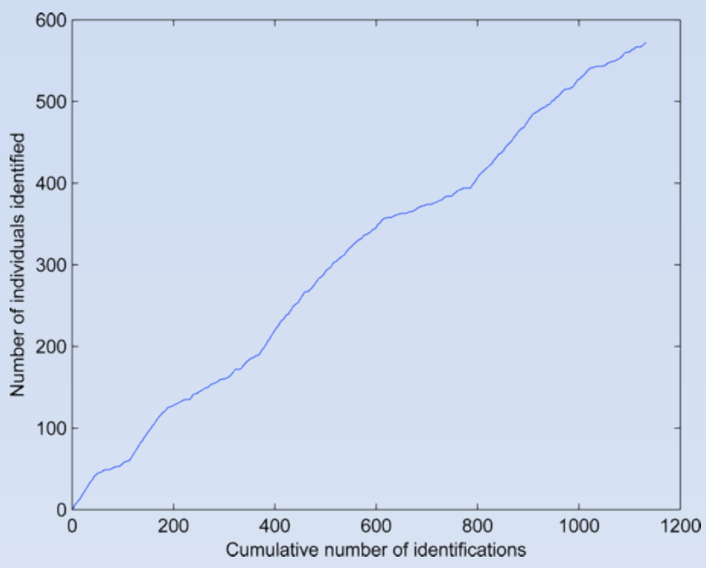

Figure 2. Discovery curve of new individuals. Total of the cumulative number of identifications plotted against the total number of individuals identified.

CONCLUSIONS

- **High resighting probability suggest site fidelity at a scale of tens of kilometers**
- **The study area used is only a small part of the species habitat**
- **To obtain more realistic results it is necessary a much larger database**
- **Sperm whales differ in their residence times in the two selected areas**

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ABSTRACT BOOK

27th CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

INTERDISCIPLINARY APPROACHES IN THE STUDY OF MARINE MAMMALS

8th-10th APRIL, SETÚBAL, PORTUGAL

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CONTENT

GENERAL

27th CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

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THEME

Interdisciplinary approaches in the study of marine mammals

Several centuries ago, when transoceanic travels and exploration were in their infancy, most oceans and water masses experienced a close to pristine situation characterized by an ecological equilibrium. Man itself was barely a part of the equation. Populations of predators and prey were relatively stable and fluctuated naturally. Natural disasters have occurred throughout history but until recently effects were more localised. Climate change also occurred but at a slower rate with gradual impacts. In the past exploitation of marine resources and their ecosystems increased in response to human needs, albeit rather limited by the available technology. However, with the advent of industrialization, and increased technical resources available to man, this has led to a change in equilibrium which was once favourable to the environment. Man is now capable of overfishing, causing direct changes in the environment at spatial and temporal scales never before imagined. As a consequence, the impacts of anthropogenic factors are now more frequent and intense, and have far exceeded the magnitude that the natural world was able to cope with by itself. Undoubtedly at present we are faced with new, diverse and unexpected challenges. Renewable energy is now being produced in the marine environment. There is an increased concern with the effects of climate change, the depletion of natural resources, the potentially irreversible transformation of ecological systems and the loss of traditional economic activities and associated human cultures. Therefore, mankind is now striving for solutions and alternatives. Combining ecological and biological subjects with emerging disciplines such as marine environmental history and historical marine ecology, culture and governance of the sea, marine biodiversity and its economy, it is possible to better understand the evolution of the marine environment as well as our relationship with this ecosystem. It is our expectation that building on innovative data collection and techniques in the context of interdisciplinary research and the application of integrated processes that build on established concepts and current trends, to inform future

prospects. The 27th ECS conference will promote informed insights and perceptions about how to shape a better future for marine mammals, and by extension, a better future for us all.

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Sperm whales are one of the main targets of the whale watching operations on the Azores archipelago. Observations made from commercial platforms, many of which collected in the context of the MONICET project, provide a low-cost and large dataset from which to study this species. The aim of this study is to analyze the residence patterns of sperm whales in selected areas of the Azores archipelago. Data was collected from 2005 to 2012 and comprises two different geographic areas (the islands of Pico Island and of Sao Miguel). A total of 1133 photographs were obtained from different opportunistic platforms and pooled together in a common database. Animals were individually identified using photo-identification methods. Residence times were analyzed by plotting lagged identification rates against time lag and fitting a series of population models implemented in Socprog 2.4 program. Selection of the best fitting models was determined using the lowest Quasi Akaike Information Criterion (QAIC) value. A total of 391 animals were identified in Pico (resighting rate of 27%) and 199 animals were identified in Sao Miguel (resighting rate of 23%). Some of the individuals have been resighted in both islands suggesting the existence of movements between islands. Preliminary results show that sperm whales spend 14.13 days around Sao Miguel Island and 4.12 days around Pico Island. Expected results will elucidate if there is a meaningful population exchange between islands.