

**CONTRIBUTIONS TO  
THE GLOBAL  
MANAGEMENT  
AND CONSERVATION OF**

**MARINE MAMMALS**



**INGRID NATASHA VISSER  
JORGE CAZENAVE  
(ORGANIZERS)**



**EDITORIA  
ARTEMIS  
2021**



**CONTRIBUTIONS TO  
THE GLOBAL  
MANAGEMENT  
AND CONSERVATION OF**

**MARINE MAMMALS**

**INGRID NATASHA VISSER  
JORGE CAZENAVE  
(ORGANIZERS)**



**EDITORIA  
ARTEMIS  
2021**



O conteúdo deste livro está licenciado sob uma Licença de Atribuição Creative Commons Atribuição-Não-Comercial NãoDerivativos 4.0 Internacional (CC BY-NC-ND 4.0). Direitos para esta edição cedidos à Editora Artemis pelos autores. Permitido o download da obra e o compartilhamento, desde que sejam atribuídos créditos aos autores, e sem a possibilidade de alterá-la de nenhuma forma ou utilizá-la para fins comerciais.

A responsabilidade pelo conteúdo dos artigos e seus dados, em sua forma, correção e confiabilidade é exclusiva dos autores. A Editora Artemis, em seu compromisso de manter e aperfeiçoar a qualidade e confiabilidade dos trabalhos que publica, conduz a avaliação cega pelos pares de todos manuscritos publicados, com base em critérios de neutralidade e imparcialidade acadêmica.

<b>Editora Chefe</b>	Prof. <sup>a</sup> Dr. <sup>a</sup> Antonella Carvalho de Oliveira
<b>Editora Executiva</b>	M. <sup>a</sup> Viviane Carvalho Mocellin
<b>Direção de Arte</b>	M. <sup>a</sup> Bruna Bejarano
<b>Diagramação</b>	Elisangela Abreu
<b>Organizadores</b>	Ingrid Natasha Visser Jorge Cazenave
<b>Imagem da Capa</b>	New Zealand orca, foraging for rays in close to the coastline. © Ingrid N. Visser / Orca Research Trust.
<b>Bibliotecário</b>	Maurício Amormino Júnior – CRB6/2422

#### Conselho Editorial

Prof. Dr. Adalberto de Paula Paranhos, Universidade Federal de Uberlândia  
Prof.<sup>a</sup> Dr.<sup>a</sup> Amanda Ramalho de Freitas Brito, Universidade Federal de Paraíba  
Prof.<sup>a</sup> Dr.<sup>a</sup> Ana Clara Monteverde, *Universidad de Buenos Aires*, Argentina  
Prof. Dr. Ángel Mujica Sánchez, *Universidad Nacional del Altiplano*, Peru  
Prof.<sup>a</sup> Dr.<sup>a</sup> Angela Ester Mallmann Centenaro, Universidade do Estado de Mato Grosso  
Prof.<sup>a</sup> Dr.<sup>a</sup> Begoña Blandón González, *Universidad de Sevilla*, Espanha.  
Prof.<sup>a</sup> Dr.<sup>a</sup> Carmen Pimentel, Universidade Federal Rural do Rio de Janeiro  
Prof.<sup>a</sup> Dr.<sup>a</sup> Catarina Castro, Universidade Nova de Lisboa, Portugal  
Prof.<sup>a</sup> Dr.<sup>a</sup> Cláudia Neves, Universidade Aberta de Portugal  
Prof. Dr. Cleberton Correia Santos, Universidade Federal da Grande Dourados  
Prof.<sup>a</sup> Dr.<sup>a</sup> Deuzimar Costa Serra, Universidade Estadual do Maranhão  
Prof.<sup>a</sup> Dr.<sup>a</sup> Eduarda Maria Rocha Teles de Castro Coelho, Universidade de Trás-os-Montes e Alto Douro, Portugal  
Prof. Dr. Eduardo Eugênio Spers, Universidade de São Paulo  
Prof. Dr. Eloi Martins Senhoras, Universidade Federal de Roraima  
Prof.<sup>a</sup> Dr.<sup>a</sup> Elvira Laura Hernández Carballedo, *Universidad Autónoma del Estado de Hidalgo*, México  
Prof.<sup>a</sup> Dr.<sup>a</sup> Emilas Darlene Carmen Lebus, *Universidad Nacional del Nordeste/ Universidad Tecnológica Nacional*, Argentina  
Prof.<sup>a</sup> Dr.<sup>a</sup> Erla Mariela Morales Morgado, *Universidad de Salamanca*, Espanha  
Prof. Dr. Ernesto Cristina, *Universidad de la República*, Uruguay  
Prof. Dr. Gabriel Díaz Cobos, *Universitat de Barcelona*, Espanha  
Prof. Dr. Geoffroy Roger Pointer Malpass, Universidade Federal do Triângulo Mineiro  
Prof. Dr. Gustavo Adolfo Juarez, *Universidad Nacional de Catamarca*, Argentina  
Prof.<sup>a</sup> Dr.<sup>a</sup> Iara Lúcia Tescarollo Dias, Universidade São Francisco  
Prof.<sup>a</sup> Dr.<sup>a</sup> Isabel del Rosario Chiyon Carrasco, *Universidad de Piura*, Peru  
Prof. Dr. Ivan Amaro, Universidade do Estado do Rio de Janeiro  
Prof. Dr. Iván Ramon Sánchez Soto, *Universidad del Bío-Bío*, Chile

Prof.ª Dr.ª Ivânia Maria Carneiro Vieira, Universidade Federal do Amazonas  
Prof. Me. Javier Antonio Alborno, *University of Miami and Miami Dade College*, USA  
Prof. Dr. Jesús Montero Martínez, *Universidad de Castilla - La Mancha*, Espanha  
Prof. Dr. Joaquim Júlio Almeida Júnior, UniFIMES - Centro Universitário de Mineiros  
Prof. Dr. Juan Carlos Mosquera Feijoo, *Universidad Politécnica de Madrid*, Espanha  
Prof. Dr. Juan Diego Parra Valencia, *Instituto Tecnológico Metropolitano de Medellín*, Colômbia  
Prof. Dr. Júlio César Ribeiro, Universidade Federal Rural do Rio de Janeiro  
Prof. Dr. Leinig Antonio Perazolli, Universidade Estadual Paulista  
Prof.ª Dr.ª Livia do Carmo, Universidade Federal de Goiás  
Prof.ª Dr.ª Luciane Spanhol Bordignon, Universidade de Passo Fundo  
Prof. Dr. Manuel Ramiro Rodriguez, *Universidad Santiago de Compostela*, Espanha  
Prof. Dr. Marcos Augusto de Lima Nobre, Universidade Estadual Paulista  
Prof. Dr. Marcos Vinicius Meiado, Universidade Federal de Sergipe  
Prof.ª Dr.ª Margarida Márcia Fernandes Lima, Universidade Federal de Ouro Preto  
Prof.ª Dr.ª Maria Aparecida José de Oliveira, Universidade Federal da Bahia  
Prof.ª Dr.ª Maria do Céu Caetano, Universidade Nova de Lisboa, Portugal  
Prof.ª Dr.ª Maria do Socorro Saraiva Pinheiro, Universidade Federal do Maranhão  
Prof.ª Dr.ª Maria Lúcia Pato, Instituto Politécnico de Viseu, Portugal  
Prof.ª Dr.ª Mauriceia Silva de Paula Vieira, Universidade Federal de Lavras  
Prof.ª Dr.ª Odara Horta Boscolo, Universidade Federal Fluminense  
Prof.ª Dr.ª Patrícia Vasconcelos Almeida, Universidade Federal de Lavras  
Prof.ª Dr.ª Paula Arcoverde Cavalcanti, Universidade do Estado da Bahia  
Prof. Dr. Rodrigo Marques de Almeida Guerra, Universidade Federal do Pará  
Prof. Dr. Sergio Bitencourt Araújo Barros, Universidade Federal do Piauí  
Prof. Dr. Sérgio Luiz do Amaral Moretti, Universidade Federal de Uberlândia  
Prof.ª Dr.ª Silvia Inés del Valle Navarro, *Universidad Nacional de Catamarca*, Argentina  
Prof.ª Dr.ª Teresa Cardoso, Universidade Aberta de Portugal  
Prof.ª Dr.ª Teresa Monteiro Seixas, Universidade do Porto, Portugal  
Prof. Dr. Turpo Gebera Osbaldo Washington, *Universidad Nacional de San Agustín de Arequipa*, Peru  
Prof. Dr. Valter Machado da Fonseca, Universidade Federal de Viçosa  
Prof.ª Dr.ª Vanessa Bordin Viera, Universidade Federal de Campina Grande  
Prof.ª Dr.ª Vera Lúcia Vasilévski dos Santos Araújo, Universidade Tecnológica Federal do Paraná  
Prof. Dr. Wilson Noé Garcés Aguilar, *Corporación Universitaria Autónoma del Cauca*, Colômbia

### Cataloging-In-Publication (CIP) (eDOC BRASIL)

C764 Contributions to the global management and conservation of marine mammals [ebook] / Organizers Ingrid Natasha, Visser Jorge Cazenave. – Curitiba, Brazil: Artemis, 2021.

Formato: PDF

System requirements: Adobe Acrobat Reader

Access mode: World Wide Web

Includes bibliography

ISBN 978-65-87396-28-6

DOI 10.37572/EdArt\_100321286

1. Marine mammals – Conservation. I. Natasha, Ingrid. II. Cazenave, Visser Jorge.

CDD 599.2

Prepared by **Maurício Amormino Júnior – CRB6/2422**



2021

## PREFACE

Contributions to the Global to Management and Conservation of Marine Mammals.

*I write the introduction to this book after just having returned from a day out researching wild orca along the New Zealand coastline. During that encounter I had the opportunity to not only see the orca hunting for rays in the shallow waters, but an adult male orca, known to me since he was born, became stranded as he followed his family over a sand bank. His calm demeanour was indicative to me that he had experienced such an event before. Whilst stranded, he patiently tested the water depth, and his ability to get off the sand bank, by gently rolling from side to side every 10 mins or so. During the time that he was stranded our team poured water over him in order to prevent his skin drying out. Eventually the tide had returned enough for him to focus all his energy into getting off and into deeper water. Within minutes of freeing himself he was back with his family and within an hour he was catching rays again. It struck me as I was watching him, that he was around 30 years old, older than I was when I started studying his family. The changes he had seen in his lifetime are changes that I've documented too. Encroachment into his habitat with new marinas, wharfs, reclamation and dredging. Exclusion from prime hunting area from all of these man-made features as well as aquaculture farms expanding so fast it is hard to document them all. He has seen the numbers of vessels increase exponentially and the volume of noise pollution expand with it. He has experienced raw sewage flowing around him when he has entered into harbours and he has swum past floating garbage and viewed sunken junk discarded in his home. He has seen members of his social network drown when entangled, die when stuck on a beach and suffer from severe wounds when hit by boats. It is a wonder he has survived as long as he has with all this and more that he must contend with. But, despite all these negative aspects, there is some hope; New Zealand now has more than 30 marine reserves (protected areas to prevent fishing and habitat destruction). Although they are comprised of only a tiny part of the entire coastline, they are a start. I also see a growing number of scientists, lawyers, researchers and field biologists interested in contributing towards conservation and management issues. My hope is that this volume will provide a platform for some of those studies to reach a wide audience and to make a difference for individual cetaceans, their populations and the habitats that they not only live in but require to survive. The book is arranged by author, rather than, species, region or topic as the first two categories ranged across multiple species and around the globe and yet at times also overlapped, whilst the topics were just as diverse.*

*Ingrid N. Visser (PhD), New Zealand*

In December 2019, the Society for Marine Mammalogy (SMM) and the European Cetacean Society (ECS) jointly hosted the World Marine Mammal Conference in Barcelona, Catalonia, Spain. That conference, the starting point for gathering the authors of this book, was the largest gathering of marine mammalogists that had ever occurred, with over 2,700 registered attendees, from more than 90 countries. It was only the second World Marine Mammal Conference, with the first being in 1998 in Monte Carlo, Monaco (and where approximately 1,200 people from 50 countries attended). With the Covid-19 pandemic now rampant across the globe it may be many years before such a similar gather occurs again. Regardless, the work of all those conference attendees will continue and this volume is just one of the many published works that are resulting from ongoing research.

## TABLE OF CONTENTS

### CHAPTER 1..... 1

ARGENTINEAN ORCA (*ORCINUS ORCA*) AS AN UMBRELLA SPECIES:  
CONSERVATION & MANAGEMENT BENEFITS

Juan Manuel Copello

Gabriela Bellazzi

Jorge Cazenave

Ingrid Natasha Visser

DOI 10.37572/EdArt\_1003212861

### CHAPTER 2 ..... 28

INCREASING THE UNDERSTANDING OF MULTISPECIES FEEDING EVENTS IN  
MARINE HOTSPOTS BY MEDIUM TERM INSTRUMENTATION AND TRACKING

Lars Kleivane

DOI 10.37572/EdArt\_1003212862

### CHAPTER 3 .....31

PARASITAS COMO ELEMENTOS INTEGRAIS DA BIOLOGIA DOS CETÁCEOS: O  
DIGÊNEO PHOLETER GASTROPHILUS COMO ESTUDO DE CASO

Claudia Pons Bordas

Natalia Fraija Fernández

Mercedes Fernández Martínez

Francisco Javier Aznar Avendaño

DOI 10.37572/EdArt\_1003212863

### CHAPTER 4 .....52

STRANDING MONITORING PROGRAMMES ON BRAZILIAN COAST: ANALYSIS OF  
REPORTS

Adriana Vieira de Miranda

Pedro Friedrich Fruet

Juan Pablo Torres-Florez

Glaucia Pereira de Sousa

Matheus Lopes Soares

Fábia de Oliveira Luna

DOI 10.37572/EdArt\_1003212864

**CHAPTER 5 ..... 59**

WILDLIFE CONSERVATION AND PUBLIC RELATIONS: THE GREENWASHING OF MARINE MAMMAL CAPTIVITY

Ingrid Natasha Visser  
Natalie Nicole Barefoot  
Matthew Volk Spiegl

DOI 10.37572/EdArt\_1003212865

**CHAPTER 6 .....102**

TRIALS AND TRIBULATIONS: THE CONSERVATION IMPLICATIONS OF AN ORCA SURVIVING A STRANDING AND BOAT STRIKE. A CASE STUDY.

Ingrid Natasha Visser  
Tracy E. Cooper  
Terry M. Hardie

DOI 10.37572/EdArt\_1003212866

**ABOUT THE ORGANIZERS ..... 149**

**INDEX .....150**



# CHAPTER 4

## STRANDING MONITORING PROGRAMMES ON BRAZILIAN COAST: ANALYSIS OF REPORTS

Submitted: 25/09/2020

Accepted: 11/11/2020

### Adriana Vieira de Miranda

Instituto Chico mendes de Conservação da Biodiversidade  
Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
<http://lattes.cnpq.br/8570962073392683>

### Pedro Friedrich Fruet

Instituto Chico mendes de Conservação da Biodiversidade  
Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
Kaosa, Rio Grande do Sul, Brazil  
<http://lattes.cnpq.br/0658064204638392>

### Juan Pablo Torres-Florez

Instituto Chico mendes de Conservação da Biodiversidade  
Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
<http://lattes.cnpq.br/6182246000004371>

### Glauca Pereira de Sousa

Instituto Chico mendes de Conservação da Biodiversidade  
Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
<http://lattes.cnpq.br/5499680365062445>

### Matheus Lopes Soares

Instituto Chico mendes de Conservação da Biodiversidade  
Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
<http://lattes.cnpq.br/6217373234368377>

### Fábía de Oliveira Luna

Instituto Chico mendes de Conservação da Biodiversidade - Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (ICMBio/CMA), Santos, São Paulo, Brazil  
<http://lattes.cnpq.br/8912525041395967>

**ABSTRACT:** The existence of a pre-salt oil region in Brazil, brought a major concern related to marine tetrapods threats, as it is a huge area where the number of boats has been increasing, besides seismic studies, underwater noise, oil spill, number of ports among others. As part of oil and gas licensing, government environmental agencies require the development of environmental programs, including stranding monitoring programmes (Projeto de Monitoramento de Praia-PMP) along the coast. The main goal of PMPs programmes is to collect data in order to evaluate the interference of hydrocarbons extraction on stranded marine tetrapods. Different institutions throughout the country were hired by Oil Companies to execute PMPs. Most of those institutions are members of the Brazilian National Stranding

Network (REMAB) coordinated by the National Aquatic Mammal Center (ICMBio/CMA) who analyze the reports. This paper aims to describe and show the analyses of PMPs reports from five geographical areas along the country (~3.388km) between Ceará and Santa Catarina States. From 2010 to 2017 PMPs institutions reported a total of 3658 stranded cetaceans, of which 2886 belong to species classified as threatened at the Brazilian List of Endangered Species. Besides remarkable spatial-temporal variation in mortality and the overall high number of stranded animals, the most immediate issue is the stranding of 1.396 Guiana dolphins (*Sotalia guianensis*) and 1.253 Franciscanas (*Pontoporia blainvillei*), classified respectively as EN and CR. Together, both species represented 92% of the total recorded mortality for threatened species analyzed. Stranding occurred throughout the year, with peaks during the months of August, September and December in the Northeast coast, and between June to October in the Southeast coast. The analysis provided an overview of marine mammal stranding information which can guide implementation of management and conservation actions.

**KEYWORDS:** Cetaceans, impact, industry, pre-salt, conservation actions.

## PROGRAMAS DE MONITORAMENTO DE PRAIA NA COSTA BRASILEIRA: ANÁLISES DOS RELATÓRIOS

**RESUMO:** A existência de uma grande região petrolífera do pré-sal no Brasil, trouxe uma grande preocupação relacionada às ameaças de tetrápodes marinhos, por se tratar de uma área onde o número de embarcações, estudos sísmicos, ruído subaquático, derramamento de óleo, número de portos entre outros aumentam pela atividade. Como parte do licenciamento de óleo e gás, as agências ambientais governamentais exigem o desenvolvimento de condicionantes ambientais, incluindo Projeto de Monitoramento de Praia-PMP ao longo da costa. O principal objetivo dos PMPs é coletar dados para avaliar possíveis impactos da extração de hidrocarbonetos em tetrápodes marinhos encalhados. Diferentes instituições em todo o país foram contratadas por empresas petrolíferas para executar PMPs. A maioria dessas instituições é integrante da Rede Nacional de Encalhes e Informação de Mamíferos Aquáticos do Brasil (REMAB) coordenada pelo Centro Mamíferos Aquáticos (ICMBio/CMA) que analisa os relatórios. Este trabalho tem como objetivo descrever e mostrar as análises de relatórios PMPs de cinco áreas geográficas ao longo do país (~3.388km) entre os estados do Ceará e Santa Catarina. De 2010 a 2017, as instituições que compõem os PMPs relataram um total de 3.658 cetáceos encalhados, dos quais 2.886 pertencem a espécies classificadas como ameaçadas na Lista Brasileira de Espécies Ameaçadas de Extinção. Além da notável variação espaço-temporal na mortalidade e o alto número de animais encalhados, o problema mais imediato é o encalhe de 1.396 botos-cinza (*Sotalia guianensis*) e 1.253 toninhas (*Pontoporia blainvillei*), classificados respectivamente como EN e CR. As duas espécies representaram 92% da mortalidade total registrada para as espécies ameaçadas analisadas. O encalhe ocorreu ao longo dos anos, com picos durante agosto, setembro e dezembro no litoral nordeste, e entre

junho a outubro no litoral sudeste. A análise forneceu uma visão geral das informações sobre encalhes de mamíferos marinhos, que podem orientar a implementação de ações para conservação.

**PALAVRAS-CHAVE:** Cetáceos, impacto, indústria, pré-sal, ações para conservação.

## INTRODUCTION

Marine mammals strandings occur worldwide due to natural and human-related factors (e.g. fisheries, oil exploration, mining, ports among others) providing invaluable data to infer key aspects of its ecology, like health status, mortality rates, regional occurrence and potential threats (CANTOR et al., 2020). Notwithstanding the real effect of those different activities are still unknown. The global increase in anthropogenic pressures on wildlife populations comes with a responsibility to manage them effectively (IJSELDIJK et al., 2020). However in order to understand these potential threats along time and space, monitoring programs should be carried-out, which can inform managers of the effectiveness of different actions and provides long-term trends to inform research (MACLEOD, et al. 2011).

In this sense, as part of Oil and Gas Licensing, the Brazilian government environmental agency requires the development of environmental programs, including tetrapods stranding monitoring programmes (Projeto de Monitoramento de Praia; PMPs). The main goal of PMPs is to collect data to evaluate the effects of hydrocarbons exploration on marine tetrapods. PMPs institutions generate an annual complete report with the information of the stranding monitoring. Thus, with the aim to analyze altogether the five geographical areas PMPs reports, the Instituto Chico Mendes para Conservação da Biodiversidade (ICMBio) created a working group, coordinated by the National Aquatic Mammal Center (CMA).

Within this manuscript, we aim to: i) show the results of the analyzes of the PMPs report working group, focusing on spatial and temporal threatened species strandings and ii) discuss the importance of monitoring stranding programmes working groups in order to provided information that can guide implementation for management and conservation actions.

## MATERIALS AND METHODS

Between the years of 2010 to 2017, PMPs reports from five different regions of Brazil were analyzed by CMA. PMPs covered around 3388 km of shoreline along the Brazilian coast from Ceará to Santa Catarina (Figure 1). The five different regions were covered by the following PMPs: i) BP - Monitoramento dos Encalhes de Biota Marinha em

Praias do Litoral Potiguar e Cearense; *ii*) PRMEA - Programa Regional de Monitoramento de Encalhes e Anormalidades na Área de Abrangência da Baía Sergipe – Alagoas; *iii*) BC-ES - Projeto de Monitoramento de Praias Baía de Campos e Espírito Santo; *iv*) BS-1 - Projeto de Monitoramento de Praias da Baía de Santos – fase 1; *v*) BS-2 - Projeto de Monitoramento de Praias da Baía de Santos – Fase 2 (Table 1).

CMA analyzes focussed mainly on the number of threatened cetacean species strandings (considering the Brazilian List of Endangered Species) and the region of strandings, with the aim to elaborate technical documents proposing actions that minimize the impacts and the mortality of the reported species.

Stranding data were gathered by different member institutions which most of them are members of the National Stranding Network (REMAB) coordinated by ICMBio/CMA.

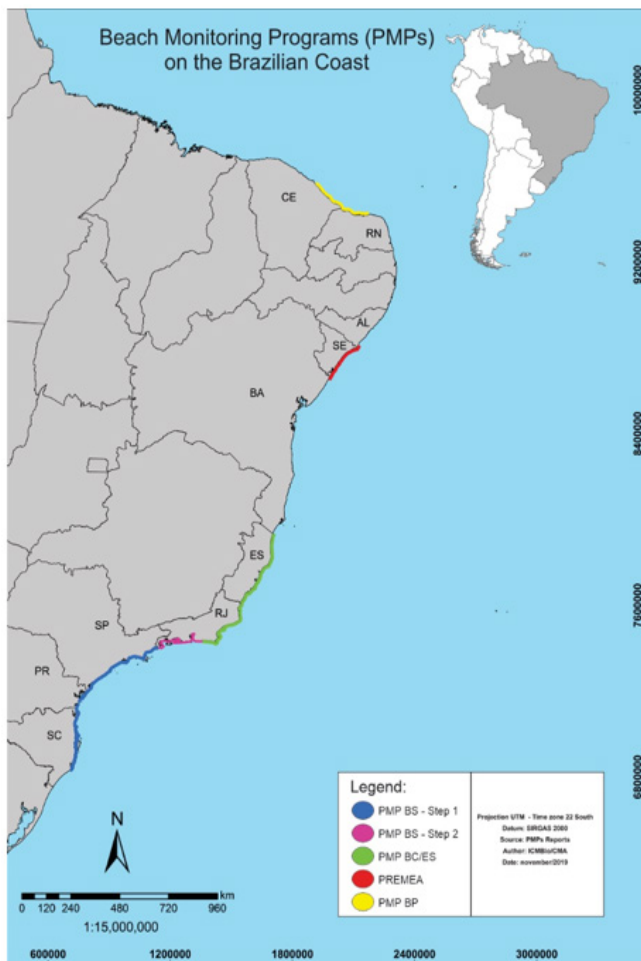


Figure 1. Coverage of the stranding monitoring program (PMPs programmes) in Brazil.

## RESULTS

A total of 3658 stranded marine mammals were reported for the five different areas (PMPs). Of those 3658, a total of 2.886 belong to seven different threatened species (Table 2). Among the high number of stranded animals, a huge concern arises after 1.396 Guiana Dolphin (*Sotalia guianensis*) and 1.253 Franciscana (*Pontoporia blainvillei*) individuals were recorded for the different PMPs (Table 2). Both species are classified as EN and CR in the Brazilian National List of Endangered Species, respectively (ICMBio/MMA, 2018).

The highest strandings numbers occurred during August, September and December along the Northeast coast (BP and PRMEA PMPs), and between June to October in the Southeast coast (BC/ES, BS-1, BS-2 PMPs).

Table 2. Number of stranded records of threatened cetacean species.

Species	CNL	BP	PRMEA	BC/ES	BS-2	BS-1	Total
<i>Balaenoptera physalus</i>	EN	0	0	0	0	1	1
<i>Eubalaena australis</i>	EN	0	0	1	0	3	4
<i>Megaptera novaeangliae</i>	NT	4	6	149	6	41	206
<i>Physeter macrocephalus</i>	VU	10	1	5	0	1	17
<i>Pontoporia blainvillei</i>	CR	0	0	180	5	1068	1,253
<i>Sotalia guianensis</i>	VU	212	68	657	66	393	1,396
<i>Trichechus manatus</i>	EN	9	0	0	0	0	9
<b>Total Geral</b>		<b>235</b>	<b>75</b>	<b>992</b>	<b>77</b>	<b>1507</b>	<b>2,886</b>

Table 3. Effort and regions for the different PMPs.

PMPs	Regions	Effort (km)	Period
<b>BP</b>	Caiçara do Norte/RN - Aquiraz/CE	325	2010-2017
	Sítio do Conde/BA - Pontal do		
<b>PRMEA</b>	Peba/AL	275	2010-2017
	Squarema/RJ - Conceição da		
<b>BC/ES</b>	Barra/ES	763	2010-2017
<b>BS-Step 2</b>	Paraty/RJ - Squarema/RJ	984.5	2016-2017
<b>BS-Step 1</b>	Laguna/SC - Ubatuba/SP	1,040.5	2015-2017

## DISCUSSION

Brazil has a remarkable stranding monitoring programme composed by the Brazilian stranding network (REMAB) and the different PMPs mentioned and reported here. These programmes are important as it allows the government to analyze anthropogenic impacts on marine mammals and develop actions to their conservation such as the Marine Cetaceans and Franciscana National Action Plans (Portaria ICMBio n° 655/375, 2018). Analysis data collected during a stranding monitoring program asked by the Brazilian government environmental agencies during the environmental licensing process, besides contributing to different conservation actions (e.g. National Action Plans), serves to subsidize government actions for new ventures within a conservation framework (e.g. technical notes).

In our analysis we identified Guiana and Franciscana dolphins as the species with the largest stranding records. This may be mainly due to different non-exclusive reasons: both are coastal species which certainly makes it more common to find it on the beaches, both faces different anthropogenic issues including pollution and accidental capture or negative interaction with fishing due to the cumulative impacts suffered by the species, oil and gas exploration, marine traffic among others.

Although marine mammal bycatch has been reported throughout the Guiana and Franciscan dolphin range, this threat has been poorly monitored and not well understood. Moreover, as mentioned before, other impacts could be affecting these species, however those are very difficult to identify and measure in a short term, but may be seriously affecting these animals in a long-term. Thus, the PMPs programmes can subsidize important information to better understand these different impacts and at some point identify how cumulative effects can explain this high number of strandings.

The next steps in the analysis of the PMP data will be to evaluate the existence or not of a relationship between the months with the highest strandings in relation to the areas with the highest fishing intensity.

## CONCLUSION

The data collected by PMPs are very important as they allow the monitoring of anthropogenic impacts on aquatic mammals, especially the long-term and cumulative impacts. Also this allows ICMBio/CMA to conduct analysis which increase the overview of marine mammals information and improve management and conservation actions to protect those species (Portaria ICMBio n° 655/375, 2018). This is one of the largest and long-term stranding monitoring programmes in the world. It is important that these

programs have continuity, as well as being extended to cover the entire Brazilian coast. This allows monitoring the various impacts to which aquatic mammals are subjected due to developments in the marine environment. It is also important that other activities that use the marine environment also carry-out stranding monitoring programmes.

## REFERENCES

Cantor, M., Barreto, A. S., Taufer, R. M., Giffoni, B., Castilho, P. V., Maranhão, A., ... & Domit, C. (2020). **High incidence of sea turtle stranding in the southwestern Atlantic Ocean**. ICES Journal of Marine Science, 77(5), 1864-1878.

Instituto Chico Mendes de Conservação da Biodiversidade – ICMBio. **Portaria ICMBio nº N° 655, de 4 de novembro de 2019**. Plano Nacional de Ação para Conservação de Toninha. Available in: [https://www.icmbio.gov.br/cepsul/images/stories/legislacao/Portaria/2010/p\\_icmbio\\_91\\_2010\\_pan\\_toninha.pdf](https://www.icmbio.gov.br/cepsul/images/stories/legislacao/Portaria/2010/p_icmbio_91_2010_pan_toninha.pdf).

ICMBio. **Portaria ICMBio nº N° 375, de 1º de agosto de 2019**. Plano Nacional de Ação para Conservação de Cetáceos Marinhos Ameaçados de Extinção. Available in: [https://www.icmbio.gov.br/cma/images/stories/Legislacao/Portarias/PORTARIA\\_Nº\\_375\\_DE\\_1º\\_DE\\_AGOSTO\\_DE\\_2019\\_-PORTARIA\\_Nº\\_375\\_DE\\_1º\\_DE\\_AGOSTO\\_DE\\_2019\\_-\\_DOU\\_-\\_Imprensa\\_Nacional.pdf](https://www.icmbio.gov.br/cma/images/stories/Legislacao/Portarias/PORTARIA_Nº_375_DE_1º_DE_AGOSTO_DE_2019_-PORTARIA_Nº_375_DE_1º_DE_AGOSTO_DE_2019_-_DOU_-_Imprensa_Nacional.pdf).

ICMBio, 2018. **Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume II – Mamíferos** / -- 1. ed. -- Brasília, DF : ICMBio/MMA, 2018. 7 v. : il. Available from: [https://www.icmbio.gov.br/portal/images/stories/comunicacao/publicacoes/publicacoes-diversas/livro\\_vermelho\\_2018\\_vol1.pdf](https://www.icmbio.gov.br/portal/images/stories/comunicacao/publicacoes/publicacoes-diversas/livro_vermelho_2018_vol1.pdf)

Ijsseldijk, L.L., ten Doeschate, M.T., Brownlow, A., Davison, N.J., Deaville, R., Galatius, A., Gilles, A., Haelters, J., Jepson, P.D., Keijl, G.O. and Kinze, C.C., 2020. **Spatiotemporal mortality and demographic trends in a small cetacean: Strandings to inform conservation management**. Biological Conservation, 249, p.108733.

MacLeod, R., Herzog, S.K., McCormick, A., Ewing, S.R., Bryce, R. and Evans, K.L., 2011. **Rapid monitoring of species abundance for biodiversity conservation: consistency and reliability of the MacKinnon lists technique**. Biological Conservation, 144(5), pp.1374-1381.

## ABOUT THE ORGANIZERS

### **Ingrid N. Visser**

Ingrid has had a passion for cetaceans since she was a child. She gained her first University degree, in Zoology, after having spent her teenage years sailing around the world. This was soon followed by a Masters degree also in Zoology. When she started her PhD in Environmental and Marine Science, with the topic of the New Zealand coastal orca, she founded the Orca Research Trust. That non-profit continues to this day and is the foundation for the data collected in Chapter 6. Her research has featured in a number of documentaries, for companies such as BBC, National Geographic, Discovery Channel. Ingrid has observed more than half of the worlds marine mammals and visited all seven continents in her quest to learn more about these fascinating animals. She has published more than 30 scientific articles, along with numerous popular-style articles for wildlife magazines and children's books and an autobiography. Since 2010 she has divided her time between working with wild cetaceans and advocating for those in captivity (see Chapter 5). As part of that work, Ingrid has observed 15 different species of cetaceans (plus other marine mammals; i.e., pinnipeds, sirenians, marine otters and polar bears), in 50 facilities around the world. She has appeared as an expert witness in Environmental and High Courts, as well as before Governments who are investigating the issues of keeping marine mammals in captivity. As part of her conservation work, she has founded (or co-founded) seven non-profit organisations, all with a focus on marine mammals, such as Punta Norte Orca Research (Chapter 1) and Whale Rescue (Chapter 6).

### **Jorge Cazenave**

Jorge started his professional career as a lawyer in Argentina, however after 10 years in this field he switched to tourism. He co-founded (and was President of) Agricultural Tour Operators International and was on the board of the National Tour Association, both whilst photographing wildlife. As an experienced naturalist, he currently guides guests to view and photograph wildlife around the world, specialising in apex predators such as puma, jaguar and orca. His expertise is sought after by documentary making companies such as the BBC, ZED and National Geographic. Since 2001, Jorge has been photographing the unique orca of Punta Norte on the remote Península Valdés, Argentina (see Chapter 1), who exhibit a range of unique behaviours including intentionally stranding to capture sea lion pups. His work with conservation extends to include collaboration with several projects in different regions of Argentina, including Punta Norte Orca Research, of which he is a board member.



## INDEX

### A

Ações para conservação 54

### B

Boat strike 12, 27, 79, 102, 103, 104, 106, 108, 111, 112, 113, 114, 115, 116, 118, 119, 126, 129, 130, 131, 133, 134, 135, 136, 137, 138, 142, 147

Branqueamento ecológico 60

### C

Captivity 17, 18, 27, 59, 61, 63, 65, 66, 67, 68, 70, 71, 73, 74, 81, 82, 84, 86, 90, 95, 97, 98, 99, 128, 133, 140, 145

Cativeiro 60

Cetaceans 12, 16, 17, 18, 24, 27, 32, 33, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 53, 57, 63, 71, 75, 81, 84, 85, 86, 97, 98, 99, 100, 102, 103, 104, 106, 115, 127, 132, 135, 138, 140, 141, 142, 144, 147, 148

Cetáceos 31, 53, 54, 58, 102

Colisión con barco 103

Conservación 1, 2, 102

Conservation 1, 3, 5, 8, 10, 11, 15, 18, 20, 21, 22, 23, 24, 25, 27, 33, 47, 51, 53, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 78, 79, 81, 82, 84, 85, 90, 91, 92, 93, 96, 97, 99, 100, 102, 104, 131, 137, 138, 143, 144, 145, 146, 147

Conservation actions 53, 54, 57

### E

Entertainment 59, 61, 62, 63, 69, 70, 73, 90, 96, 99, 101

Entretenimento 60

Especies paraguas 1, 2

### F

Filogeografía 31, 32

### G

Greenwashing 27, 59, 60, 61, 63, 69, 71, 84, 90, 100

## H

História de vida 31, 32

## I

Impact 1, 2, 5, 6, 12, 13, 14, 24, 25, 27, 32, 33, 34, 53, 55, 57, 58, 59, 65, 71, 85, 95, 97, 100, 106, 129, 135, 138, 140, 143

Impacto 2, 32, 53, 54

Impacto del turismo 2

Indústria 54, 60

Industry 18, 53, 59, 61, 62, 63, 71, 73, 79, 81, 82, 84, 91, 100, 139

Intervención 102, 103

Intervention 102, 106, 127, 128, 129, 131, 133, 134, 136, 137, 138, 140, 141, 145, 147

## K

Killer whale 1, 11, 23, 24, 25, 26, 27, 37, 38, 47, 51, 66, 68, 75, 91, 92, 98, 100, 102, 103, 104, 132, 143, 144, 145, 146, 147, 148

Killer whale (*Orcinus orca*) 1, 23, 26, 27, 144, 145, 147

## L

Life history 20, 25, 32, 33, 40, 46, 48, 146

## M

Microhabitat selection 32, 33, 42

## O

*Orcinus orca* 1, 22, 23, 24, 25, 26, 27, 65, 68, 96, 98, 102, 103, 143, 144, 145, 146, 147, 148

## P

Pathogenic potential 32, 44

Pholeter gastrophilus 31, 32, 33, 36, 37, 38, 39, 42, 44, 45, 46, 47, 48, 50

Photo-identification 1, 8, 11, 21, 143, 147

Phylogeography 32, 48

Potencial patogênico 32

Pré-sal 53, 54

Pre-salt 52, 53

## R

Reabilitação 60

Rehabilitation 59, 61, 63, 64, 65, 85, 87, 90, 91, 93, 98, 101, 127, 128, 132, 133, 136, 140, 146, 148

Rescue 18, 59, 61, 63, 64, 69, 71, 78, 91, 97, 102, 103, 106, 108, 111, 114, 116, 127, 131, 132, 133, 136, 137, 138, 140, 141, 142, 146

Resgate 60

## S

Seleção de microhabitat 31, 32

Stranding 5, 6, 8, 9, 11, 17, 20, 24, 26, 27, 46, 52, 53, 55, 56, 57, 58, 102, 103, 104, 106, 108, 114, 119, 122, 127, 128, 129, 131, 132, 133, 134, 136, 137, 140, 142, 144, 146, 147, 148

Supervivencia 103

Survival 11, 42, 65, 93, 96, 102, 104, 127, 131, 133, 135, 136, 137, 147

## T

Tourism impact 1

## U

Umbrella species 1, 6, 16, 143

## V

Varamiento 103



**EDITORA  
ARTEMIS**