INTO THE DEEP

30TH CONFERENCE OF THE
EUROPEAN CETACEAN SOCIETY

MADEIRA · 2016

14TH TO 16TH MARCH, FUNCHAL

INTO THE DEEP: RESEARCH AND CONSERVATION ON OCEANIC MARINE MAMMALS

CONFERENCE PROGRAMME

museudabaleia
CANIÇAL | MADEIRA

MACHICO
CÂMARA MUNICIPAL

EUROPEAN CETACEAN SOCIETY

Sperm whale photo: Luís Freitas©Museu da Baleia da Madeira

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European Cetacean Society - www.europeancetaceansociety.eu

ReliableOcenan - Associação

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Common dolphin photo: Ana Dinis© Museu da Baleia da Madeira

ACKNOWLEDGEMENTS

HOSTED BY:

The Madeira Whale Museum - an institution of Machico Municipality.

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ORGANIZATION

museu da baleia CANIÇAL MADEIRA

MACHICO CÂMARA MUNICIPAL

European Cetacean Society

INSTITUTIONAL SUPPORT

Região Autónoma da Madeira Governo Regional

Secretaria Regional do Ambiente e Recursos Naturais
Direção Regional do Ordenamento do Território e Ambiente

SRETC RETARIA REGIONAL DA ECONOMIA, TURISMO E CULTURA

DRC DIREÇÃO REGIONAL DA CULTURA

Região Autónoma da Madeira Governo Regional

Secretaria Regional de Educação

Região Autónoma da Madeira Governo Regional

Secretaria Regional de Agricultura e Pescas

Conservatório - Escola das Artes - Eng.º Luíz Peter Clode
Governo Regional da Madeira - Secretaria Regional de Educação e Cultura

IVBAM INSTITUTO DO VINHO, DO BORDADO E DO ARTESANATO DA MADEIRA, IP.

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DELTASOM Multimédia

20 YEARS ACCOBAMS conserving cetaceans 1996 - 2016

Electricidade da Madeira

VMT Madeira

Lobosonda Madeira Whale Watching

ventura NATURE EMOTIONS

rota dos cetáceos

GENERAL

THEME

Into the deep: research and conservation on oceanic marine mammals

The oceanic realm contains the habitats of most of the marine mammal species on the planet. Its vastness and dynamics mean that many top predators have evolved to be highly mobile, allowing them to follow their prey across great distances and to adapt to an environment in constant change. Some have also evolved to exploit the great ocean depths.

The sun fuels constant oceanographic and biological changes within a system that can be highly dynamic. Yet this apparently chaotic world holds discernible patterns that influence the biology of marine mammals, including the rhythms and limits of their biological cycles. The latitudinal and depth gradients, currents, gyres, upwelling areas, spring and autumn blooms and many other marine phenomena that repeat themselves in time and space, create a myriad of ecological niches that are exploited by marine mammals, ranging from the migratory great whales, through the deep diving sperm and beaked whales, to the wide ranging oceanic dolphins and the seals and polar bears of the pack ice.

In such vastness, oceanic islands and sea mounts are very important. They are obstacles to water mass movements, generating turbulence that in turn favours biological productivity. Marine mammals are attracted to these hotspots of productivity. Some even select islands as their permanent residence. The oceanic islands are also important because they allow access to these animals. The absence of a continental shelf means deep waters close to shore and thus easy access to these oceanic species, some of them deep divers, making the islands ideal places to study them.

Studying oceanic marine mammals remains an expensive and difficult task, only recently made easier by advances in technology. However, there are still financial, logistical and research difficulties to be overcome in order to have comprehensive knowledge of these species.

The sheer magnitude of the oceanic realm has been a strong barrier to the advance of knowledge about oceanic marine mammals but, up to recent times, it has also protected them. With the advent of modern navigation, the exploitation of marine resources, including offshore whaling, and access to remote areas in the ocean became possible. With it, came increasing oceanic marine traffic, underwater noise and human activities moved further and further offshore, and into the realm of all these species. These human activities have impacts on marine mammals, some of these localised and some diffuse, but all pose great challenges to their conservation. Even marine mammals in the most remote places suffer the consequences of human activities, for example, those caused by the ever growing litter produced on land and thrown to the sea and taken across the oceans thousands of miles from their sources by marine currents. Remoteness is no longer equivalent to protection for the offshore marine environments.

However, the management of human activities in offshore areas and the enforcement of measures to minimize their impact on the marine environment still face many constraints related to the vastness of the oceans, in spite of the recent technological developments such as, satellites, drones, underwater autonomous vehicles, among others. It is important to continue developing and implementing legal and management tools for the conservation and sustainable use of offshore areas.

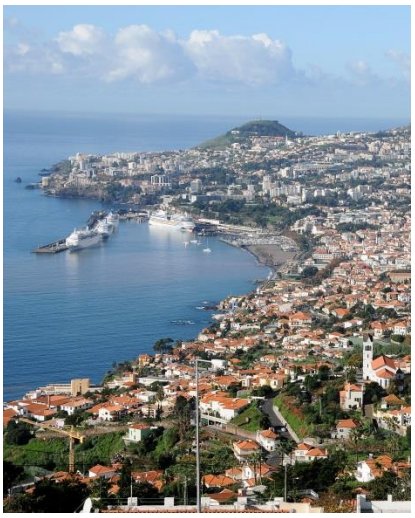
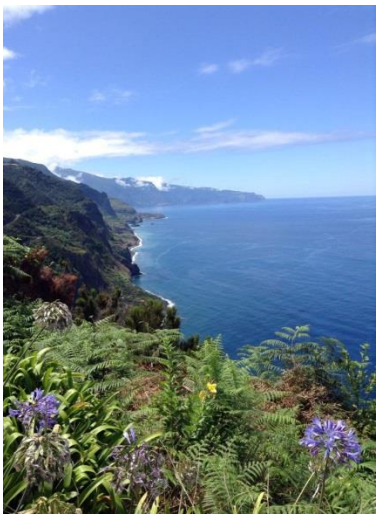
This year's annual conference – the thirtieth - of the European Cetacean Society has oceanic marine mammals as its focus and we shall review advances in both research and conservation relating to these animals with, entirely appropriately, an oceanic island as the scenic backdrop for this event.

Luís Freitas

Chair of the Conference Organising Committee

VENUE

The conference will take place in the *Centro de Congressos da Madeira* (the Madeira Congress Centre) (fig. 1). The Conference Centre, the adjacent Casino and the Pestana Casino Park Hotel are part of a complex conceived by the famous Brazilian architect Oscar Niemeyer who also planned Brazilia, now the capital of Brazil. The *Centro de Congressos da Madeira* is located in *Avenida do Infante*, 9004-513 Funchal, some seven minutes' walk from the City Centre, the capital of Madeira.

The *Centro de Congressos da Madeira* has very good facilities for events such as the European Cetacean Society Conference. The talks and short-talks of the conference will take place in the auditorium which has 628 seats and the posters will be displayed in the room on the ground floor where the coffee breaks will also be held.

GPS coordinates: N32.64502, W16.91632

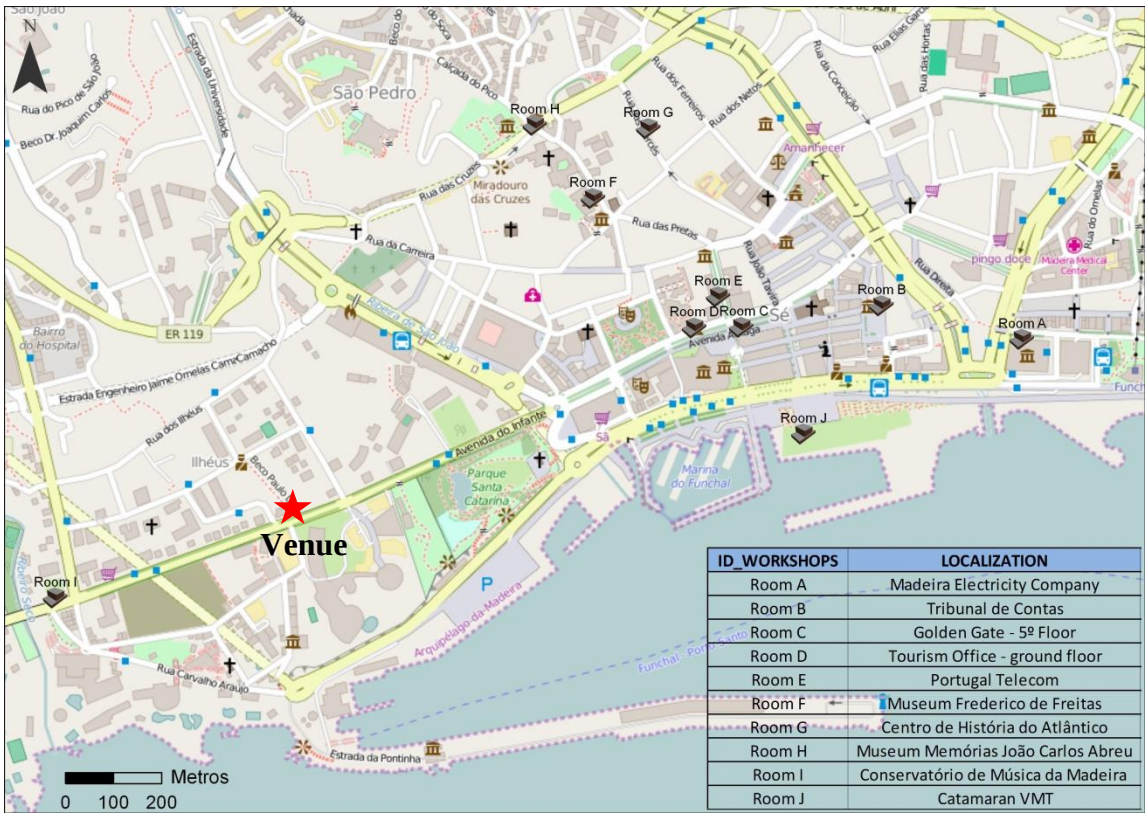

WORKSHOP LOCATIONS

Room A – Auditorium of "*Museu de Electricidade*" Madeira Electric Company (*Empresa de Electricidade da Madeira*).

From the Conference Centre: approx. 2 km or 18 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight all the way along *Avenida Arriaga* until you reach the cathedral, then you take the street on the left (*Rua do Aljube*) and you keep walking, cross the bridge over the river and you reach a small square ("Largo do Phelps"). Then you choose the street on the right (*Rua Fernão de Ornelas*) and you keep walking all the way until you cross another bridge over a river and reach Funchal market, then turn right and go down *Rua Brigadeiro Oudinot*, passing by two small streets on the right, and then you turn right to a broader street. You walk 50m and on your right there is the "***Museu da Electricidade***" where the auditorium is situated.

If you choose to go by taxi or private car the address is: **Museu de Electricidade, Rua Casa da Luz, nº 2, Funchal**

GPS coordinates: N32.64774, W16.90425



ID_WORKSHOPS	LOCALIZATION
Room A	Madeira Electricity Company
Room B	Tribunal de Contas
Room C	Golden Gate - 5º Floor
Room D	Tourism Office - ground floor
Room E	Portugal Telecom
Room F	Museum Frederico de Freitas
Room G	Centro de História do Atlântico
Room H	Museum Memórias João Carlos Abreu
Room I	Conservatório de Música da Madeira
Room J	Catamaran VMT

Fig. 1 – Location of the Venue and workshops' rooms.

Room B – Auditorium of *Tribunal de Contas* (Accounting Court House).

From the Conference Centre: approx. 1km or 12 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight all the way along *Avenida Arriaga* until you reach the cathedral, then you take the street on the right of the cathedral (*Rua da Sé*) and you keep walking straight until you reach a square – *Praça Colombo*. The auditorium is on the other side of the square at *Rua do Esmeraldo* in an old stone building.

If you choose to go by taxi or private car the address is: **Tribunal de Contas, Rua do Esmeraldo (Praça Colombo), nº 20-38, Funchal.** The streets in this area are closed to traffic so you will have to walk from a nearby street.

GPS coordinates: N32.64818, W16.90687

ID_WORKSHOPS	LOCALIZATION
Room A	Madeira Electricity Company
Room B	Tribunal de Contas
Room C	Golden Gate - 5º Floor
Room D	Tourism Office - ground floor
Room E	Portugal Telecom
Room F	Museum Frederico de Freitas
Room G	Centro de História do Atlântico
Room H	Museum Memórias João Carlos Abreu
Room I	Conservatório de Música da Madeira
Room J	Catamaran VMT

Reference Point

Sé - Cathedral of Funchal

Room C – Auditorium of Golden Gate Building – Regional Ministry of Agriculture and Fisheries (*Secretaria Regional da Agricultura e Pescas*).

From the Conference Centre: approx. 800m or 9 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight all the way along *Avenida Arriaga* until you reach the statue of *Gonçalves Zarco* in the middle of the boulevard. The auditorium is on the 5th floor of the building on the right. The entrance is a glass door next to corner cafe.

If you choose to go by taxi or private car the address is**: Edifício Golden Gate, Avenida Arriaga, nº 21, Funchal.** The boulevard is parcially closed to traffic so you will have to walk from nearby.

GPS coordinates: N32.64784, W16.90951

Room D – Auditorium InfoArt – Regional Ministry of Tourism, Transports and Culture (*Secretaria Regional do Turismo, Transportes e Cultura*).

From the Conference Centre: approx. 720 m or 8 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight through *Avenida Arriaga* on the left side walk passing by the Municipal Garden until you reach the auditorium, which is situated next to the Funchal tourism office.

If you choose to go by taxi or private car the address is: **InfoArt, posto de turismo do Funchal, Avenida Arriaga, nº 16, Funchal.**

GPS coordinates: N32.64784, W16.91036

Room E – Auditorium of Portugal Telecom

From the Conference Centre: approx. 840 m or 10 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight through *Avenida Arriaga* on the left side walk passing by the Municipal Garden and the tourism office until you reach *Avenida de Zarco* where you turn left. The auditorium is approximately 50m up *Avenida de Zarco* on the left side in the Portugal Telecom building.

If you choose to go by taxi or private car the address is**: Portugal Telecom, Avenida de Zarco, nº 7, Funchal.**

GPS coordinates: N32.6484, W16.90992

Room F – Auditorium of *Casa-Museu Frederico de Freitas* – Regional Ministry of Tourism, Transports and Culture (*Secretaria Regional do Turismo, Transportes e Cultura*)

From the Conference Centre: over 1 km or 15 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight through *Avenida Arriaga* on the left side walk passing by the Municipal Garden and the tourism office until you reach *Avenida de Zarco* where you turn left and go all the way up this avenue. At the top follow the narrower street at the continuation of the Avenue and turning sligthy left until you reach the Church of São Pedro. There you choose the street going on the left of the church and you walk for about 50m until you reach Casa-Museu Frederico de Freitas, which is on the left side of the street.

If you choose to go by taxi or private car the address is: **Casa-Museu Frederico de Freitas, Calçada de Santa Clara, nº 7, Funchal.**

GPS coordinates: N32.64993, W16.9122

Room G – Auditorium of *Centro de Estudos de História do Atlântico* – Regional Ministry of Tourism, Transports and Culture (*Secretaria Regional do Turismo, Transportes e Cultura*)

From the Conference Centre: over 1 km or 16 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight through *Avenida Arriaga* on the left side walk passing by the Municipal Garden and the tourism office until you reach *Avenida de Zarco* where you turn left and go all the way up this avenue. At the top follow the narrower street at the continuation of the Avenue and turning sligthy left until you reach the Church of São Pedro. There you turn right to *Rua dos Netos*, then you turn on the first left to *Rua do Castanheiro* and walk for about 70m until you reach Centro de Estudos de História do Atlântico that is on the right side of the street.

If you choose to go by taxi or private car the address is: **Centro de Estudos de História do Atlântico, Rua dos Ferreiros nº 165, Funchal.**

GPS coordinates: N32.65106, W16.91124

Room H – Auditorium of *Espaço de Memórias João Carlos Abreu* – Regional Ministry of Tourism, Transports and Culture (*Secretaria Regional do Turismo, Transportes e Cultura*)

From the Conference Centre: over 1 km or 20 minutes' walk. You walk down *Avenida do Infante*, go around the runabout and keep going straight through *Avenida Arriaga* on the left side walk passing by the Municipal Garden and the tourism office until you reach *Avenida de Zarco* where you turn left and go all the way up this avenue. At the top follow the narrower street at the continuation of the Avenue and turning sligthy left until you reach the Church of São Pedro. There you choose the street going on the left of the church going all the way up until the flatter area with a junction and the Conventry of Santa Clara on your left. You walk for about 50m until you reach Espaço de Memórias João Carlos Abreu, which is a grey house on the right side of the street.

If you choose to go by taxi or private car the address is: **Espaço de Memórias João Carlos Abreu, Calçada do Pico, nº 2-4 Funchal.**

GPS coordinates: N32.65111, W16.91336

Room I – Auditorium of *Conservatório - Escola de Artes – Eng. Luíz Peter Clode* – Regional Ministry of Education (*Secretaria Regional de Educação*)

From the Conference Centre: approx. 570m or 7 minutes' walk. You walk left in *Avenida do Infante*, until you reach a junction with traffic lights, then you turn right to *Avenida Luís Camões* and the entrance to Conservatório - Escola de Artes is 20m up the avenue on the left.

If you choose to go by taxi or private car the address is: **Conservatório - Escola de Artes – Eng. Luíz Peter Clode, Avenida Luís Camões, nº 1, Funchal.**

GPS coordinates: N32.6438, W16.92206

Room J – VMT catamaran

From the Conference Centre: aprox 800 meters or 10 minute walk. Follow the map to the Funchal Marina in Avenida do Mar, where you will find the VMT office. From there you will be directed to the catamaran where the workshop will take place.
Adress: Loja 09, Marina do Funchal
GPS coordinates: N32.646167, W16.910686

GENERAL INFORMATION

Funchal is the capital of the Madeiran Autonomous Region. This Portuguese volcanic archipelago is made up of two inhabited Islands, Madeira and Porto Santo, as well as the Desertas and Selvagens Islands, with both these sub-archipelagos classified as Nature Reserves.

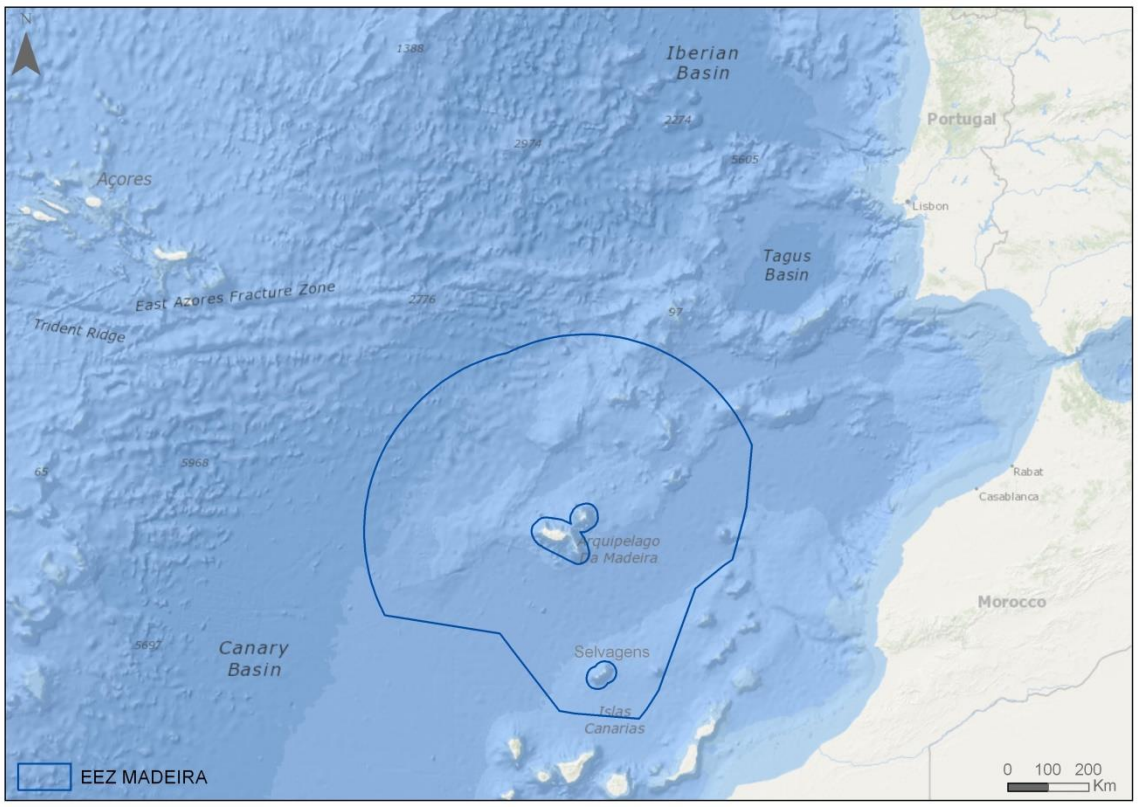


Fig. 2 - Location of Madeira archipelago in the Atlantic.

The Madeira archipelago has a sub-tropical climate, with mild weather most of the time. Funchal has mostly sunny days and the average temperature in March is 16ºC, with a maximum of 19ºC and a minimum of 13ºC. The sea water temperature is around 18ºC. Machico is another important town situated on the southeast coast of Madeira Island and the place where the discoverers of the archipelago first landed.

Madeira is the archipelago's main island with 255,000 inhabitants and tourism is its main economic activity. Tourists tend to mingle with the locals, who have a friendly and welcoming attitude towards them. Although the language spoken in Madeira is Portuguese, English is widely spoken by the Madeirans, especially the younger generation.

Madeira has a rich history going back to the epic Portuguese discoveries of Porto Santo and Madeira Islands in 1419. Testifying to its rich cultural heritage, there are numerous museums and monuments that can be visited. There are also many cultural activities in the Island, from music festivals, concerts, theatre plays and so on.

Madeira is also famous for its excellent access to many species of cetaceans and whaling took place here, between 1941 and 1981, using small open deck whaleboats. The sperm whale was the main target species and it was hunted using harpoons thrown by hand, like the old Yankee whalers.

The Madeira Whale Museum was established to preserve the memory of whaling in the Madeira archipelago, pay homage to the whalers and promote the study and conservation of cetaceans in Madeira waters. The organization of the permanent exhibition reflects and contextualizes the evolution of society's attitudes towards whales and dolphins, and by analogy to nature in general, and specifically in Madeira, where it went from an extractive and unsustainable activity to the conservation of cetaceans in general and their sustainable socio-economic use, through whale-watching and the activities of the Madeira Whale Museum.

Twenty eight cetacean species are recorded to Madeira archipelago waters. So this may be the opportunity to see some oceanic species that you have not seen before. There are several whale-watching companies operating from different localities such as Funchal, Calheta, Machico and Caniçal. Local legislation for whale-watching established a code of conduct for operators and limits the number of boats operating in order to contribute to the sustainability of the activity and the conservation and welfare of the animals being observed.

The Mediterranean Monk seal is another marine mammal you may also see. Once very common on the coast of Madeira, it was forced in recent centuries to find refuge from persecution and hunting in the Desertas Islands. One Madeiran town called "Câmara de Lobos", which in English means "Chamber of monk seals" is a testimony to this species' presence on Madeira Island. Protected in Madeira waters since 1986, its numbers have been recovering slowly from a minimum in the 1980s. Presently, the local population is estimated at around 40 animals, living mainly in the Desertas Islands. However, more and more animals are again using the coastal waters of Madeira Island and are sometimes seen from shore. The Mediterranean monk seal, locally called "lobo marinho", has become the symbol of nature conservation efforts in the archipelago as well as one of the symbols of the Autonomous Region by having two animals included in Madeira's Coat of Arms. Sea birds (e.g. Cory's and Manx shearwater) and marine turtles (mainly Loggerhead turtle) can also be seen.

There are plenty of things to do in Madeira before and after the conference. You can go up into the mountains and explore the high peaks or go deep into the laurel forest following the levadas (water irrigation channels that cross the island bringing water from the north to the south and from higher up in the mountains to the agriculture fields down closer by the sea). There are over 900 km of levadas and walking trails all over the island. Many of these levadas and trails pass by the Madeira Natural Park, an area that covers two thirds of Madeira Island. There is also trekking, canyoning, geocaching, mountain biking, trail running, climbing, sightseeing or golf, just to name a few activities.

But being an island the sea is always present and calling. You can enjoy the mild sea water temperature and its oceanic clear waters by going to one of the pebble natural beaches around the island. If you are more interested in action, sports and adventure then you find many different options, such as scuba diving, sailing,

windsurfing, surfing, stand up paddling, costering, boat rides or big game fishing. If you want to have a different perspective then we recommend you try hang-gliding or paragliding.

Porto Santo Island is only 2:30 hours away by ferry. With a small population of less than 5 000 people most of the year, it is a place of quietness, sea, nature and a beautiful long sandy beach.

The Desertas Islands are located 20 km Southeast of Madeira and can easily be seen from Funchal. Although they are a Nature Reserve with areas of restricted access, there are also areas that can be visited.

The Selvagens Islands are located 300 km South of Madeira and are an area of Integral Nature Reserve, with visits being allowed only under a special permit. They constitute a sanctuary for marine birds and many endangered species use them for nesting.

Madeira also has its distinctive gastronomy to offer - from Espetada to peixe-espada-preto, bolo do caco, lapas, sopa de trigo or fresh fish - you should try these different delicacies and see which best fits your taste. You should also, of course, taste the different types of eponymous Madeira wine and Poncha, which Madeira is also famous for.

To find more about Madeira:

www.visitmadeira.pt/en-gb/

www.museudabaleia.org/en/

USEFUL INFORMATION

IMPORTANT CONTACTS

Emergency number: 112

Civil Protection (Emergency services including Fire Brigades): 291 700 112

Conference organisation: +351 92 44 32 091 / +351 92 44 32 092

International telephone code for Portugal: +351

Hospital (Funchal): 291 705 600 (general) - 808 201 414 (emergency services information)

Police Forces: 291 208 400 (PSP)

Pharmacy closest to the venue: Farmácia Funchal – La Vie Shopping Center. Open from 7 a.m. to 12 p.m. Contact: 291 231 174

Taxi service: 291 795 149

Madeira Aeroport: 291 520 700

POSTERS

Posters can be set up on Sunday from 15:00 until 18:30. There will be a poster plan on the door of the poster room to help you locate your poster position. Presenting authors are asked to be by their posters during their designated poster session:

Monday 14th: Poster session 1 (**odd numbers**); Tuesday 15th: Poster session 2 (**even numbers**)

INTERNET

Free WIFI will be available at the **Conference** Centre main auditorium and poster room. Three desktop computers with internet connection will also be available to participants that may not have devices connected to the internet. It is **not possible to guarantee** internet connection in all the workshop rooms across Funchal City, but most will have it.

TRANSPORTS

Bus routes from Funchal centre passing by the Venue

1 Ponta da Laranjeira
2 Ponta da Cruz
3 Lombada - PIZO
4 Amparo
8 Sta. Quitéria (via barreiros)
9 Courelas
10 Chamorra
10A Chamorra (Barreira)
12 Jamboto (via Hospital)
14 Álamos
16 Pinheiro das Voltas
24 Papagaio Verde
44 Nazaré (via Virtudes)
45 Nazaré (via Barreiros)

Bus routes to Funchal centre passing by the Venue

1 Ponta da Laranjeira
2 Ponta da Cruz
4 Amparo

For more information regarding Bus routes, check www.horariosdofunchal,pt

ICEBREAKER

The icebreaker will be held at the Madeira Whale Museum (www.museudabaleia.org/en/) the institution in the archipelago dedicated to the study, conservation and education about cetaceans and the related marine environment and Host of Conference. The Icebreaker is kindly supported by "Agência de Promoção da Madeira" and ACCOBAMS, **in the celebration of the 20th and 30th anniversary of ACCOBAMS and ECS,** respectively.

Buses will leave the *Centro de Congressos da Madeira* at 19:00 to transport the participants to the Madeira Whale Museum. Transport to Funchal will be secured by the same buses starting to leave Caniçal at 22:00.

MADEIRA FROM THE SEA AT SUNSET, WHALE-WATCHING AND MADEIRA WINE TASTING

One of the main whale-watching operators in Madeira (VMT Madeira) is supporting the ECS Conference by offering a trip to each participant on a catamaran off Funchal. One trip is scheduled for Monday (14th March) at 19:00 to see the sunset at sea and is preferencially for the participants that are leaving Madeira before Tursday (17th March) morning.

For those who are staying longer a second trip for whale and dolphin watching will take place on Thursday morning (17th March; 09:30 – 12:30). The catamaran has a total capacity of 216 people.

There is also a Madeira Wine tasting event for those participants that are not interested in going out to sea on Monday or may do so on Thursday morning. Please, choose your option when you register at the conference onsite. Because of the limited number of places on Monday you may be requested to attend a particular event once the other one is full.

DINNER AND DANCING

The conference banquet will be at the Pestana Casino Park Hotel next to the Conference Centre, followed by dancing. If you did not buy a ticket online for the banquet and dancing, please do so by Monday morning (14th March) at the Conference help desk.

TIPS

LUNCH

Close to the venue, and just across the street, there are several coffeeshops with wonderful pasteries and in the street "Imperatriz D. Amélia" there are a few restaurants. With just a 10min walk you can reach the city center, where you will find many restaurants and coffeeshops. In the city center you can also find the "La Vie Shopping Center", where you can have a quick meal or go to the supermarket.

KEYNOTE SPEAKERS

Hal Whitehead is a University Research Professor in the Department of Biology at Dalhousie University. He holds a BA in Mathematics (1972), Diploma in Mathematical Statistics (1977), and PhD in Zoology (1981) from Cambridge University in England. His research focuses on social organization and cultural transmission in deep-water whales, but he also works on their ecology, population biology and conservation. His field work is mainly carried out in the North Atlantic (particularly off eastern Canada) and the South Pacific using a 12-m sailing boat. He has developed statistical tools and software for analyzing vertebrate social systems. Hal coedited "Cetacean Societies: Field Studies of Whales and Dolphins" (University of Chicago Press; 2000) and has written "Sperm Whales; Social Evolution in the Ocean" (University of Chicago Press, 2003), "Analyzing Animal Societies: Quantitative Methods for Vertebrate Social Analysis" (University of Chicago Press, 2008), and, with Luke Rendell, "The Cultural Lives of Whales and Dolphins" (University of Chicago Press, 2015). He received the Marsh Award for Marine and Freshwater Conservation, Zoological Society of London, in 2007.

Mónica Almeida e Silva (Portugal) is a Senior Research Associate at the Institute of Marine Research (IMAR), University of the Azores, and at the Marine and Environmental Sciences Centre (MARE), and a Guest Investigator at the Woods Hole Oceanographic Institution (WHOI). She obtained her BSc (Honours) in Biology from the University of Lisbon (Portugal) in 1996 and her PhD in Marine Biology from the University of St. Andrews (Scotland) in 2007. From the time of graduation until enrolling in her PhD, she worked on marine mammal strandings, diet and reproduction, and on the design of Marine Protected Areas (MPAs) at the Nature Conservation Institute (Portuguese Ministry of the Environment), served as Scientific Consultant for the International Union for the Conservation of Nature (IUCN) in Guinea Bissau, and was temporarily assigned to the University of the Azores to work as a Research Assistant. From 2007 to 2013 she was a Postdoctoral Research Fellow at the Centre of the Institute of Marine Research of the University of the Azores and at the WHOI. Her main research interests are on cetacean spatial and movement ecology, foraging and acoustic behavior, population dynamics, and on cetacean-fisheries interactions. She has more than 40 papers in peer-reviewed journals. Since 1999 she has been involved in a series of research projects aimed at supporting the application of the EU Habitats and Bird Directives in the Azores, including the designation of Special Areas of Conservation for cetaceans, the implementation of the Natura 2000 network, and the development of management plans for MPAs. She has also served as scientific advisor to the Regional Government of the Azores in the management and regulation of whale-watching activities. She is a member of the ICES Working Group on Marine Mammal Ecology and the OSPAR Commission Expert Group - Mammals and Reptiles. She is Vice-coordinator of the *Open Ocean and Deep Sea Research Group* of MARE and Member of the Direction Board of IMAR.

Robin Baird has been studying whales and dolphins since 1986, and received his Ph.D. on the foraging behavior and ecology of mammal-eating killer whales from Simon Fraser University in 1994. His post-doctoral work was at Dalhousie University in Halifax, Nova Scotia, with studies on northern bottlenose whales off Nova Scotia and killer whales in Iceland and British Columbia. Since 1999 his primary research focus has been a multi-species, multi-question study of toothed whales and dolphins in the Hawaiian archipelago, using photo-identification, genetic sampling, and short- and medium-term tagging to examine movements, behavior, population structure, diel patterns, abundance, and habitat use. Although most of his field work is in Hawai‘i he lives in Olympia, Washington, and works as a Research Biologist with Cascadia Research Collective, a non-profit research and education organization.

CONFERENCE PROGRAM

SATURDAY, 12TH MARCH 2016

WORKSHOPS

For the location of the workshop rooms please see map and directions on pages 9–12 or use the conference mobile application (ECS2016APP) for live orientation (this only works if you are connected to internet) or to consult offline the workshops's map. The buildings where the workshops will take place will be identified outside by conference roll ups/banners.

ECS student workshop – Where the wild things are

09:00 – 16:30 Venue: Catamaran of VMT-Madeira (**Room J**) at Funchal Marina and auditorium of *Centro de Estudos de História do Atlântico* **(Room H)**

Development of a conservation status surveillance system for monk seals

09:00 – 17:30 Venue: Auditorium Golden Gate **(Room C)**

Conserving Europe's cetaceans through synergy-building between the relevant legislative frameworks

09:30 – 17:40 Venue: Auditorium of the *Museu de Electricidade* **(Room A)**

Remote insular marine habitats: how important are these regions for oceanic cetacean populations

09:15 – 12:30 Venue: Auditorium of *Tribunal de Contas* **(Room B)**

Platforms of opportunity as research vehicles: benefits and limitations

14:15 – 17:30 Venue: Auditorium of *Tribunal de Contas* **(Room B)**

SUNDAY, 13TH MARCH 2016

WORKSHOPS

Control Exposure Experiments - Scientific Advisory Committee workshop

09:00 – 17:00 Venue: auditorium of *Centro de Estudos de História do Atlântico* **(Room G)**

The Joint Cetacean Protocol: lessons learned and looking to the future

09:30 – 17:00 Venue: auditorium InfoArt **(Room D)**

Integrating abundance and distribution information into the process for the identification of Important Marine Mammal Areas (IMMAs)

09:00 – 17:30 Venue: Auditorium of *Tribunal de Contas* **(Room B)**

Changing values, uses and practices regarding marine mammals: from the Iron Age to early modern and contemporary times

09:30 – 17:30 Venue: Auditorium of *Espaço de Memórias João Carlos Abreu* **(Room H)**

Marine Mammal Rescue

09:30 – 17:00 Venue: *Auditorium of Conservatório - Escola de Artes – Eng. Luíz Peter Clode* **(Rooms I)**

Developing tools to ensure high quality MMOs in the ACCOBAMS area

09:00 – 17:30 Venue: Auditorium at *Casa-Museu Frederico de Freitas* **(Room F)**

Threats to marine mammals in the Mediterranean Sea: how do they cope with human impact?

09:00 – 16:30 Venue: Auditorium Golden Gate **(Room C)**

What is new in cetacean pathology

09:30 – 18:00 Venue: *Auditorium of Conservatório - Escola de Artes – Eng. Luíz Peter Clode* **(Rooms I)**

4th workshop on communicating marine mammal science to the general public

09:00 – 18:00 Venue: auditorium of *Madeira Whale Museum*, Caniçal

REGISTRATION

15:00 – 19:00 – **Centro de Congressos da Madeira**

ICEBREAKER

19:00 – 23:00 **– Icebreaker at the Madeira Whale Museum, Caniçal**

Buses will leave the *Centro de Congressos da Madeira* at 19:00 to transport the participants to the Madeira Whale Museum at Caniçal where the Icebreaker will take place. Transport to Funchal will be secured by the same buses starting to leave Caniçal at 22:00.

MONDAY, 14TH MARCH 2016

REGISTRATION

08:00 - 09:00 – Registration/help desk of the *Centro de Congressos da Madeira*

OPENING

09:00 - 09:30 - Auditorium of the *Centro de Congressos da Madeira*

Please note: Only presenting authors are listed below

KEYNOTE SPEAKER

09:30 – 10:15 **Sperm whale societies of the Atlantic and Pacific: why so different?**

Prof. Hal Whitehead

ABUNDANCE AND DISTRIBUTION I

Chairperson: **Hal Whitehead**

10:15 – 10:30 Density dependent responses in Southern Right whales *Eubalaena australis* at Península Valdés, Argentina - **Enrique Crespo**

10:30 – 10:45 A generalized logistic regression model of the functional distribution of fin whales (*Balaenoptera physalus*) in Catalonian coasts - **Daniel Patón**

10:45 – 11:00 Connecting the dots between Critical Habitats for beaked whales in the deep ocean - **Laura Feyrer**

11:00 - 11:45 COFFEE BREAK

BEHAVIOUR

Chairperson: **Mario Acquarone**

11:45 – 12:00 Habitat use and activity patterns of landlocked Baltic Ringed seals - **Martin Silts**

12:00 – 12:15 Seeking companions: An analysis of cetacean mixed-species associations and co-occurrence in the eastern and central Pacific - **Mridula Srinivasan**

12:15 – 12:30 Sperm whales reduce foraging effort during exposure to 1-2 kHz sonar and killer whale sounds - **Saana Isojunno**

12:30 – 12:45 Humpback dolphins (*Sousa plumbea*) in south-eastern South African waters-where to from here - **Stephanie Ploen**

12:45 - 13:00 Next level fission fusion society: fin whales - **Christian Ramp**

13:00 - 14:15 LUNCH BREAK

SHORT-TALKS

14:15 – 15:15 ECOLOGY, BEHAVIOUR AND STRANDINGS

Chairperson: **Mark Simmonds**

- Photo-identification as a tool to monitor the critically endangered Mediterranean monk seal *Monachus monachus* in Greece - **Styliani Adamantopoulou**
- Behavioural observations on wild harbour porpoises (*Phocoena phocoena*) using drones - an innovative approach to marine mammal monitoring and behavioural analysis - **Daniela Prömper**

- Stranded minke whale (*Balaenoptera acutorostrata*) cases on Cape Cod, MA, USA from 1999-2014, with a review of pathology findings including ship strikes, entanglements and brucellosis - **Misty Niemeyer**
- Finding food in the ocean: could cetaceans use chemical cues? - **Bertrand Bouchard**
- Cytochrome P450 1A1 and 2B protein expression as biomarker for the first assessment of the ecotoxicological status of Cuvier's beaked (*Ziphius cavirostris*) in the NW Mediterranean Sea - **Matteo Baini**
- Preliminary ecotoxicological data on C type kille whale (*Orcinus orca*) from Terra Nova Bay (Antarctica): Molecular biomarkers and persistent organic contaminants - **Cristina Panti**
- "Weather or not?" An investigation into the effect of variations in oceanographic and meteorological conditions on cetacean strandings along the Irish coast - **Emer Keaveney**
- Studying the vertical distribution of small cetaceans and their prey in a tidal stream Demonstration Zone - **Gemma Veneruso**
- Causes of death of harbor porpoises (*Phocoena phocoena*) stranded on the northern French coastline (1995-2015) - **Thierry Jauniaux**

STRANDINGS AND ANATOMY

Chairperson: **Antonio Fernández**

15:15 – 15:30 CSI of the sea - investigating UK strandings over the last 25 years - **Robert Deaville**

15:30 – 15:45 Localization and characterization of the brain structures of the stress system in toothed whales - **Simona Sacchini**

15:45 - 16:00 Rescue response to long-finned pilot whale mass stranding events in the United Kingdom - **Stephen Marsh**

16:00 - 16:30 COFFEE BREAK

ACOUSTIC AND HUMAN INTERACTIONS

Chairperson: **Rui Prieto**

16:30 - 16:45 Signature whistles and group composition in resident bottlenose dolphins: can we link photo-id with emissions? - **Ana Rita Luís**

16:45 – 17:00 Responses of seals to mitigation signals revealed by at sea controlled exposure experiments - **Jonathan Gordon**

17:00 – 17:15 Conservation of killer whales in the Strait of Gibraltar requires ecosystem-based bluefin tuna fishery management - **Ruth Esteban**

17:15 – 17:30 Assessing the impact of underwater clearance of unexploded ordnance on harbour porpoises (*Phocoena phocoena*) in the Southern North Sea - **Alexander von Benda-Beckmann**

17:30 – 17:45 Ambient & vessel noise measurement and marine mammal monitoring in the Strait of Georgia, British-Columbia, Canada - **John Moloney**

POSTER SESSION 1 – odd numbers

17:45 - 19:15 – Poster room at *Centro de Congressos da Madeira*

MADEIRA AT SUNSET

19:00 - 20:45 – Sunset boat trip – see information about the event in USEFUL INFORMATION

19:30 – 20:30 – Madeira Wine Tasting – see information about the event in USEFUL INFORMATION

TUESDAY, 15TH MARCH 2016

KEYNOTE SPEAKER

09:00 – 09:45 **The ecological importance of open waters and oceanic islands for baleen whales**

Dra. Mónica Silva

ECOLOGY

Chairperson: **Mónica Silva**

09:45 –10:00 Niche diversification in deep-diving sperm, pilot and beaked whales - **Natacha Aguilar de Soto**

10:00 – 10:15 Ecological insights from long-term trends in cetacean stomach contents – **Andrew Brownlow**

10:15 – 10:30 The effect of changing environmental conditions on the distribution of fin whales (*Balaenoptera physalus*) in the Northeast Atlantic - **Anna Schleimer**

10:30 – 10:45 Stable isotope analysis reveals inter-specific and individual variation in migration strategies and wintering habitats in NE Atlantic blue, fin and sei whales - **Rui Prieto**

10:45 – 11:00 Results from chemical marker analyses question some of the currently accepted conservation units for Atlantic whale populations - **Morgana Vighi**

11:00 – 11:30 COFFEE BREAK

HUMAN INTERACTIONS

Chairperson: **Luís Freitas**

11:30 – 11:45 Use of AIS data for characterization of passenger vessel traffic in the Pelagos Sanctuary and assessment of impact risk - **Alessandro Bisson**

11:45 – 12:00 Assessing the ecological risk of anthropogenic noise pollution from maritime traffic on the Cuvier's beaked whale in the Genoa Canyon - **Frazer Coomber**

12:00 – 12:15 Dolphin depredation of bottom-set fishing nets in the Gulf of Corinth, Mediterranean Sea - **Silvia Bonizzoni**

12:15 – 12:30 The PlasticPelagos Project: microplastics, convergence areas and fin whales in the Pelagos Sanctuary (northwestern Mediterranean Sea) - **Maria Cristina Fossi**

12:30 – 12:45 Common dolphins, *Delphinus delphis*, and the Portuguese sardine purse-seine fishery: Interactions, feeding ecology and mitigation - **Ana Marçalo**

12:45 – 13:00 Predicting the effects of human developments on individual dolphins to understand potential long-term population consequences - **Enrico Pirotta**

13:00 – 14:15 LUNCH (short student AGM meeting in the conference room at 13:00)

SHORT-TALKS

14:15 – 15:15 ECOLOGY, ABUNDANCE, GENETIC AND ANATOMY

Chairperson: **Alexandros Frantzis**

- A genetic perspective of one of the smallest conservation units of bottlenose dolphin in Europe – the Sado population (Portugal) - **Inês Carvalho**
- Risso's dolphin (*Grampus griseus*) absolute abundance estimates using photographic mark-recapture methods in the northwestern part of the Pelagos Sanctuary, Mediterranean Sea - **Sabina Airoldi**
- Skull shapes of the Lissodelphininae: open ocean to nearshore - **Anders Galatius**

- Cetaceans distribution in the Macarronesia: from Portugal to Cape Verde - **Ana Mafalda Correia**
- Deep sea predators in Irish waters and their trophic relevance - **Gema Hernandez-Milian**
- Autonomous photo trap systems: new tool for the monk seal conservation in Madeira - **Rosa Pires**
- Using radiocarbon to study Southern hemisphere humpback whale feeding ecology and migration - **Pascale Eisenmann**
- Genomic insights into the origin, spread and pathogenicity of Influenza A virus in marine mammals - **Linnea Worsøe Køpke**

MODELLING

Chairperson: **Sophie Laran**

15:15 – 15:30 Data degradation: an approach to simulating rare species distribution models - **Auriane Virgili**

15:30 – 15:45 Using environmental envelopes to assess existing cetacean data collections and help prioritize survey effort at the basin scale - **Laura Mannocci**

15:45 - 16:00 Estimating proportion of occupied area in single - visit surveys of marine mammals - **Matthieu Authier**

16:00 -16:30 COFFEE BREAK

ABUNDANCE AND DISTRIBUTION II

Chairperson: **Phil Hammond**

16:30 - 16:45 Distribution, abundance and habitat use of bottlenose dolphin in the Madeira archipelago - **Luís Freitas**

16:45 – 17:00 Mediterranean Monk seal distribution in the Saharan coast (Mauritania/Morocco) - **Pablo Fernández de Larrinoa**

17:00 – 17:15 Using seismic data to study fin whales in offshore waters off southwest Portugal - **Andreia Pereira**

17:15 – 17:30 Model based humpback, fin whale and krill distribution – results of a snapshot study from the west Antarctic Peninsula - **Helena Herr**

17:30 – 17:45 The First REMMOA Program: A tropical tour of marine mammal biodiversity across three oceans - **Sophie Laran**

17:45 – 18:00 Observatory of the Mediterranean monk seal population of the Cabo Blanco Peninsula (Mauritania/Morocco). An important conservation tool - **Mercedes Muñoz Cañas**

FOR INFO

18:00 – 18:30

- Ship Strikes: How to Mitigate a Problem with Many Unknowns – **Fabian Ritter**
- Important Marine Mammal Areas (IMMAs): why do we need them? – **Micheal Tetley**
- Years of new learning from cetaceans in arctic norway - before the increased human presence – **Russel Baker and Mario Acquarone**

POSTER SESSION 2 – even numbers

18:30 - 20:00 - Poster room at *Centro de Congressos da Madeira*

VIDEO NIGHT

21:15 23:00 Video Night at *Centro de Congressos da Madeira*

23:00 - onwards - **Students party**

WEDNESDAY, 16TH MARCH 2016

KEYNOTE SPEAKER

09:00 – 09:45 **Oasis in a desert sea: island-associated populations of open-ocean odontocetes in the Hawaiian archipelago** - Dr. Robin Baird

CONSERVATION AND ENERGETICS

Chairperson: **Robin Baird**

09:45 - 10:00 The science and policy drivers leading to a mitigation zone for beaked whales along the Irish shelf edge - **Simon Berrow**
10:00 – 10:15 An evaluation of EU Habitats Directive criteria for a mobile cetacean in a small country - **Tina Centrih**
10:15 – 10:30 A critical assessment of research trajectories concerning climate change, with recommendations for future engagement - **Mark Simmonds**
10:30 – 10:45 Using management strategy evaluation to test the performance of a potential biological removal tier system - **Paula Moreno**
10:45 - 11:00 The benefit of being big: body rotations and acceleration over a 3000:1 mass range in cetaceans - **Lucia Martina Martin Lopez**
11:00 -11:30 COFFEE BREAK

GENETICS

Chairperson: **Inês Carvalho**

11:30 - 11:45 Reconstructing the post-glacial colonization of the northern extreme of the range of a top marine predator, the bottlenose dolphin - **Milaja Nykanen**
11:45 – 12:00 History of population fragmentation and collapse in the endangered Yangtze finless porpoise revealed by population genetics - **Yacine Ben Chehida**

SHORT-TALKS

12:00 – 13:00 CONSERVATION, HUMAN INTERACTIONS, ACOUSTICS AND HISTORY
Chairperson: **Cristina Brito**

- Harmonization of general and local approaches to effective conservation of critically endangered population of Baltic harbor porpoise (*Phocoena phocoena*) in Polish waters - **Iwona Pawliczka**
- Computing ship strike and near miss along main shipping lanes; results of a direct observation study in the Mediterranean Sea undertaken from 2007 to 2015 - **Antonella Arcangeli**
- A new equation to calculate the allometric inter-pulse interval to body length relationship in Mediterranean male sperm whales - **Nino Pierantonio**
- Risk assessment of port activities on cetaceans, a framework to analyse and reduce the impacts: case study on the Guiana dolphin in southern Brazil - **Tara Van Belleghem**
- Fishing's phantom menace: the impact of lost and discarded fishing gear on European cetaceans & pinnipeds - **Elizabeth Hogan**
- Estimates of grey seal predation mortality on three principal commercial demersal species in a mixed fishery and the implications for stock assessments - **Vanessa Trijoulet**
- Sperm whale codas can encode individuality as well as clan identity - **Cláudia Oliveira**
- Social and biological implications of medieval European whaling - **Youri van den Hurk**
- Spatio-temporal variation in click production rates of beaked whales: implications for passive acoustic density estimation - **Victoria Warren**

13:00 - 14:15 LUNCH BREAK

14:15 15:30 Workshop reports

15:30 - 16:45 **Annual General Meeting**

16:45 -17:15 COFFEE BREAK

17:15 - 18:15 **Awards & Closing**

- Student awards

- Video award

- Mandy McMath Conservation Award

CONFERENCE DINNER

20:00 – 22:00 – Hotel Pestana Casino Park

DANCING

22:00 – 01:00 – Hotel Pestana Casino Park

THURSDAY, 17TH MARCH 2016

WORKSHOPS

Marine mammals pathology: update of the necropsy protocol on dissection techniques and tissue sampling – Part II

10:00 – 17:30 Venue: Auditorium of Portugal Telecom **(Room E)**

WHALE-WATCHING

09:30 - 12:30 - **Whale-watching trip** - see information about the event in USEFUL INFORMATION

LIST OF POSTERS

THEMATICS

ABU – ABUNDANCE AND DISTRIBUTION

ANA – ANATOMY

BE - BEHAVIOUR

HI – HUMAN INTERACTIONS

MN – MONITORING

MO – MODELLING

NT – NEW TECHNIQUES

PH – PHOTO-IDENTIFICATION

STR – STRANDINGS

WW – WHALE-WATCHING

ABSTRACTS / KEYNOTE SPEAKERS

Sperm whales

photo: Filipe Alves© Museu da Baleia da Madeira

14th March, 09:30

Sperm whale societies of the Atlantic and Pacific: why so different?

Hal Whitehead, *Dalhousie University, Canada*

Studies at several locations have found substantial and consistent differences in social structure of female sperm whales between the eastern Pacific and North Atlantic Oceans, even though nuclear DNA shows no significant differentiation between the populations. In the Pacific, female sperm whales live in nearly-permanent social units which typically contain about 11 females and immatures of multiple unrelated matrilines. These units form temporary groups with other units for periods of days, apparently exclusively with other units from the same cultural clan. Clans contain thousands of females, are not distinct in nuclear DNA, but are sympatric and have distinctive culturally-determined vocalizations and movement patterns. In the North Atlantic social units rarely group with other units and there is little evidence for sympatric cultural clans. Possible drivers of these contrasts include oceanographic differences, predation, the effects of whaling, and culture. Protection against predation by killer whales may be the primary reason for grouping in the Pacific, and as killer whales do not seem such a threat in the Atlantic, social units there rarely form groups, and as clans primarily function to structure inter-unit interactions, they are less apparent in Atlantic waters.

Back to Program

15th March, 09:00

The role of oceanic island and seamount ecosystems to baleen whales

Mónica Silva, *MARE – Marine and Environmental Sciences Centre & IMAR – Institute of Marine Research, University of the Azores, Portugal*

There are over 20,000 oceanic islands and about 125,000 large seamounts in the world. While a small number of these features are formed from tectonic uplift of the seafloor, the vast majority are of volcanic origin. Thus, oceanic islands and seamounts are not randomly distributed across ocean basins but are associated with mid-ocean ridges and spreading centres, subduction zones, and intraplate hotspots. Oceanic islands and seamounts come in a range of shapes and sizes; they occur as chains or in clusters, or as isolated entities, located at varying distances from continental shelves. The geophysical properties of oceanic islands and seamounts, together with their hydrographic and biogeographic contexts, will affect their functional role and importance to baleen whales.

Oceanic island and seamount ecosystems may create increased feeding opportunities for baleen whales and assist in their navigation and orientation. These topographic structures interact with the atmospheric (islands) and oceanic (islands and seamounts) circulation, promoting a range of physical processes that may enhance and aggregate primary production or retain allochtonous productivity. In ocean areas where primary production is limited by iron availability, significant iron inputs from islands and seamounts may induce phytoplankton growth. Volcanic islands and seamounts have geomorphological, biological and oceanographic characteristics that differ from those of surrounding seafloors and open waters, potentially creating a series of acoustic, magnetic, chemical, thermal and visual cues that could be perceived by whales. Larger islands may offer sheltered habitat for whales to rest and conserve energy during their annual migrations across open oceans. Finally, oceanic islands in tropical and subtropical regions may provide suitable conditions for breeding and calving whales.

I review the function and potential role of oceanic islands and seamounts to baleen whales in the light of existing information on the biological, geological and oceanographic characteristics of these ecosystems, and of available knowledge on whale ecology. I will also identify knowledge gaps and suggest future research directions.

Back to Program

16th March, 09:00

Oasis in a desert sea: island-associated populations of open-ocean odontocetes in the Hawaiian archipelago

Robin W. Baird, *Cascadia Research Collective, USA*

The Hawaiian Islands sit within an oceanic desert, the oligotrophic waters of the central tropical Pacific. A slight increase in productivity around the islands and spatially predictable prey resources create an oasis within this desert. Long-term multi-species studies using a combination of association and movement analyses from photo-identification, genetic analyses of biopsy samples, and movement data from satellite tagging, have revealed that 11 of the 18 species of odontocetes in Hawai‘i have developed resident, island-associated populations. Results show that each of these 11 species differs in how they utilize the islands. For some, there is only a single insular population among the main Hawaiian Islands – melon-headed whales, false killer whales, dwarf sperm whales, Cuvier’s beaked whales, Blainville’s beaked whales – while for others there are multiple resident populations – short-finned pilot whales, pygmy killer whales, bottlenose dolphins, rough-toothed dolphins, spinner dolphins, pantropical spotted dolphins. Off Hawai‘i Island there are resident populations for 10 species, while off Kaua‘i there are resident populations for only 4 species. This presentation will describe the study approach and methods, and highlight some of the more interesting and recent findings as well as some of the conservation implications from this work.

Back to Program

ABSTRACTS / TALKS

Atlantic spotted dolphins photo: Cláudia Ribeiro© Museu da Baleia da Madeira

14th March, 10:15

Density dependent responses in Southern Right whales *Eubalaena australis* at Península Valdés, Argentina

Enrique Crespo[1], Susana Pedraza[2], Silvana Dans[1], Mariano Coscarella[1], Guillermo Svendsen[3], Mariana Degrati[1], Juan Pedraza[4], Adrián Schiavini[5]

(1) Marine Mammal Laboratory, Centro Nacional Patagónico, (CONICET) & University of Patagonia
(2) Instituto de Ciencias Polares, Ambientales y Recursos Naturales. (ICPA). Universidad Nacional de Tierra del Fuego, Antártida e Islas del Atlántico Sur (UNTDF) Onas 450. Tierra del Fuego, Antártida e Islas del Atlántico Sur
(3) Instituto de Biología Marina y Pesquera Alte. Storni & Escuela Superior de Ciencias Marinas (Universidad Nacional del Comahue) & CONICET
(4) Ciclo Básico Común - Universidad de Buenos Aires
(5) Ecología y Conservación de Vida Silvestre, Centro Austral de Investigaciones Científicas (CONICET)

This paper presents information on rate of increase (RI) and mortality rates (MR) for Southern Right Whales (SRW). 1) RI was estimated using GLM procedures based on data of number of individuals obtained in aerial surveys carried out from 1999 to 2015 in Peninsula Valdes (PV). Predictor variables were Year and Julian Day, using also Julian Day2. Response variables were: a) total number of whales; b) number of calves; c) number of solitary individuals and c) number of mating groups. The total population is increasing at 3.23% annually and the number of calves by 5.54%. RI declined from 6.22% (1999-2007) to 3.23 (1999-2014). Solitary Individual and Mating Groups are no longer growing, 2) the trend of MR was analysed trough time. Data of live and dead calves was obtained for the period 1971-1973, 1981-1982 and 2003-2014. The number of estimated calves born each year was obtained by means of a cumulative function developed from the GLM. It is clear that MR is variable among years. Maximum rates were observed in 2007, 2008 and 2009, being the highest rate in 2008 reaching almost 30% while minimum rates were as low as those observed in 2004 and 2014. The rates observed in the former years show the same pattern of variability with ranging 2-10%. Finally, the analysis of the information supports that the SRW south Atlantic stock is increasing in the nursing area around PV. Although the number of whales in the surveyed area is increasing, RI is steadily decreasing. Density has been also increasing and whales are expanding their distribution to deeper waters during the last decade. The analysis of the MR since the early 70´s shows an increase. All these facts together are coherent with a density-dependence response.

Back to Program

14th March, 10:30

A generalized logistic regression model of the functional distribution of fin whales (*Balaenoptera physalus*) in catalonian coasts

Daniel Patón[1], Natàlia Amigó[2], Margarita Junza[2], Cristina Martín[2], Eduard Degollada[2]

(1) University of Extremadura. Numerical Ecology Unit, Avda. Elvas s/n, Badajoz, Badajoz, 06071, Spain
(2) EDMAKTUB Association. C/ Manila 54, 08034, Barcelona, Spain

In the present study we have taken advantage of a generalized logistic regression model (GLM) to explain the functionality of the distribution of fin whales (*Balaenoptera physalus*) in Catalonian Coasts. The GLM is the best possible choice due to the need of fitting data of presence/absence (1/0) with a non-normal distribution of errors. The significant parameters of GLM model were Surface Sea Temperature (SST in Celsius degrees), Chlorophyll content (CL in mg/m3) and Bathymetry (BT in meters). The final model correlated the Probability of fin whales (PFW) with SST, CL and BT using the following equation:

PFW = -0.57*CL – 1.4*SST – 0.04*BT + 4.34*CL*SST + 0.03*CL*BT + 0.002*SST*BT + 16.42

A Receiver Operating Characteristic (ROC) curve was calculated to illustrate the performance of a binary classifier system as a function of the discrimination threshold. A value of 0.924 has been obtained for the C-index, a generalization of the area under the ROC curve (AUC), a parameter that measures the correlation between the predicted (continuous variable) and the observed presence (binary variable) of fin whales. Our model yields results in good agreement with observations based in the use of drones to investigate the feeding behavior of fin whales, likely using surface plankton as the main food in the area counteracting the seasonal eutrophication. Therefore, our methodological approach can be useful for the identification of the main factors that affect the seasonal distribution of fin whales in Catalonian Coasts.

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Connecting the dots between Critical Habitats for beaked whales in the deep ocean

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Within the deep ocean bathymetric features such as oceanic ridges, seamounts and submarine canyons are often used as indicators of important prey resources and therefore critical habitat for marine mammals. However, because of connectivity limitations, similar structural features are not always equivalent in terms of habitat use. Here we assess how scale influences the connectivity and habitat use of submarine canyons by Northern Bottlenose whales. The largest submarine canyon along the continental shelf of Atlantic Canada, the Gully, was designated marine protected area (MPA) in 2004 partly because it provided critical habitat for the endangered Scotian shelf population of Northern Bottlenose whales. There are however, two smaller canyons located 50 and 100km to the east of the Gully that are also designated as critical habitat for bottlenose whales - but are not MPAs. At this regional scale (100 kms), we know that individual whales from the Gully use all three canyons, however whale site fidelity among the canyons is not well understood. At a broader scale, the Scotian shelf population may travel to other lesser-known canyons located along the shelf edge off New England, Nova Scotia, Newfoundland and, possibly, Labrador. These peripheral canyons could provide critical habitat and could connect populations of bottlenose whales currently thought to be distinct. We present our analysis of habitat use and connectivity among and between canyons using data from continuous acoustic surveys of the larger study area (2,500 kms) and a long-term photo–identification study. We compare traditional spatial methods such as nearest neighbour distance, directionality, and pairwise cluster detection, to modularity, a newer method, to assess the scale of connectivity between canyons. Identifying the scale of connectivity has important ecological and evolutionary implications for beaked whale populations, MPA management strategies and our assessments of critical habitat in the deep ocean.

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Habitat use and activity patterns of landlocked Baltic ringed seals

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The Baltic ringed seal is a land-locked subspecies of the Arctic ringed seal. Due to human pressure and climate change once very abundant seals are counted in only some hundreds in southern sub-populations, the subspecies is classified as vulnerable by HELCOM. We deployed 14 telemetry tags in 1994-1999 (ARGOS) and 25 tags in 2008-2014 (GPS) to measure habitat use and activity of endangered southernmost subpopulations in Gulfs of Riga and Finland. The studied subpopulations are notably allopatric with mean 95% Kernel utilized distribution ranges of 1022-2634 km2 in the Gulf of Riga and 532-976 km2 in the Gulf of Finland, seasonal variation is significant. We used clustered dive profiles to measure foraging efforts in different sub-areas. 70% of dives flat-bottomed to average depths of 18 meters. The very limited, isolated distribution ranges, exposure to anthropogenic risks and sensitivity to deteriorating winter ice conditions are increasing the risk of extinction of those subpopulations in foreseeable future. Effective conservation measures are based on adequate information of habitat requirements for the species. The geographically restricted habitat of the Baltic sea and direct influence of changing climate provides possibility to study reactions of small ice breeding pinnipeds to change of environmental factors and prognose scenarios for oceanic species and populations.

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Seeking companions: an analysis of cetacean mixed-species associations and co-occurrence in the eastern and central Pacific

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Comprehensive documentation of cetacean mixed-species schools in different habitats will increase our ability to elucidate the social and ecological determinants of such associations. Here, we analyzed 19,811 sightings of 44 cetacean species and sub-species, collected over a 28-year time period (1986-2014), using standard line-transect surveys by NOAA Fisheries' Southwest Fisheries Science Center, to quantify mixed-species associations and co-occurrence patterns and discuss ecological correlations. The study areas included >480,000 sq. km from 23 cruises in the eastern tropical Pacific, central tropical Pacific, Alaska, and the California Current. Approximately, 86% (N=17,396) were single-species and 14% (N =2,415) were mixed-species schools. For 22 species with single and mixed-species schools, we calculated mean, min, max and median group sizes, and tested for species-specific spatial correlation for each region and all regions combined. Median group sizes for mixed-species schools were significantly higher than single-species schools. Overall, spatial correlations based on geographic distance and randomization tests indicate significant relationships for select combinations, e.g., mixed schools of *T.truncatus* (TUTR) and *G.griseus* (GRGR) and *M. novaeangliae* (MENO) and *B. physalus* (BAPH). Centrality measures and association frequencies by area and species confirm previous observations but reveal new ones. For baleen whales, BAPH most frequently co-occurred with MENO (23%) and *B. musculus* (15%) (N = 69) while, MENO with BAPH (27%) and *L. obliquidens* (19%) in all areas (N = 63). Among delphinids, GRGR, *G.macrorhynchus* (GLMA), *P. crassidens* were most associated with TUTR. But TUTR, most associated with *S. attenuata* (STAT) (22%) and *S.bredanensis* (STBR) (20%) in all areas (N = 206). However, in the tropics, TUTR frequently associated with STAT (22%), GLMA (19%) and STBR (19%) (N= 177), but preferred GRGR (48%) in CCS (N = 21). Foraging and breeding preferences and relative abundance likely govern species co-occurrence but persistent bonds prevalent in some delphinids may be socially driven.

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Sperm whales reduce foraging effort during exposure to 1-2 kHz sonar and killer whale sounds

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The time and energetic costs of behavioral responses to incidental and experimental sonar exposures, as well as control stimuli, were quantified using hidden state analysis of time series of acoustic and movement data recorded by tags (DTAG) attached to 12 sperm whales using suction cups. Behavioral state transition modeling showed that tagged whales switched to a non-foraging, non-resting state during both experimental transmissions of low-frequency active sonar from an approaching vessel (LFAS; 1-2 kHz, source level 214 dB re 1µPa m, 4 tag records) and playbacks of potential predator (killer whale) sounds broadcast at naturally-occurring sound levels as a positive control from a drifting boat (5 tag records). Time spent in foraging states and the probability of prey capture attempts were reduced during these two types of exposures with little change in overall locomotion activity, suggesting an effect on energy intake with no immediate compensation. Whales switched to the active non-foraging state over received sound pressure levels of 131-165 dB re 1µPa during LFAS exposure. In contrast, no changes in foraging behavior were detected in response to experimental negative controls (no-sonar ship approach or noise control playback) or to experimental medium frequency active sonar exposures (MFAS; 6-7 kHz, source level 199 re 1µPa m, received SPL = 73-158 dB re 1µPa). Similarly, there was no reduction in foraging effort for three whales exposed to incidental, unidentified 4.7-5.1 kHz sonar signals received at lower levels (SPL = 89-133 dB re 1µPa). These results demonstrate that similar to predation risk, exposure to sonar can affect functional behaviors, and indicate that increased perception of risk with higher source level or lower frequency may modulate how sperm whales respond to anthropogenic sound.

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Humpback dolphins (*Sousa plumbea*) in south-eastern South African waters-where to from here

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Humpback dolphins (*Sousa plumbea*) are currently recorded as the only 'endangered' marine mammal in South African waters, but a lack of information on the species along the entire South African coast is evident. Here we present a summary of a number of studies spanning data collected over four decades, allowing a first assessment of the population trends and feeding ecology of the species in South African coastal waters. Analysis of historical data (1972 to 2009) from animals incidentally caught in KwaZulu-Natal indicate a change in the relative proportions of the main prey items found in stomachs, but no difference in species richness or diversity; no change in trophic level was recorded between decades, but the overall change in isotopic signature was significant. Analysis of teeth and reproductive organs allowed characterization of the life history parameters for the South African population. Field observations in Algoa Bay, Eastern Cape, indicated a decline in the mean (from 7 to 3 animals) and maximum (from 24 to 13 animals) group size, an increase in solitary individuals (from 15.4% to 36%), and a change in predominant behaviour from foraging (64% to 18%) to travelling (24% to 49%) over a 16-year period. In addition, 2366 opportunistic photo-identification pictures taken during boat surveys between 2008 and 2011 resulted in 47 identified individuals, with a low number of resightings; 57.5% of animals were seen only once and only 6.4% of individuals more than three times. The observed changes suggest a range shift or a potential decline in numbers, most likely in response to decreased food availability. Although first recommendations for conservation were proposed as early as 1998, to date no implementation has occurred. However, the information at hand indicates an urgent need for effective conservation and management plans for humpback dolphins along the south-east coast of South Africa.

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Next level fission fusion society: fin whales

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Baleen whales are generally thought to be less social than odontocetes, particularly outside their breeding season, but remain comparatively poorly studied except for humpback whales.. Here we analysed the social structure of a population of fin whales in the Gulf of St. Lawrence based on 4915 sightings of 2608 groups composed of 292 photo-identified animals (87 males, 72 females) recorded in the summer months of 2004-2010. Fin whales formed groups of varying size (1-15, mean/SD=2.63/1.84) and the process of joining, splitting and re-joining groups was frequent and often accompanied by antagonistic behaviour. Group size and composition changed often between consecutive surfacings, with larger groups being more unstable. Females were observed more often alone than males. The larger the groups, the more male biased they became, although females lead most mixed-sexed groups. Half-weight association indices were higher for males and for male-male dyads than for females, female-female and female-male dyads. Permutation test showed that the association patterns are not random, but failed to show any long-term (>1day) companionship, which was confirmed by standardized lagged association rates. Based on a weighted non-directed network males showed a higher strength, eigenvector centrality and reach than females. Using a directed network analysing the within-group position revealed that a few females possessed the highest strength and lower but similar strength for many males. The resemblance to competitive groups of humpback whales observed during the breeding season is compelling. However, our study was conducted outside the presumed breeding season of fin whales. Targeting large schools of fast preys could justify fin whales' tendency to form larger groups, even though animals might also face scramble competition within their group. Female's preference to be alone and if in groups, leading them, could indicate a tendency to reduce feeding competition due to their larger energetic demands.

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CSI of the sea - investigating UK strandings over the last 25 years

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The collaborative UK Cetacean Strandings Investigation Programme (CSIP) has been funded by UK government since 1990, to provide a systematic and coordinated approach to the surveillance of cetacean strandings around the UK coast and to the investigation of causes of death. In the 25-year period between 1990 and 2014, the CSIP received reports of 12362 cetaceans, of which 10844 were dead strandings, 941 live strandings and 577 found dead at sea. The CSIP investigated 3471 strandings through systematic necropsy during the study. Nineteen species were necropsied comprising; *Phocoenidae* (n=2127); *Delphinidae* (n=1186); *Balaenopteridae* (n=71); *Ziphiidae* (n=56); *Physeteridae* (n=24); and *Kogiidae* (n=7). Traumatic causes of mortality or those where the animal was otherwise healthy formed 54% of those examined. Common direct anthropogenic drivers of mortality included by-catch and/or entanglement (n=790) and ship strike (n=32). Additional drivers of mortality included infectious disease related mortality (n=643), live stranding (n=481), starvation (n=434, of which 134 were neonatal starvation cases) and interspecific aggression (n=376, primarily due to aggressive bottlenose dolphin interactions but also including a small number of recent cases of grey seal predation). Stranding events involving two or more cetaceans (mass stranding events, n=143) also occurred during this period. Two of the mass stranding events investigated by the CSIP during this period had potential acoustic drivers. Although evidence of marine debris ingestion was noted in some individuals, no cases of fatal impact from debris ingestion were noted in any of the cetaceans examined during the 25-year period. However, several cases of chronic entanglement were diagnosed and these may represent evidence of marine debris entanglement. As well as helping ensure that the UK complies with a number of national and international agreements and obligations, the research of the CSIP has had a broad impact at a scientific, policy and educational level over the last 25 years.

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Localization and characterization of the brain structures of the stress system in the toothed whales

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Previous studies have demonstrated the susceptibility of cetaceans to post-capture stress during active strandings or in cases of entanglement in fishing gears. For an understanding of the central control of the stress system, we identified some of the basic neurological structures that compose it: the amygdala and particularly the central nucleus of the amygdala (CeA), the paraventricular nucleus (PVN) and the supraoptic nucleus (SON) of the hypothalamus, and the *locus coeruleus* (LC).

The CeA mediates the behavioral and physiological reactions associated with fear and anxiety and the hypothalamus-pituitary–adrenal responses by modulating brain Corticotropin Releasing Factor (CRF) activity. The hypothalamus acts releasing the CRF, produced primarily by the parvicellular population of the PVN, as well as by the SON. The CRF acts as a neuromodulator in the brainstem and neocortical regions of stress responses. There are no published neuroanatomical references of these brain nuclei in toothed whales. Finally, the LC is the largest catecholaminergic nucleus and it supplies norepinephrine to the entire brain. The only cetacean species examined so far for this nucleus has been a bottlenose dolphin (Manger et al., 2003). For the study of these nuclei, 13 animals of 8 different species of the suborder *Odontoceti* were used: bottlenose dolphin, striped dolphin, common dolphin, Atlantic spotted dolphin, short-finned pilot whale, Risso's dolphin, Blainville's beaked whale, and Cuvier's beaked whale. The CeA extended mainly dorsal to the lateral nucleus of the amygdala and ventral to the most ventral part of the *corpus striatum*. The PVN was located in the periventricular region of the hypothalamus. The SON extended from the preoptic area to the hypothalamic tuberal area. The LC was composed of five subdivisions: A6d, A6v, A7, A5, and A4. The analyzed animals did present the A4 division, not reported in the only odontocete previously studied for this nucleus.

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Rescue response to Long-finned Pilot Whale mass stranding events in the United Kingdom

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Over the last five years, mass strandings of Long-finned Pilot Whales (*Globicephala melas*) have become a regular occurrence in the United Kingdom, especially in Scotland. Events include 77 whales in Durness in 2011 (44+ refloated), 26 in Pittenweem in 2012 (13 died prior to callout, remaining 13 refloated and 10 survived but a further 24 seen but did not strand), Essex in 2014 (40 whales in danger, herded to safety), Staffin on Skye in 2015 (21 animals stranded, 14 survived). Trained volunteers from British Divers Marine Life Rescue in cooperation with other agencies successfully rescued and refloated the majority of animals at these events, or herded them to avoid stranding in the first instance. While in other countries whales often die on the beach without care or following inappropriate rescue attempts, the UK's leading marine animal rescue organisation has had remarkable success. How has this been achieved by a voluntary body with limited resources and what can be gleaned from their experience? What are the priorities that responders elsewhere should focus on and how does science help our understanding of and response to these events?

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Signature whistles and group composition in resident bottlenose dolphins: can we link photo-id with emissions?

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Bottlenose dolphins (*Tursiops truncatus*) are known to produce unique, stable, stereotyped acoustic signals often designated as signature whistles. These well-defined frequency-modulated contours, thought to convey individual identity information, represent 38-70% of all whistles' emissions in the wild. The occurrence of individual identity cues that enhance the recognition of kin, mates and allies may facilitate social interactions in a demanding underwater environment. Identifying the whistling individuals and assessing the social context of signature whistles' emission in wild populations is an important step towards a better understanding of such distinctive calls. A stable, well-known population, for whom the long-term occurrence of stereotyped calls has been studied for more than 20 years, presents an opportunity to further explore the relationship between signature whistles' production, group composition and social interactions. In the Sado estuary, Portugal, acoustic emissions of wild bottlenose dolphins' calls have been documented systematically since 2011. Groups' composition and individuals' interactions have been described using photo-id technique. Whistles have been categorized through visual inspection of the spectrograms, using experienced judges and inter-observer reliability tests. Preliminary results revealed a strong association between specific stereotyped whistles categories and specific individuals (P=0.017; Fisher's exact test, with Monte Carlo simulation). Furthermore, the most-likely emitters were pin-pointed for 7 contour profiles (5 previously identified as signature whistles, based on SIGID criteria, Janik 2013). These results suggest the potential of a non-invasive technique to identify whistling individuals and to assess social interactions in the wild.

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Responses of seals to mitigation signals revealed by at sea controlled exposure experiments

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Activities such as large diameter pile-driving and underwater explosions pose acute risks of damage for marine mammals. Current observer-based mitigation methods are likely to be ineffective. Using aversive sound to temporarily move vulnerable animals out of an exclusion zone may provide effective mitigation, especially when exclusion zones are large, animals are difficult to detect or operations occur at night or in poor weather. However, establishing the efficacy and safety of this approach requires rigorous tests of candidate signals in realistic field conditions. We report a series of controlled exposure experimental (CEE) trials to assess seal responses to aversive sounds. 23 adult harbour seals were fitted with UHF/Fastloc-GPS transmitters providing both near-real-time data to a research vessel at sea and archived data downloads to shore-stations. Seals were tracked at sea using a motor-sailor allowing quiet approaches to set up CEE trials in different scenarios with different ranges, locations, and behavioural states. Aversive signals tested were an ADD (Lofitech) and killer whale calls.

113 seal CEEs were achieved. Generally, seals showed "managed" avoidance responses but not panic. The clearest responses were to the ADD with maximum response ranges of ~3000m (estimated received level 111dB). All seals within 998m (estimated received level 132dB) showed an avoidance response. Seals directly approaching the source detoured to skirt around it, but their nearest approach was often closer than the initial response range. Responses to killer whale calls were less consistent with responses scored at ranges as high as 4.5km but other instances with no response at ranges of <200m.

These preliminary trials are encouraging and suggest that aversive sounds may provide an effective pre-exposure mitigation method. Issues still to be addressed include the closer approaches by animals transiting past sound sources. This method is clearly applicable to testing responses to other anthropogenic sounds such as sonar.

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Conservation of killer whales in the Strait of Gibraltar requires ecosystem-based bluefin tuna fishery management

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The viability of the isolated subpopulation of killer whales that inhabits the Strait of Gibraltar depends upon the continued health of their main prey, the endangered bluefin tuna. We found behavioural differences between pods that affected their life-history parameters. From 1999 to 2011 we carried out 21,307 km of effort, concluding in 109 sightings of killer whales, we accounted 39 individuals alive in 2011, which were grouped into 5 pods. All pods were observed in the western part of the Strait in spring, where they actively hunt bluefin tuna. However only 3 pods had been observed actively hunting in summer in the central waters of the Strait. Two of these pods have also been observed interacting with the Moroccan and Spanish drop-line fisheries. This new behaviour allow them to have access to larger tuna than the ones that they are able to actively hunt. Consequently reproductive success was improved within these two pods, resulting in 4% growth rate, whilst a stable rate without growth was observed in pods not interacting with the fishery. The conservation of this endangered sub-population depends upon the implementation of ecosystem-based fishery management, that based on the findings presented here, should include relocation of a higher percentage of national bluefin tuna quotas to artisanal drop-line fisheries, in conjunction with the allocation of a specific quota for killer whales based on their energy requirements.

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Assessing the impact of underwater clearance of unexploded ordnance on harbour porpoises (*Phocoena phocoena*) in the Southern North Sea

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Large amounts of legacy unexploded ordnance (UXO) are still present in the North Sea. UXO are frequently accidentally encountered by fishermen and dredging vessels. Out of concern for human safety and to avoid damage to equipment and infrastructure from uncontrolled explosions, most reported UXO found in the Dutch Continental Shelf (DCS) are detonated in a controlled way. These underwater detonations produce high amplitude shock waves that may adversely affect marine mammals. The most abundant marine mammal in the DCS is the harbour porpoise (*Phocoena phocoena*), a species demonstrated to be highly sensitive to sound. Therefore, an assessment of potential impacts of underwater explosions on harbour porpoises was undertaken. Information regarding UXO cleared in the DCS provided by the Netherlands Ministry of Defence was used in a propagation model to produce sound exposure maps. These were combined with estimates of exposure levels predicted to cause hearing loss in harbour porpoises and survey-based models of harbour porpoise seasonal distribution on the DCS. It was estimated that in a 1-y period, the 88 explosions that occurred in the DCS very likely caused 1,280, and possibly up to 5,450, permanent hearing loss events (i.e., instances of a harbour porpoise predicted to have received sufficient sound exposure to cause permanent hearing loss). This study is the first to address the impacts of underwater explosions on the population scale of a marine mammal species. The methodology is applicable to other studies on the effects of underwater explosions on the marine environment.

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Ambient & vessel noise measurement and marine mammal monitoring in the Strait of Georgia, British-Columbia, Canada

John Moloney[1], Xavier Mouy[2], David Hannay[2], Ildar Urazghildiiev[3], Tom Dakin[4], Pierre-Alain Mouy[5], Orla Robinson[6]

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(6) Port Metro Vancouver

Recently JASCO Applied Sciences (Canada) Ltd (JASCO), Ocean Networks Canada (ONC) and the Port of Metro Vancouver (PMV) have collaborated in the installation of a novel, real-time ocean observing (listening) system (PMV-ECHO system deployed in the Strait of Georgia, BC. This system was designed specifically to measure ambient noise, vessel source levels, and to detect, classify, localize and track marine mammals using their vocalization in order to estimate population density. The listening station deployment and monitoring activities are part of the Enhancing Cetacean Habitat and Observation (ECHO) Program. The program aims to better understand and manage the impact of shipping activities on at-risk whales throughout the southern coast of British Columbia.
The PMV-ECHO system is composed of two unique spatial arrays of four hydrophones and one active projector each. Both arrays are used to measure and monitor the environment and calibrate the hydrophones over time. Further, a new shored-based data processing and visualization system (JMesh) is used automatically process the data and to enable operators to easily provide measurement information, navigate through large time series of detections, examine spectrograms, listen to detected sounds, validate detections, and compare detections for different species over time and space. The JMesh web platform has been designed to overcome the otherwise overwhelming volume of acoustic data collected by the PMV-ECHO sensor systems.
This paper will describe how the PMV-ECHO system along with the automated real-time analysis and visualization software suite can be used study marine mammal distribution and behaviour, variation of vessel noises and potential effects of anthropogenic activities on marine mammals. The goal of the PMV-ECHO program is to find ways to reduce shipping impact on at-risk species especially in the approaches to large ports. This program and its scientific and technical approaches should be of interest to many marine organizations, industries, researchers and enforcement agencies.

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Niche diversification in deep-diving sperm, pilot and beaked whales

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Top-predators in the deep sea are expected to diversify resource exploitation and to develop specialized foraging strategies adapted to their niches. Here we compare the foraging behaviour of three species of deep-diving whales in low latitudes using data gathered with suction-cup attached DTags. Echolocation clicks and buzzes identify periods of prey search and prey capture attempts during deep dives, while movements provide an indicator of energy expenditure. The mean maximum depth of deep foraging dives is comparable for the short-finned pilot whale (*Globicephala macrorhynchus*, Gm, 713m), the sperm whale (*Physeter macrocephalus*, Pm, 820m) and the Blainville´s beaked whale (*Mesoplodon densirostris*, Md, 810m). This contrasts with differences in mean dive duration (15, 45, 48 min, respectively) and mean total number of prey capture attempts per day (104, 360, 325, respectively). These differences are not apparently related to the body-mass of the species: Gm: 1.5 Tn, Pm: 15 Tn (♀, expected to dominate tag-data in low latitudes)[1] , and Md<1 Tn. The mass-specific field metabolic rate (calculated by respirometry) of Gm, Pm and MD is not simply related to their body-mass either: pilot whales have some 3x higher energetic requirements than similar-sized beaked whales. A simplistic model based on these data and assuming similar hunting success for the three species indicates large differences in the average caloric value of the prey targeted by sperm, pilot and beaked whales. This may be influenced by the resources available in different habitats, but studies in the same general area, the Canary Islands, indicate that Blainville's beaked whales target prey with an order of magnitude lower energetic content than the average prey of short-finned pilot whales. The results explain differences observed in tag-data in the energetic requirements of the hunting behaviour of these top-predators and support the expectation of niche partitioning in the deep ocean.

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Ecological insights from long-term trends in cetacean stomach contents

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In several parts of the NE Atlantic cetacean strandings monitoring has been ongoing for the last two and a half decades, providing long series of stomach contents data, especially for harbour porpoise and common dolphin but also to a lesser extent for several other small cetacean species. Interpretation of such data can be challenging due to heterogeneity in sampling methods (e.g. use of bycaught versus stranded animals, sub-sampling versus whole stomach contents, use of fish otoliths and cephalopod beaks only versus all prey hard structures).
Here we assemble data from Scotland (UK), Galicia (Spain), The Netherlands and Ireland to compare patterns and trends in diet across species and across areas. We used Generalised Additive Models to extract year to year variation in average numbers of the main prey categories in stomach contents, accounting for variability related to size, sex and cause of death. The effect of using equal weighting (necessary when stomachs contents have been subsampled rather than fully documented) and using all hard structures was evaluated where feasible. Time series methods (e.g. dynamic factor analysis) were used to identify common trends among dietary series from different species and areas, Relationships between cetacean diet and prey abundance were then investigated using a combination of GAMs and time series methods, applied to dietary indices and measures of fish abundance for the main species of importance to fisheries. Fish abundance was based on ICES stock assessments, also using trawl survey data when available.
Evidence for diet following prey abundance was mixed. This may reflect the fact that some prey species are preferred, while others are eaten more frequently when preferred prey are less available. However, sampling issues and lack of availability of fish abundance data at the most relevant spatial scale may result in some relationships going undetected.

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The effect of changing environmental conditions on the distribution of fin whales (*Balaenoptera physalus*) in the Northeast Atlantic

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Driven by large-scale climatological oscillations, major hydrographical changes have resulted in a period with colder and fresher water in the early 1990s and a period of warmer and saltier water masses after 1995 in the North Atlantic. Concurrently, the abundance of fin whales (*Balaenoptera physalus*) increased by 10% in the Irminger Sea between 1987 and 2001, which lead Víkingsson *et al.* (2009) to the hypothesis that the changes in environmental conditions affected the carrying capacity of the Irminger Sea.

With regards to this hypothesis, this study aimed to investigate the effect of changing environmental conditions on the distribution of fin whales in the northeast Atlantic. Using sighting data from the North Atlantic Sighting Surveys in 1987, 1989, 1995, 2001, and 2007, Generalised Additive Models (GAMs) with a negative binomial error distribution were used to model relative abundance of fin whales in terms of physiographic and remotely sensed covariates. The model predicted that fin whale abundance was highest around the 2000m isobath along the East Greenland shelf and northeast of Iceland, which may reflect habitat preferences of fin whale prey. Changes in sea surface temperature and height after 1995 resulted in higher predictions of fin whales in the Irminger Sea in accordance with the observations.

It is proposed that the hydrographical changes after 1995 had bottom-up effects on prey availability and that fin whale diet composition may have changed in recent years, due to restructuring at lower trophic levels. Fin whales showed a plastic response to variable environmental conditions in terms of distribution and possibly diet, which may allow them to deal with the wide range of environmental conditions encountered throughout their lifetime. A greater understanding about the trophic ecology of fin whales is required to fully resolve the effect of changing environmental conditions on the species.

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Stable isotope analysis reveals inter-specific and individual variation in migration strategies and wintering habitats in NE Atlantic blue, fin and sei whales

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The trophic ecology of migrating blue (*Balaenoptera musculus*), fin (*B. physalus*) and sei (*B. borealis*) whales was studied trough skin stable isotopes (nitrogen -δ15N and carbon δ13C). Samples were collected off the Azores between 2002 and 2014 (blue whale=17; fin whale=46; sei whale=36). Isotopic composition for all species combined ranged from -20.4‰ to -15.9‰ for δ13C and from 7.3‰ to 11.9‰ for δ15N. Blue whales showed the widest range in δ13C (3.7‰) and fin whales in δ15N (3.3‰). Sei (-17.5 ± 1.01‰), blue (-18.7 ± 1.02‰) and fin (-19.5 ± 0.76‰) whales were significantly different from each other in δ13C. Differences in δ15N were only significant between fin and sei whales. No overlap in the isotopic niche space between fin and sei whales was detected, but both species shared their niche space with blue whales (blue-fin: 45% overlap; blue-sei: 34% overlap). Isotopic variability was independent from gender in all species. In blue whales season and year also didn't explain variability. In fin whales carbon and nitrogen isotopic signatures varied significantly across years. In sei whales isotopic signals varied mainly across seasons and differences were chiefly attributable to carbon. Our results indicate that the three species feed at similar trophic levels, but highlight inter-specific differences in use of habitats with distinct isotopic baselines. The carbon isotopic signals of blue and fin whales suggest a dietary input from pelagic temperate/tropical waters. The carbon signal of most sei whales (excepting autumn samples) was outside the range of values of their potential prey in pelagic systems. We suggest that sei whales' higher δ13C indicate feeding in an upwelling system, possibly off north-west Africa. However, potential effects of physiological fractionation on carbon signal cannot be totally discarded. The intra-specific variability in isotopic signals highlights the importance of individual strategies in shaping species ecology.

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Results from chemical marker analyses question some of the currently accepted conservation units for Atlantic whale populations

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For conservation and management purposes, most of the large cetacean populations have been categorized in stocks, considered as isolated and demographically independent management units. Many research techniques may contribute in the definition of these stocks, such as morphometric studies, mark recapture studies, genetics, satellite tracking. Here we evaluate the potentialities of chemical markers, such as stable isotopes and element concentrations, to investigate the patterns of distribution and the level of structuring of cetaceans populations. Three case studies were considered: the Eastern North Atlantic sperm whale; the South Western Atlantic right whale, and the North Atlantic fin whale. δ15N, δ18C and δ18O were analyzed in sperm whale teeth, right whale and fin whale bone; fluoride and metals (Zn, Pb, Ti, Sr, Cu) concentrations were analyzed in fin whale bone. Each marker provided, at different levels, valuable information regarding the studied populations. Some difficulties also emerged, connected with the complexity of the migratory cycles of whales, the possible intervention of homeostatic regulation mechanisms, and the characteristics of the tissues investigated. Nevertheless, results highlighted the occurrence of structuring within the North Atlantic sperm whale population, as well as within the South Western Atlantic right whale population, which are both currently considered as a single management unit. Overall, our results underline the power of chemical markers as a complementary tool to the traditional techniques used for investigating the structure and demography of cetaceans' populations.

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Use of AIS data for characterization of passenger vessel traffic in the Pelagos Sanctuary and assessment of impact risk

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The Mediterranean Sea is among one of the world's busiest waterways accounting for 15% of global shipping activity. The Pelagos Sanctuary is a Marine Protected Area that is crossed by several major ferry routes, where cetaceans are abundant. This study aims to use AIS data to determine two descriptors (width and intensity) of the ferry routes and assess the relative impact risk for large cetaceans. The analyses were conducted at two spatial resolutions (1km and 5km) during 18 months (May 2013-November 2014) of ferry transits of the 7 biggest companies (97% of the total ferry traffic). The cetacean data collected during the same time frame along 4 routes was used to calculated Sightings Per Unit Effort (SPUE*100) for each grid. A normalized risk index was the calculated using the SPUE and the corridor's transit intensity. A total of 17,650 transits with a total length of 1,060,673,602km within 14 main corridors were identified. Corridor widths were found to be significantly different ($H=1846.7$, $d.f.=13$, $p\text{-value}<0.001$), ranging from 0.8 to 19km wide with an average of 6.8km (SD=5.5km). The total length of all corridors was 90,000km and covered a total area of 28,500km2 (32.6%) over the whole sanctuary. There were 355 fin whale and 28 sperm whale sightings with an associated 13,500km of survey effort giving an average SPUE of 0.0195 (SD=0.0255) and 0.0050 (SD=0.0100) for the 1km and 5km grids respectively. The risk assessment analysis highlighted 2 high (>0.8) and 1 medium ($0.5<x<0.7$) risk cells and 1 high and 2 medium risk cells for the 1km and 5km grids respectively. Comparing the grids, 1 medium and 1 high cell overlapped indicating consistency of the method. The results of which could be integrated into mitigation strategies for whale-ship collision management plans.

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Assessing the ecological risk of anthropogenic noise pollution from maritime traffic on the Cuvier's beaked whale in the Genoa Canyon

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Previous studies have highlighted the behavioural disruption of anthropogenic noise pollution on Cuvier's beaked whales (CBW). The aim of this work is to assess the ecological effect of the maritime noise pollution on a CBW hotspot in the northwest Mediterranean Sea and to determine the corresponding level of risk. An 11 year cetacean survey dataset was used to fit two Generalized Additive Models (GAMs), a 5km descriptive Bernoulli GAM to assess the ecological impact and a 1km predictive logistic GAM to create a high resolution probable habitat map. Several remotely sensed (5km only), bathymetric and impact (calculated transits and modelled noise using AIS data) predictor variables were used. A 1km normalized risk index map was then created using the predicted probable habitat and the maritime transit frequency and the associated modelled noise. The research area covers 3,524km2 that analyzed 109 cells at 5km2 and 391 cells at 1km2 with respectively 66 and 195 CBW presence cells. The 5km impact model was successfully fitted with 6 important predictors: eastward current (p=0.018), depth (p=0.002), northward current (p=0.003), chlorophyll (p=0.042), transit frequency (p=0.067) and aspect cosine (p=0.140). The model explained 51.6% of the deviance and had a moderate evaluation C-index value (0.753±0.055). Results indicate at a negative effect between the marine traffic and the CBW sighting probability. The 1km predictive habitat model found 61% of the Genoa Canyon was suitable CBW habitat. Of this habitat 3.7% and 70% were found to be at higher than average risk from shipping traffic and underwater noise pollution respectively. This work shows for the first time that maritime traffic and its correlated noise pollution (r=0.794) has a detrimental ecological effect on CBW. It also highlights several areas at risk from these impacts so this information should be integrated into future conservation management plans.

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Dolphin depredation of bottom-set fishing nets in the Gulf of Corinth, Mediterranean Sea

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In the Gulf of Corinth (GOC), a 2,400 km2 semi-enclosed embayment in Greece, three odontocete species occur within 11 km of the nearest coast. Striped dolphins *Stenella coeruleoalba* are abundant (1,420 animals, 95%CI 1,275-1,566) and live in mixed groups with 26 short-beaked common dolphins *Delphinus delphis* (95%CI 13-39) and 58 individuals of intermediate pigmentation, indicating hybrids (95%CI 38-79). Additionally, in 2011-2014 we estimated fewer than 40 common bottlenose dolphins *Tursiops truncatus* per year, of which some are transient. We investigated dolphin distribution and interactions with fisheries through (1) boat-based visual surveys totalling 16,289 km; (2) dolphin follows encompassing 1,663 km (296 h); and (3) 98 interviews with small-scale fishers deploying bottom-set nets across 29 ports. Based on survey data, multiple geographic, bathymetric, oceanographic and anthropogenic variables were incorporated in generalized additive models (GAMs) and generalized estimation equations (GEEs) to describe dolphin presence, taking into consideration intensity of survey effort and sea state conditions. Modelling indicated that bottlenose dolphins strongly prefer the shallower waters of the northern GOC (as well as areas near finfish farms, that only exist in the north). Conversely, striped, common and apparent hybrid dolphins prefer deep waters in the central and southern GOC. Depredation by presumed dolphins was reported by 69 fishers (70.4%). Fishers in the northern sector of the Gulf reported significantly greater damage ($\chi 2=22.21$, $p<0.001$). Perceived economic loss averaged €1,398/boat/yr in the north (SD=1,950, range 0-10,000), and €81/boat/yr in the south (SD=254, range 0-1,000): a significant difference ($p<0.001$, Mann-Whitney U=154). Our results suggest that despite a high abundance of striped dolphins near southern ports, these animals (or common dolphins) were unlikely to depredate nets. Depredation occurred primarily in the north, where bottlenose dolphins and fishing effort overlap. Interviews and sighting records indicate that loggerhead sea turtles *Caretta caretta* contributed to depredation in both areas.

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The PlasticPelagos Project: microplastics, convergence areas and fin whales in the Pelagos Sanctuary (northwestern Mediterranean Sea)

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The Mediterranean Sea is one of the areas most affected by litter in the world. The highest percentage (~80%) of marine litter consists of plastic including microplastics (plastic fragments smaller than 5 mm). Research on the impact of microplastics on large filter-feeding species, such as fin whale (*Balaenoptera physalus*), is still in its infancy. Here we present the results of the PlasticPelagos pilot project focused to investigate the overlap between microplastics and fin whale feeding ground in convergence areas (gyres) of the SPAMI Pelagos Sanctuary (northwestern Mediterranean Sea). A sampling cruise carried out in September 2014 along 967 miles allowed collecting surface microplastics samples (n=21), counting macrolitter, monitoring cetaceans and collecting skin biopsies of fin whales. Two operational models of ocean circulation (LaMMA) and fin whale potential habitat (JRC) were used to localize possible convergence areas of marine litter and probable presence of foraging fin whales respectively. A multi-layer approach was used to investigate the possible overlap between microplastics convergence areas and fin whale feeding ground. The three layers of field data, microplastics abundance (items-micro/m2), macroplastics abundance (items-macro/km2) and cetacean presence were compared with the maps of ocean circulation and fin whale potential feeding habitat. The plastic data set has revealed high occurrence of microplastics (from 0.009 to 0.260 items/m2) in the investigated surface neustonic/planktonic samples and a significant overlap with the areas showing high macroplastic density (0.6127, R. Spearman). Moreover the areas of high densities of microplastics detected on circulation maps largely overlapped with fin whale potential feeding grounds suggesting that whales are particularly exposed to microplastics threat when foraging in the Pelagos Sanctuary during summer. The ecotoxicological analysis of the collected fin whale skin biopsies will be carried out to elaborate further on this hypothesis.

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Common dolphins, Delphinus delphis, and the Portuguese sardine purse-seine fishery: Interactions, feeding ecology and mitigation

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Competition for the same finite food resource in the marine environment attracts fishing operations and inevitably top predators such as cetaceans. In Portugal, a country with a large fleet composed mainly of artisanal vessels, studies to assess problems with interactions between fisheries and protected species are scarce, which has been a major constraint for the evaluation of the necessity to define marine protected areas within the Portuguese EEZ. Sardine, the target species of the Portuguese purse seine fishery, is also the primary prey species of common dolphins along the Portuguese mainland coast. Recently, efforts have been made to improve data on many aspects of this cetacean-fishery association. The present work comprises: 1. Quantification of interactions between cetaceans and the Portuguese sardine purse-seine fishery based on on-board observations; 2. Common dolphin feeding ecology (2010-2013) and evaluation of competition levels and consumption rates of pelagic fishes by the analysis of stomach contents of stranded dead animals; 3. Mitigation efforts working in collaboration with the fishing sector. Regression models showed that cetacean presence (96 % common dolphins) during a fishing set was significantly ($p<0.05$) associated with sardine catches, effort, and latitude/longitude. The estimated annual mortality rate due to purse seining is 113 (95% CI 3–264) common dolphins, which is 0.63% of the current most optimistic estimate of population size for the area (SCANS II). Diet analysis suggested that common dolphin diet has changed in response to changes in the pelagic fish community, particularly the decline of sardine and the increase of scad and chub mackerel. Mitigation trials using acoustic deterrent devices and the development of other measures are in progress, depending fundamentally on fisher cooperation. Completion of this work will promote finding solutions to the problems of specific cetacean-fisheries interactions in the area, which must be based on the comprehension of ecosystem dynamics.

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Predicting the effects of human developments on individual dolphins to understand potential long-term population consequences

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Human activities that impact wildlife do not necessarily remove individuals from populations. They may also change individual behaviour in ways that have sub-lethal effects. This has driven interest in developing analytical tools that predict the population consequences of short-term behavioural responses. Recent research has shown that modelling behavioural dynamics that arise from underlying motivations is an effective way to simulate the processes affecting individuals' decision-making. However, there are relatively few examples where this was done using a robust evidence base. In this study, we incorporate empirical information on the ecology of a population of bottlenose dolphins ranging along the East coast of Scotland (UK) into an individual-based model that predicts how individuals' behavioural dynamics arise from their motivational states, as well as their interaction with boat traffic and dredging activities. We simulate the potential effects of proposed coastal developments on this population and predict that the operational phase may affect animals' motivational states. For such results to be relevant for management, the effects on individuals' vital rates also need to be quantified. We investigate whether the relationship between an individual's exposure and the survival of its calves can be directly estimated using a Bayesian multi-stage model for calf survival. We carry out a simulation study to assess any bias, as well as the sample size and effect size required to detect an effect. The results suggest that any effect on calf survival is likely small and that a significant relationship could only be detected in large, closely-studied populations. Our work can be used to guide management decisions, accelerate the consenting process for coastal and offshore developments and design targeted monitoring.

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Data degradation: an approach to simulating rare species distribution models

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Cetaceans, and particularly deep-divers here defined as the sperm and beaked whales of the families Physeteridae, Kogiidae and Ziphiidae, typically show low to very low densities, disperse across wide ranges and are available to surface observation only a small fraction of the time. Hence even when massive sighting effort is deployed only limited data sets are produced and it is difficult to tell apart true from false absences, making habitat modelling for these taxa particularly challenging. Here we simulate poor datasets by degrading rich data sets to determine how models fitted on the former match the latter. Additionally it is hypothesized that strongly spatially structured data sets better resist to low sample size than poorly structured ones. We used Generalized Additives Models (GAMs) with a Tweedie distribution on two large data sets of the SAMM surveys (Suivi Aérien de la Mégafaune Marine), the small dolphins (277 sightings, 4612 individuals) and the auks (1455 sightings, 16658 individuals) that represent weakly and strongly structured distributions respectively. We used the complete datasets to set up the two reference models and we fitted models on increasingly degraded data sets (25, 50, 75 and 90% of data removed at random) to compare these results with predictions from the reference models. By using mean squared error it appeared that the models fitted on these degraded data sets best predicted the data than a homogeneous model up to a certain threshold. For delphinids, the models were able to predict species distributions from only 25% (69 sightings) of original data set, while for auks, they were able to predict the species distribution even with only 10% (146 sightings) of the original data set. Hence, the data set structure appeared to influence predicted distributions; modelling strongly patterned species would require less data than for weakly patterned species.

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Using environmental envelopes to assess existing cetacean data collections and help prioritize survey effort at the basin scale

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Line transect surveys are conducted to sample cetacean populations in a study area, derive density models to relate species abundances with environmental covariates and eventually predict potential overlaps with human activities. Line transect surveys have been implemented in Exclusive Economic Zones in the northern Hemisphere, but survey coverage over the global ocean is highly unequal. Here we propose a simple approach that uses environmental envelopes to assess existing data collections and prioritize future survey effort in space and time. The approach can be applied to any study area and consists in four stages: (1) aggregating line transect surveys implemented by multiple organizations; (2) mapping monthly climatologies of environmental covariates obtained from remote sensing and ocean models; (3) sampling covariate values with the geographic coordinates and months of transects and (4) mapping the resulting 'environmental envelopes' in the study area based on the ranges or quantiles of sampled covariates. Examining where and when covariate values approach the edges or fall beyond these envelopes can help obtain a representative environmental coverage and direct future survey effort. The application of this approach to the western North Atlantic revealed the need for additional survey effort in the North Atlantic gyre in summer and in the polar ecoregion in winter, to achieve a more representative coverage of primary productivity and sea surface temperature, respectively. Examining environmental envelopes, in addition to considering financial, political and logistical constraints, can be useful to prioritize survey effort in data-poor areas of the global ocean. Future directions include applying this approach to the Mediterranean Sea to assess the existing spatiotemporal coverage of data collections at the basin scale and set forth the development of density models for predicting cetaceans' overlap with increasing human activities.

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Estimating proportion of occupied area in single-visit surveys of marine mammals

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Knowing the distribution of a species is an essential pre-requisite for its conservation and management. For example, the European Marine Strategy Framework (Directive 2008/56/EC) and several Regional Sea Conventions require that the distribution of marine mammals be monitored to assess the health of marine ecosystems. Distribution and distributional range are often core indicators for these conservation instruments: they are intuitive; they summarize effectively the data, and can easily be communicated. Current methods to estimate these indicators usually assume perfect detectability, a problematic assumption which can result in underestimation of Proportion of Occupied Area (POA) by a species. Site-occupancy models tackle the problem of imperfect detectability when estimating POA. However, they require replicates or multiple visits which are difficult to obtain given the costs associated with sampling the marine environment. We illustrate with detection data on 5 cetacean species (3 delphinids and 2 baleen whales) collected by Marine Mammal Observers during the ecosystemic PELGAS 2012-2014 surveys in the Bay of Biscay, the relevance of single-visit site occupancy models (Lele et al. 2012). Using state-of-the-art methods, we compared POA estimates from multiple- and single-visit site-occupancy models. Estimates from single-visit models were unsurprisingly less precise, but unbiased for the three delphinid species. For baleen whales which are less abundant and more oceanic in the study area, these estimates were either biased or too unprecise to be of any practical significance. Nevertheless, under certain assumptions, survey data without replicates (which corresponds to the general case for cetaceans), can be used to estimate core indicators to guide management and conservation.

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Distribution, abundance and habitat use of bottlenose dolphin in the Madeira archipelago

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Dedicated visual systematic and random ship surveys were carried out between 2007-2012 by the Madeira Whale Museum in coastal waters around the Madeira archipelago to study the distribution and abundance of cetacean species. Abundance was estimated using design-based distance sampling methods and the distribution of the density of individuals and groups was modelled using Generalised Additive Models (GAMs). Abundance estimates were based on 69 sightings of bottlenose dolphin recorded out of ~9 000 km of observation effort in sea conditions of Beaufort ≤3. The estimate of abundance was 482 (95% CI = 365-607, CV = 0.14) animals corresponding to a density of 0.11 animals/km2. These estimates have not been corrected for availability or perception bias and are therefore underestimates of the species abundance in the coastal waters of Madeira. The modelled distribution of bottlenose dolphin revealed a greater concentration of both density of animals and density of groups in southeast Madeira, in the channel between Madeira and the Desertas Islands, in the north and northeast of Madeira, and in southwest of Porto Santo. Additionally, the habitat use was modelled with GAMs using data collected between 2001 and 2012 from dedicated shipboard visual surveys and from observers on board fishing and whale-watching vessels. The habitat use modelled distributions showed that the bottlenose dolphin use Madeira coastal waters differently with, for example, resting happening mainly on the east of Madeira and calving on discrete areas east, north and south of Madeira. This differentiated use of the habitat has important implications for the species management and conservation. These results were based on a robust methodology with comprehensive geographical coverage, and were the basis for the proposal of a local SAC for this species and an important contribution for the spatial management of whale-watching activities in the archipelago.

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Mediterranean monk seal distribution in the Saharan coast (Mauritania/Morocco)

Pablo Fernández de Larrinoa[1], Fernando Aparicio[1], Mercedes Muñoz[1], Abba M'Bareck [1], Moulaye Haya[1], Miguel Angel Cedenilla[1], Cristina Martinez[1], Hamdy M'Bareck [1]

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The largest Mediterranean monk seal colony still surviving in the world is located at Cabo Blanco peninsula (Mauritania/Morocco). The conservation and research actions developed during the last years completed the information about the spatial structure of the colony and about the use of terrestrial and marine habitat. This was possible thanks to the monitoring of 90 more kilometers of coast north from the breeding caves, and to the deployment, for the first time, of GPS receptors in monk seal individuals. The data confirmed that adult females use for hauling out and pupping only the 3 breeding caves already known, located in a coastline of 1 Km. inside the “Coast of the Seals” reserve. In these caves, seals show a gregarious behavior and concentrate in large groups. Adult males frequently use breeding caves for hauling out, but they can also haul out on other areas inside the movement range of each individual. Adult males also defend small coastal aquatic territories in areas away from the breeding caves. Through the data obtained from the Fastloc GPS deployed on monk seals of the colony, we know that mostly all the adult seal's activity in the marine environment is in an area limited to 80 Km north and south of the breeding caves, and up to 12 nautical miles off shore. By contrast, juveniles tagged performed exploratory movements up to 25 nautical miles off shore, being therefore more vulnerable to interaction with industrial fishing fleets. The information gathered highlights the importance of the protection of this coastline at the Cabo Blanco peninsula where the breeding caves and the aquatic territories of adult males are located, as well as to maintain permanently the No fishing area established from the coast to 12 nautical miles offshore, in order to guarantee the survival of this species.

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Using seismic data to study fin whales in offshore waters off southwest Portugal

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Instruments used for seismic monitoring have been recording baleen whales along with the target data. These long-term datasets, some in offshore waters, provide valuable information for the study of large cetaceans that would otherwise be difficult to obtain due to economic and logistic reasons. Fin whales are classified as 'Endangered' and therefore knowledge of stock structure, population size and spatial and temporal distribution patterns is essential for good management strategies. In Portugal, sightings of fin whales off mainland waters are rare and are insufficient to assess any kind of trend. Therefore, acoustic data, even collected from opportunistic sources such as seismic surveys, are useful for monitoring this species. An array of 24 ocean bottom seismometers (OBS) was deployed between August 2007 and July 2008 in offshore waters southwest of Portugal to study potential tsunami sources. Calls of fin whales were also recorded during this deployment. The aim of this study was to develop a spectrogram cross correlation automatic detection routine to: 1) analyse the occurrence of 20 Hz calls; 2) characterize the main two calls produced by fin whales (20 Hz and back-beats); and 3) assess movement patterns. The occurrence of the 20 Hz call was seasonal, with a peak in the winter months (Dec-Feb). The two main calls could be clearly distinguished by the median frequency, frequency bandwidth and inter-call interval and they seem to show seasonal differences. Movement patterns were assessed considering the presence of a seamount in the study area, the Gorringe Bank, which has been proposed for a new marine protected area, and the proximity with the entrance to the Mediterranean Sea. These results provide baseline knowledge about this endangered species in offshore waters off Portugal and contribute to our understanding of fin whale occurrence and seasonal movements in relation to areas of conservation interest.

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Model based humpback, fin whale and krill distribution – results of a snapshot study from the west Antarctic Peninsula

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The marine ecosystem of the West Antarctic Peninsula (WAP) is a highly productive area, supporting large populations of top predators, including several species of large whales. Humpback whales *(Megaptera novaeangliae)* and fin whales *(Balaenoptera physalus)* undertake yearly migrations to Antarctic waters to feed on krill (Euphausiacea). Comparatively little is known about their local distribution at smaller scales and relationships to krill occurrence. During Expedition ANT29-3 of R/V Polarstern in the austral summer 2012/13, a dedicated aerial cetacean survey was conducted at the same time as a standardized RMT8 net trawl survey for krill. Distance sampling data on cetacean occurrence were used to produce density surface models for humpback and fin whales at the WAP. Distinct distribution patterns suggest segregation of feeding habitats at medium scale with fin whales aggregating at the shelf edge of the South Shetland Islands and humpback whales residing in the Bransfield Strait. Krill biomass estimated from the concurrent krill survey were used along with CTD data from the same expedition, bathymetric parameters and satellite data on chlorophyll-a and ice concentration to model krill distribution in the survey area. Comparisons of the predicted distributions of both whale species with the predicted distributions of *Euphausia superba*, *E. crystallorophias* and *Thysanoessa macrura*, the main contributors to krill biomass, suggest a complex relationship rather than a straight forward correlation between krill and whales. However, results indicate that fin whales were feeding in an area dominated by *T. macrura*, while humpback whales were found in areas of higher *E. superba* biomass.

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The first REMMOA program: a tropical tour of marine mammal biodiversity across three oceans

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Starting in 2008, the REMMOA aerial surveys aim at monitoring marine mammals and other pelagic megafauna across the tropical waters under French jurisdiction and adjacent waters. The PELAGIS observatory was commissioned by the French Agency for Marine Protected Areas to design and conduct the first set of these large scale surveys in the Caribbean and French Guiana (2008), the south-western Indian Ocean (2009-10), the French Polynesia (2011), and more recently the south-western Pacific Ocean with New Caledonia and Wallis and Futuna (2014-15). Following a standardized methodology, a total effort of 261,400 km (1,560 hours) was realized over more than 4 million km² (1.2% of the ocean surface), where .sightings of more than 800 marine mammals, 55,000 seabirds, 1,250 turtles, 1,260 elasmobranchs were collected . Across the four sampled regions, we found substantial, and quite stable, abundance of deep divers (beaked whales, kogia, sperm whale), while more contrasted results were obtained for Delphininae and Globicephalinae. The smallest density of cetaceans was encountered in French Polynesia, while the largest densities were observed in French Guiana for Delphininae, and North of Mozambique Channel for Globicephalinae. Aerial survey allows higher flexibility and an optimal rate of platform usage under good detection conditions of surface top predators. The latter are relevant indicators of marine biodiversity and ecosystems. The first REMMOA program allowed the quantification and comparison of richness and abundance of marine megafauna in data-poor regions, and will contribute to the establishment of MPA networks for marine mammals.

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Observatory of the Mediterranean monk seal population of the Cabo Blanco peninsula (Mauritania/Morocco). An important conservation tool

Mercedes Muñoz Cañas[1], Moulaye Haya[1], Abba M'Bareck[1], Fernando Aparicio[1], Miguel Angel Cedenilla[1], Hamdy M'Bareck [1], Pablo Fernández de Larrinoa[1]

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The Mediterranean monk seal (*Monachus monachus*), one of the rarest and most endangered pinniped of the world, has its larger colony at Cabo Blanco peninsula (Mauritania/Morocco). There, CBD Habitat Foundation, which works on the area since 2000 implementing a conservation program that follows the International Action Plan for the recovery of the Mediterranean monk seal in the eastern Atlantic, monitors daily the monk seal population inhabiting "Costa de las Focas" reserve, currently estimated in 250 animals.

With this constant monitoring effort, mostly all members of the colony are recaptured yearly and their life history built, allowing us to create a very robust observatory of the whole monk seal population.

Thanks to this observatory, we know important parameters of the colony as recapture rates by age category, number of reproductive females, their reproductive history and reproductive rate, total number of animals that are part of the population and of each age class, etc. Which lead us to know with great exactness population parameters as the trend of the colony, age class structure or mortality rates.

This deep and precise knowledge of the population let us confirm that the Cabo Blanco monk seal colony is in recovery process. Moreover, it let us evaluate the ongoing conservation measures implemented at Cabo Blanco peninsula, allowing the design of new ones focusing at the age classes most vulnerable or with higher degree of threat.

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The science and policy drivers leading to a mitigation zone for beaked whales along the Irish Shelf Edge

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In 2013, a Mitigation Zone was declared by the Irish government along the continental shelf margin due to concerns about the potential effects of seismic on deep-diving whale species. All seismic survey activity was excluded from this zone until a proper assessment of the importance of this habitat could be made following the recommendations of three consecutive Strategic Environmental Assessments of offshore exploration. The Mitigation Zone extends for some 300km and covers a strip up to 60km wide totally 180,000km2 in total area. In this paper we describe the evolution of this mitigation zone, including the scientific evidence and conservation concerns regarding the sensitivity of these habitats for beaked whales and the policy drivers which lead to this important precautionary measure. An offshore cetacean atlas involving 1078 days at sea over a 7 year period identified the northwest shelf edge as a potential hotspot for beaked whales. A pilot scheme to assess the feasibility of using static acoustic monitoring to monitor beaked and other deep-diving whales in these shelf habitats was carried with four sites monitored over a 12 month period with two independent SAM equipment. A dedicated passive acoustic survey targeting beaked whales was carried out in 2010 and 2011 with over 2800km of track-line surveyed. The results from these studies were used to inform the licensing authority. The oil and gas industry still wish to acquire seismic data along the shelf edge and the Irish government have recently commissioned two research projects, including passive and static acoustic monitoring and aerial surveys to further inform them on the importance of these habitats for all cetacean species. This is an excellent example of best practice in marine spatial planning and the management of offshore habitats for whales and dolphins.

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An evaluation of EU Habitats Directive criteria for a mobile cetacean in a small country

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The EU Habitats Directive is one of the most influential pieces of legislation related to biodiversity conservation in Europe. However, its implementation can be challenging, especially in marine habitats or for highly mobile species that regularly transgress political borders. The common bottlenose dolphin (*Tursiops truncatus*) is one of the species for which the provisions of the Directive apply to. Slovenia, an EU member state, should take measures for its conservation, including the establishment of Natura 2000 sites, as the species is regularly present within Slovenian waters. However, the small extent of Slovenian national waters, and the mobile nature of dolphins, may bring this into question. We analysed the implementation of Slovenia's obligations under the Directive and assessed whether justification exists for the designation of Natura 2000 sites. We provide some specific examples and discuss their wider implications. This may have wider international relevance with respect to other small countries and the implementation of international law. We conclude that Slovenia's implementation of the Directive is inconsistent. No sites for bottlenose dolphins have been designated, despite the availability of scientific information that supports such a designation. Dolphins use Slovenian waters year-round, and use them for all aspects of their lives, including feeding, resting, socializing and breeding. Photo-ID data showed that the population is resident. The limited genetic information suggests this population is distinct. We argue that existing data are sufficient and that the dolphin population meets the site assessment criteria for the designation of Natura 2000 sites for dolphins in Slovenia.

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A critical assessment of research trajectories concerning climate change, with recommendations for future engagement

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Climate change, including warming, is now one of the biggest changes facing ocean ecosystems and the animals and people that depend on them. Climate change is widely expected to have an impact on populations of marine mammals and it is increasingly the subject of dedicated research projects in Europe and elsewhere. Here, based on critical assessment of the relevant literature, we consider where this research is pointing to date in terms of (i) impacts on marine mammals and (ii) whether improved international collaboration to direct scientific research is warranted and how this might be best achieved. Changes in prey availability and/or movements or other changes in water bodies causing distribution shifts in marine mammals have long been speculated about. There is now evidence of some changes in distribution. This has implications for changed interactions between species (for example species that did not previously overlap in distribution may now start to compete) and between marine mammals and humans (for example in terms of fisheries operations, which may move into new areas with new implications for the marine mammals there). Despite predictions of significant conservation implications for some species, international coordination of effort to better understand these changes through international bodies remains limited. Relevant bodies to help guide or lead international effort include the Scientific Committee of the International Whaling Commission and the Convention for Migratory Species and both have expressed interest in better understanding the effects of climate change.

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Using management strategy evaluation to test the performance of a potential biological removal tier system

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Conservation and management of marine mammals (MMs) can involve a regulatory framework that sets annual limits on human-caused mortality. Managers face many sources of uncertainty stemming in part from these animals' high mobility, which can result, for example, in incomplete survey coverage of transboundary stocks. Success of a management framework depends on the ability to identify, evaluate and account for relevant uncertainties concerning the managed system. Management Strategy Evaluation (MSE) is a simulation approach to quantitatively evaluate the performance of a management framework given uncertainty. Two widely used MM management frameworks, the U.S. Potential Biological Removal (PBR) and the Strike Limit Algorithms used by the IWC to manage aboriginal subsistence whaling, were developed using MSE. We expand the previous MSE used to develop the PBR by taking into account different levels of data availability and uncertainties in stock structure. A tiered hierarchy of stocks based on data availability (from data-rich to data-poor) is introduced and alternative approaches for deriving values used to calculate PBR for each data tier (e.g. using multiple abundance estimates for data-rich stocks) are evaluated relative to the management objectives of the Marine Mammal Protection Act. Averaging abundance estimates from multiple surveys, instead of the current guideline approach of using only the most recent survey estimate, allows the use of a higher percentile to estimate minimum stock abundance, while still ensuring equivalent management performance (i.e. 95% probability of depleted populations recovering to numbers above Maximum Net Productivity Level in 100 years). In addition, an averaging approach leads to lower inter-annual PBR variability. These preliminary findings confirm the value of applying a MSE approach to evaluate management systems and refine guidelines for MM stock assessment.

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The benefit of being big: body rotations and acceleration over a 3000:1 mass range in cetaceans

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Mechanical mass-specific cost of transport is predicted to decrease as mass-1/3 for a given speed and locomotion style meaning that larger animals need to produce less force per kilogram. However, quantitative observations of this relationship have yet to be obtained from free-ranging animals over a large mass range. Here we test the prediction by comparing the steady-swimming kinematics of 11 cetacean species including deep and shallow divers, from porpoises to blue whales, covering a 3000:1 mass range. Animals were tagged with suction-cup DTAGs which include triaxial accelerometers and magnetometers sampled at 50 Hz. Accelerometers measure both specific acceleration (SA, net force per kilogram), and instantaneous orientation. A high-pass filter can separate the mean orientation from the so-called dynamic acceleration (DA), which contains both SA and body rotations (BRs) at the stroking rate. But SA and BRs cannot be separated by filtering, making SA unmeasurable with only accelerometers. Here we quantify SA by first estimating BRs independently using the magnetometer and then removing these from the DA. After correcting for tag location, we show that the longitudinal and dorsal-ventral SA increase linearly with stroking rate (R2=0.76 and R2=0.82 respectively, n=66 individuals) while the BRs are roughly constant. As the stroking rate of swimming animals is proportional to mass-1/3 over a large size range, our result matches the predicted force-mass relationship providing experimental evidence that swimming needs proportionally less force and so may be more efficient for big cetaceans. As a consequence DA is dominated by SA in small animals and by BRs in large animals. Thus, the overall dynamic body acceleration (ODBA), a widely-used proxy for energetic cost of movement computed from DA, represents a fundamentally different aspect of movement in small versus large animals. This highlights the importance of using appropriate methods when comparing energetics across different size animals.

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Reconstructing the post-glacial colonization of the northern extreme of the range of a top marine predator, the bottlenose dolphin

Milaja Nykanen[1], Marie Louis[2], Kristin Kaschner[3], Simon Ingram[4], Valentina Islas[5], Post Klaas[6], Henry Van Der Es[6], Nathan Wales[7], Andrew Brownlow[8], Rob Deaville[9], Emer Rogan[10], Andrew Foote[7]

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Oscillations in the Earth's temperature and the subsequent retreating and advancing of ice sheets around the polar regions are thought to have played an important role in shaping the distribution and genetic structuring among contemporary populations of plants and animals, especially those occurring at higher latitudes. Following the last glacial period, the retreating ice sheets would have freed suitable habitats for early colonizers to rapidly occupy niches, often leading to the exclusion of other conspecifics, referred to as 'leading edge expansion'. We investigated the post-glacial colonization of the North-East Atlantic (NEA) by bottlenose dolphins, *Tursiops truncatus*, using habitat modelling and genomics.

Using the AquaMaps approach, we generated models of suitable habitat for the bottlenose dolphin in the present day and during the Last Glacial Maximum (LGM). According to the model predictions, core suitable habitat became available at the northern extreme of this species' range after the LGM. To reconstruct the post-glacial colonization of the newly available habitat, we generated mitochondrial data from three subfossil samples radiocarbon-dated to the early Holocene and 37 complete mitochondrial genome sequences from modern samples collected in the NEA and assigned to 'coastal' and 'pelagic' ecotypes by previous studies. We then compared these to a published worldwide mitogenome dataset.

We found little phylogenetic structuring amongst the 'pelagic' samples; in contrast, the 'coastal' samples clustered into two highly divergent clades. We found evidence of only low level dispersal between the 'pelagic' and 'coastal' ecotypes. Mitochondrial data from the subfossil samples verified a previous biogeographical time-calibration and revealed that coastal bottlenose dolphin populations in the NEA result from a post-glacial radiation by two founder lineages. This pattern of diversity is consistent with the leading edge expansion hypothesis and the subsequent reduction of genetic diversity. It highlights the legacy of the Late Pleistocene glacial cycles on contemporary genetic structuring.

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History of population fragmentation and collapse in the endangered Yangtze finless porpoise revealed by population genetics

Yacine Ben Chehida[1], Minmin Chen[2,3], Michael C. Fontaine[1], Jinsong Zheng[2], Min Wu[2,3], Qingzhong Zhao[2], Ding Wang[2]

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Recent ecological surveys have indicated that populations of the critically endangered finless porpoise (YFP, Neophocaena asiaeorientalis asiaeorientalis) in Yangtze River are becoming increasingly small and fragmented, and will be at high risk of extinction in the near future. Here we used indirect methods based on population genetics to study how populations are structured and connected, and how they recently evolved. We analysed the genetic variation at a 597 base-pairs fragment of the mitochondrial control region and 11 microsatellites loci for 153 in YFPs sampled along the Yangtze River. Analysis of the genetic structure using Bayesian clustering and multivariate approaches identified 3 distinct populations in the studied area and one admixture zone. The low genetic diversity observed in each population was consistent with extremely low effective population size (≤ 106 individuals). Although an admixture zone occurs between the 3 populations, the level of gene flow detected was extremely asymmetric, with actually no evidence of recent effective migration between the 3 populations. Reconstructions of the demographic history using an Approximate Bayesian Computation approach revealed that populations from the Yangtze all descended from a common ancestral population. A small number of founders, probably coming from the sea, would have colonized the Yangtze River during the last post-glacial period about 10,000 years ago. The 3 populations would have then diverged more recently following a radiation or fragmentation process within the last millennium. Finally, each population displayed a clear genetic signature of population decline during the last century which correlated with the intensification of anthropic activities. This study highlights the impacts of the past climate change and human activities on the distribution of YFP and showed that populations are becoming increasingly fragmented and will probably continue to decline in the future unless conservation actions are taken.

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ABSTRACTS / SHORT – TALKS

Blainville beaked whale photo: Cátia Nicolau© Museu da Baleia da Madeira

14th March, 14:15

Photo-identification as a tool to monitor the critically endangered Mediterranean monk seal *Monachus monachus* in Greece

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The Mediterranean monk seal is the most endangered Pinniped in the world and comparatively little is known about its biology. Research on the species in Greece is hampered by low population densities and the inaccessibility of its habitat. Recent developments in camera trap technology have enabled the use of this effective wildlife monitoring technique also in the highly demanding habitat of the Mediterranean monk seal (i.e., dark, humid marine caves). In 2008 we initiated systematic efforts to use infrared trail cameras to assess population status of the Mediterranean monk seal in Greece, one of the species' last strongholds in the eastern Mediterranean: at the islands of Karpathos and Astakida in the Dodecanese Islands, at the island of Gyaros in the northern Cyclades Islands and at the island of Evoia. We collected and evaluated > 180,000 short videos and photographs and identified a total of 46 non-pup individuals (Karpathos: 2008 – 2015, 43,000 images, 12 adult females, 2 adult males identified); (Gyaros: 2008 – 2015, 120,000 images, 20 adult females, 4 adult males identified); (Evia: 2013 – 2014, 23,000 images, 5 adult females, 3 adult males identified). The evaluation of these data enabled also the collection of important information on the behaviour of the species, including aggressive interactions between females and females and pups, lactation of pups by non-filial females and social interactions and the recording of several births. Taking into account the results of the study and the fact that in recent years more and better quality pictures and videos are received through the National Rescue and Information Network from throughout Greece, we believe that the creation of a national Photo-ID catalogue for the species is feasible and necessary. In the near future this national Photo-ID catalogue will become a valuable tool for the management of the species in Greece.

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Behavioural observations on wild harbour porpoises (*Phocoena phocoena*) using drones - An innovative approach to marine mammal monitoring and behavioural analysis

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The behaviour of harbour porpoises (*Phocoena phocoena*) is notoriously difficult to study in the field due to their small size and skittish swimming style. Here we filmed wild harbour porpoises in Danish waters. Observations and drone launch occurred on three different boats in Lillebælt and Greatbælt where a drone, hovering 30-60m above the sea surface, was controlled to capture footage on harbour porpoises. Additionally all animals present were counted from the boat to establish differences in both methods as well as its reliability. Recorded behaviours were classified as being : travelling, resting, foraging, nursing, mating among other social behaviours such as seen in mother calf pairs. The group sizes observed with the drone were often more than twice as large as the group size quantified from a boat. The harbour porpoises showed no apparent reactions to the presence of the drone. This indicates that drones could be very useful tools for non-invasive studies on the behavioural ecology and social organization of harbour porpoises in the field as well as offering new possibilities in marine mammal research.

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Stranded minke whale (*Balaenoptera acutorostrata*) cases on Cape Cod, MA, USA from 1999-2014, with a review of pathology findings including ship strikes, entanglements and brucellosis

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Minke whales are one of the few baleen whale species not currently classified as endangered. However, many recent population estimates, including the North Atlantic population, are based on outdated and limited survey data. While US Stock Assessment reports estimate the abundance to be ~20,000, the IWC acknowledges data are lacking and, therefore, accurate assessment of abundances are difficult. The species faces threats from human impacts, many of which are under-documented, including entanglements, ship-strikes, pollution, ocean noise and whaling. Due to their current status, they are not studied to the same extent as other baleen whale species, leaving a gap in information throughout their range. From 1999-2014, 27 minke whales stranded on or near Cape Cod, Massachusetts, USA. These strandings comprise half of the baleen whales stranded in our response area and 14% (27/192) of all minke whales stranded in the U.S during this time period. Of those cases, 37% (10/27) had signs of entanglement, and one had signs of ship strike. Full necropsies were conducted on 11 cases. Analyses were conducted when possible, including hematology, microbiology, toxicology, histology and virology. For eight of these cases which had sufficient data, a final diagnosis was determined using a pathology categorization system developed by several stranding agencies. Four cases had a proximate cause of death (COD) of trauma from entanglement, with two cases having an acute ultimate COD being asphyxia, and two cases having ultimate COD due to chronic conditions. Additional remarkable findings include two cases with a proximate COD of bacterial infectious disease, caused by Brucella. These are the only documented cases of Brucella positive and active brucellosis infections in minke whales in the northeast, USA. Thorough gross examinations and analysis of these cases are necessary to monitor this species for impacts from human events, prevalence of disease and overall population health.

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Finding food in the ocean: could cetaceans use chemical cues?

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Chemical perception (*i.e.* olfaction and gustation) in marine mammals has so far received relatively little scientific attention compared to other sensory modalities such as audition or vision. Because cetaceans' adaptation to aquatic life induced deep modifications of the oral and nasal anatomy, chemoreception in modern species is thought to be reduced, if present. Taste buds are found in neonates but seem to degenerate in adults, and only one taste receptor gene may be functional. The sense of smell is more likely to be present in Mysticetes than in Odontocetes who lack olfactory mucosa, nerve and bulb. Alternative nervous pathways may however have evolved during their aquatic adaptation, and a few behavioral experiments in captive Odontocetes have suggested that they could perceive the four basic tastes as well as volatile compounds. But whether they can use chemical cues in the aquatic environment to find foraging grounds has never been tested.

Here, we describe the behavioral responses of wild cetaceans to different chemical stimuli diffused through a floating device. In the Western Mediterranean Sea, Odontocetes (bottlenose dolphins and pilot whales) were exposed to fish oil and to dimethyl sulfide (DMS), a volatile compound produced in areas of high primary productivity known to be perceived by several sea bird, pinniped and turtle species. Attractiveness of these compounds have been compared to solvent (control) while the numbers and behaviors of sea birds have been analyzed because they could be a visual cue for cetaceans. A similar protocol was used with humpback whales in their breeding grounds in the Indian Ocean, using DMS and krill extracts as chemical stimuli. Biological and ecological implications of these results as well as future prospects for research will be discussed.

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Cytochrome P450 1A1 and 2B protein expression as biomarker for the first assessment of the ecotoxicological status of Cuvier's beaked (*Ziphius cavirostris*) in the NW Mediterranean sea

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Cuvier's beaked whale is one of the least known cetaceans in the world. The Mediterranean subpopulation is now ranked as data deficient (DD) in the “Red List of Threatened Species” by IUCN because data on distribution, population structure and abundance in the Mediterranean basin are lacking except for very limited areas. The few studies carried out on threats posed to this species highlight that one of the main threat is the underwater noise but the ecotoxicological risk it is unknown. The xenobiotics compounds (OCs, PBDEs, etc.) in the environment can accumulate along marine food chains, having noxious effects on marine predators especially on long-living species. The objective of this study is to investigate for the first time the ecotoxicological status of Cuvier's beaked whale in the NW Mediterranean Sea (Pelagos Sanctuary). Among the diverse investigations that can be performed to obtain information about the health status of a species, a useful tool is represented by biomarkers. In this study the expression and induction of cytochrome's P450 (CYP1A1 and CYP2B isoforms) was evaluate as a molecular biomarker of exposure to OCs in 22 skin biopsies of free-ranging specimens belongings of both sexes and different age classes. This sample represent about the 20% of the resident population in the area which has been monitored during the last fifteen years. In the same samples the OCs levels (HCB, DDTs and PCBs) were analysed. This study represents an important step forward in our understanding of the effects of toxic compounds on Cuvier's beaked whale, considering also the information gathered on the gender differences, age and the life history of the animals. Further investigations need to be performed in this and other areas to better understand the ecotoxicological status of this data deficient species.

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Preliminary ecotoxicological data on C type kille whale (*Orcinus orca*) from Terra Nova Bay (Antarctica): Molecular biomarkers and persistent organic contaminants

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Among killer whale forms, the type C is a fish eating form and the most common in the Ross Sea. In the austral summer 2015 a study to evaluate the toxicological hazard C type killer whale faces in the Antarctic ecosystem was conducted in Terra Nova Bay. Seven biopsy samples were collected from adult specimens (5 males and 2 females) in the surroundings of the Italian research station Mario Zucchelli by means of remote dart sampling from the pack ice.The accumulation levels of persistent organic pollutants (POPs), including legacy (DDTs, PCBs, HCB) and emerging POPs (PBDEs) were measured. Moreover, the protein expression of cythocrome P450 (CYP1A and 2B) and the mRNA level variations of the peroxisome proliferator-activated receptors α and γ (PPARα-γ) and the Estrogen Receptor α (ERα) were evaluated. PPARs are ligand-dependent nuclear receptors involved in lipid homeostasis, inflammation and adipogenesis, and ERα is involved in the estrogen pathways and induced by estrogen-like exogenous compounds such as OCs and PBDEs. PCBs (twenty-one ortho PCB congeners), DDTs, HCB and PBDEs (fourteen congeners from tri- to deca-substituted) were analyzed on freeze-dried blubber biopsy samples by GC-qMS. The protein expression was evaluated by Western Blot and the mRNA levels were quantified by quantitative Real-Time PCR. The average abundance pattern for the contaminants was DDTs>PCBs>HCB>PBDEs. Contaminant levels resulted to be lower when compared to existing data from Antarctic type C killer whales from Ross Sea (McMurdo Sound) and those reported for the fish-eating resident or offshore killer whales, or feeding at higher trophic levels. Both protein and gene expression biomarker responses were correlated to contaminant levels to evaluate the biological responses to POPs. A comprehensive assessment of the ecotoxicological status of Ross Sea killer whale will be undertaken by considering the satellite tracking and feeding ecology data gained on the same samples.

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"Weather or not?" An investigation into the effect of variations in oceanographic and meteorological conditions on cetacean strandings along the Irish coast

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Cetacean stranding patterns may reflect local distribution and abundance, but may also reflect environmental parameters, including prevailing wind speed and direction, sea surface temperature and NAO. Stranding records along the Irish coast during the period 1990-2014 were examined and the effect of environmental parameters on the spatio- temporal trends was analysed using generalized linear modelling. A total of 2,343 cetaceans were reported of which *Phocoena phocoena* were the most frequently stranded cetacean (28.19%), followed by *Delphinus delphis* (24.83 %), and *Globicephala melas* (10.89%). Reports of stranded cetaceans have increased in recent years and although strandings occurred on all coasts and in all seasons, were more frequently reported along the west and south coasts of Ireland during the winter months. Environmental predictors were species specific. Wind speed significantly influenced stranding frequency of *Delphinus delphis*, which had the highest densities of strandings over the time series along the west coast of Ireland, while along the south coast sea surface temperature significantly affected *Phocoena phocoena* strandings. *Globicephala melas* strandings along the west coast, were found to be affected by wind direction. As a key biological parameter of long-term monitoring strategies, understanding variations of mortality, influenced by confounding environmental factors is necessary to help inform up-to-date legislative requirements, such as the Marine Strategy Framework.

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Studying the vertical distribution of small cetaceans and their prey in a tidal stream demonstration zone

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Understanding the ecology of high current areas is important for attempts to predict potential interactions between marine mammals and tidal-stream marine renewable energy (MRE) devices. Vertical use of the water column by top predators and other fauna is relevant for assessing potential impacts of in stream devices, particularly the risk of collision, as well as in studies of the functional use of MRE sites. The SEACAMS project aimed to test methods that can be used to assess at which depths and temporal cycles harbour porpoise and prey distribution overlap.

A drifting hydrophone array, developed using a NERC knowledge exchange grant, was used to investigate 3D underwater behaviour of small cetaceans at MRE sites. A series of drifts were completed over a period of five days in late April 2015. In early May 2015, a two day research cruise was conducted to study vertical distribution of potential porpoise prey items. A scientific echo sounder and a mid-water trawl were used to sample at regular intervals in conjunction with assessments of suspended sediment properties and current speed.

The hydrophone array trials were successful with 15 drifts completed at various phases of the tidal cycle and harbour porpoise dive profiles were determined. Initial trials suggest that certain dives reach the seabed at approximately 40 meters depth. Possible prey species were successfully sampled both acoustically and physically. Several species which other studies have shown to be present in the diets of harbour porpoise were recorded, including juvenile whiting and micronekton.

The vertical distribution of these prey was observed to change over diel cycles, with overall abundance higher near the seabed. Data from these combined methods and survey design will support the development of an ecosystem approach to understanding the foraging ecology of small cetaceans at MRE sites.

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Causes of death of harbor porpoises (*Phocoena phocoena*) stranded on the northern French coastline (1995-2015)

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The multidisciplinary research group MARIN (Marine Animals Research & Intervention Network) investigated the causes of death of marine mammals stranded on the continental coastline of the southern North Sea. Since the end of the 1990s, a significant rise of harbor porpoise (*Phocoena phocoena*) stranding occurred in the southern North Sea and the density of stranding on its continental coastline (Netherlands, Belgium and northern France) is among the highest in Europe. The aim of the study is to present the main lesions and causes of death of 165 porpoises stranded on the northern French coastline and their evolution between 1995 and 2015. Porpoises were selected for necropsy and sampling (histopathology, toxicology, microbiology) following a standard procedure. Frequent observations included net marks on the skin, sub-cutaneous and muscular bruises, emaciation, pulmonary (blood vessels and airways) and gastric parasitism, acute pneumonia, and pulmonary congestion and edema. The two main causes of death were by caught in fishing nets and infectious diseases. By-catch in fishing nets was mainly observed in animals stranded in March and April and appeared to be more frequent (from 20% to 35%). Infectious diseases (40%), mainly acute pneumonia associated with severe parasites infestation, occurred throughout the year. The infection by *Brucella ceti* is reported on 8% of stranded porpoises. Two other causes of death are emerging: severe emaciation with lung edema in absence of other lesions and grey seal attacks with typical lacerations of the skin and the blubber. The two main reasons for the recent porpoises stranding rise on the continental coastline of the southern North Sea are linked (1) with the southward shift of the population within the North Sea and (2) with the characteristics of winds, tides and currents pushing carcasses towards the coast.

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A genetic perspective of one of the smallest conservation units of bottlenose dolphin in Europe – the Sado population (Portugal)

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The identification of conservation units is crucial for the management and conservation of natural populations, and knowledge of the genetic structure is needed to define appropriate conservation units. The bottlenose dolphin is listed as a priority species under the EU Habitats Directive, which therefore requires the designation of Special Areas of Conservation for this species. The bottlenose dolphin population inhabiting the Sado estuary (Portugal) region comprises less than 30 individuals and is recognised as a separate management unit. It inhabits one of the most polluted estuaries in Portugal characterized by multiple sources of contamination and several anthropogenic pressures. Dedicated research, based on photo-identification, has revealed year-round long-term site fidelity, an aging population, very low levels of immigration, high calf/juvenile mortality and a declining population in the last few decades. Nevertheless their genetic structure is still unknown. In this collaborative study, we investigated the genetic diversity and population structure of Sado dolphins and their relationships with other populations in neighbouring areas (Iberian Peninsula, Azores and Madeira archipelagos), using samples (N=220) from museums, strandings and biopsies. We used mitochondrial and nuclear markers and found that the Sado population has several unique maternal lineages and is genetically differentiated from individuals from other areas. This confirms a certain degree of isolation, as suggested before, which it is a concern for the conservation of this endangered population. Advanced inferential genetic methods were used to reconstruct key aspects of the demographic history of this population and understand the dynamics of Sado population through time. These results all together will be fundamental to promote effective conservation

measures for the Sado dolphins, as well as to redefine the boundaries of existing Marine Protected Areas in the region and/or propose new ones.

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Risso's dolphin (*Grampus griseus*) absolute abundance estimates using photographic mark-recapture methods in the northwestern part of the Pelagos Sanctuary, Mediterranean Sea

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A combined photographic dataset was created by merging the catalogues provided by four Institutes operating in the Ligurian-Provençal basin, allowing a coverage of circa 40,000 km2 (approximately 50% of the Pelagos Sanctuary). Data were collected during dedicated and opportunistic boat-based surveys conducted mostly during the summer from 1989 to 2014. A total of 215 sightings was recorded during which Risso's dolphins were identified. The integration of all catalogues resulted in a total of 405 different individuals identified based on the right side, and 402 individuals based on the left side. Only 261 individuals were identified using both sides. The number of captures varied greatly between years, therefore mark-recapture methods were not applied on the whole dataset and data were pooled based on the homogeneity of the photographic effort. Abundance estimates were calculated based on both closed and open population models. For closed population models, the field season and the monthly unit were chosen as the most appropriate primary and secondary sampling intervals, and allowed us to produce abundance estimates for 12 field seasons. Some abundance estimates were also produced based on open population models. The mean abundance of Risso's dolphin was 130 individuals (range 90 - 230 individuals, 95% CI). However mark-recapture estimates outlined temporal patterns in Risso's dolphin abundances, peaking at 240-250 individuals in 2000 and 2005, followed by a subsequent decreasing trend. Open population models confirmed the results of closed population models and also provided an estimate for the last years of the time series, where the number of captures was too low to sustain closed population models based on the field season as primary sampling interval. The 2012-2013 estimates suggest that the number of Risso's dolphin individuals occurring in the area has recently decreased to half of the mean values for the whole time series (60-70 individuals).

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Skull shapes of the Lissodelphininae: open ocean to nearshore

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Within Delphinidae, the sub-family Lissodelphininae consists of 8 Southern Ocean species and 2 North Pacific species. Lissodelphininae is the result of recent phylogenetic revisions based on molecular methods. Thus, morphological radiation within the taxon has not been investigated previously. The sub-family consists of ecologically diverse groups such as (1) the *Cephalorhynchus* genus of 4 small species inhabiting coastal waters, (2) the robust species in the *Lagenorhynchus* genus with the coastal Peale's dolphin, the offshore hourglass dolphin, the pelagic species dusky dolphin and Pacific white-sided dolphin, and (3) the morphologically aberrant right whale dolphins inhabiting open ocean in the Pacific and Southern Oceans. Here, shapes of 164 skulls from all 10 species were compared using 3-dimensional geometric morphometrics. The Lissodelphininae skulls were supplemented by samples of white-beaked dolphin and common dolphin to obtain a context for the variation found within the subfamily. Principal components analysis was used to map the most important components of shape variation on phylogeny. The first component of shape variation described an elongation of the rostrum, lateral and dorsoventral compression of the neurocranium and smaller temporal fossae. The two right whale dolphins were on the high extreme of this spectrum, while Peale's, hourglass and Haviside's dolphin were at the low extreme. Along the second component, hourglass dolphin was isolated from the other species by its expanded neurocranium and concave facial profile. Shape variation supports the gross phylogenetic relationships proposed by recent molecular studies. However, despite the great diversity of ecology and external morphology within the subfamily, shape variation was modest compared to other dolphin taxa, indicating a similar mode of feeding across the subfamily. All 10 species were similar in their pattern of skull asymmetry, but interestingly, two species using narrowband high frequency clicks were among the most asymmetric species, contradicting previous interpretations of odontocete skull asymmetry.

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Cetaceans distribution in the Macarronesia: from Portugal to Cape Verde

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Cetacean surveys on large-scale routes allow the determination of the distribution for wide-ranging species, as well as the identification of migratory routes. In the Macaronesia area, most studies are coastal or within islands. With the expansion of commercial activities towards the open ocean, and increasing threats from overfishing, pollution and marine traffic, conservation measures for cetaceans in offshore areas are becoming more urgent than ever, demanding an increase of effort on oceanic cetacean research to understand the effects of the anthropogenic pressures. Moreover, in the Atlantic Ocean, knowledge on cetacean migratory routes is still scarce. In 2015, the 4th year of monitoring aboard platforms of opportunity in large-scale transects crossing oceanic areas of Macaronesia, the route to Cape Verde was added to the program. The route starts in Mainland Portugal, passing in the Canary Islands and Mauritania before arriving in Cape Verde. Each survey (outbound and return) covers, in average, 4100 nnm. To date, 7 surveys were performed between May and October 2015, and 263 sightings collected: 147 of dolphins, 45 of baleen whales and 44 of toothed whales. Several species were associated with others, with the most common associations being with *Dephinus delphis.* From cold-water to tropical, 21 species were identified, and a shift in species pattern was visible along the latitudinal range. Moreover, cetaceans probably on their migratory routes were sighted: *Balaenoptera musculus*, *Orcinus orca* and *Megaptera novaeangliae*. Results are the first for several offshore areas in the region, highlighting cetacean hotspots and habitat preferences. The monitoring program will continue to collect data with planned surveys for winter and spring months, improving the dataset and providing consistent data on cetacean distribution, hotspots and migratory routes.

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Deep sea predators in Irish waters and their trophic relevance

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The interest in the mesopelagic community has increased over the last few decades, but our knowledge of links with other communities is still very limited. We review the diet of cetaceans that inhabit at waters off Ireland and their trophic interaction with the mesopelagic community. Eight different cetacean species has been recorded feeding on mesopelagic fish and squid. Half of these species are deep divers: pygmy sperm whale (n=3), sperm whale (n=4), True's beaked whale (n=5), and northern bottlenose whale (n=2). The other four were pelagic dolphins (common dolphin (n=43), striped dolphin (n=30), Atlantic white-sided dolphin (n=8), and bottlenose dolphin (n=5)) likely exploiting the behaviour of mesopelagic communities that migrate to upper layers of the water column at night. The main fish prey were Myctophiformes (*Benthosema glaciale*, *Notoscopelus kroyeri*, *Myctuphum punctatum* and *Diaphus* spp.), Stomiiformes (*Argysopelecus* spp. and *Maurolicus muelleri*), and gadoids (*Gadiuclus argenteus thori* and *Micromesistius poutassou*). The main squid species occurring were *Histioteuthis* spp., *Teuthowenia* spp., *Brachioteuthis risso* and *Taonius pavo*. Significant differences ($\chi 2$, $p<0.005$) were found in the diet of both groups, with the pelagic predators having a more piscivorous diet than those of the deep divers. Within the pelagic group significant differences ($\chi 2$, $p<0.005$) were also found among the species showing resource partitioning in the area. The information obtained in this study will help in our understanding of the role of these predators, and the mesopelagic community, in the deep sea ecosystem structure.

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Autonomous photo trap systems: new tool for the monk seal conservation in Madeira

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The Mediterranean monk seal *Monachus monachus* is the most endangered seal species in the world. One of the few surviving colonies worldwide is located at Madeira archipelago, a small population of 40-50 seals distributed over Desertas and Madeira Islands. In the 80ies this population was near extinction and restricted to Desertas islands. Therefore, in 1988 a monk seal conservation program, that included the creation of the Desertas Islands Nature Reserve and the monitoring of the monk seal population, was implemented. Since then, non invasive methods are used mostly based on direct observation of the seals. In 2012 an autonomous photo trap system was experienced with good results in some caves of Desertas islands used by seals to monitor them on land. This system became one of the main actions of the LIFE LIFE13 NAT/ES/000974 Madeira Monk Seal project, for the development of a surveillance system of the conservation status of the species and its habitat in Madeira. Within this LIFE project, since August 2014, 14 cameras were installed in 7 caves and one beach of Desertas Islands with confirmed or with evidences of use by monk seals. 65.709 pictures have been collected up to August 2015. Monk seal presence has been confirmed in the 8 locations through 1.420 pictures with monk seals . The preliminary analysis shows that this is an excellent tool to identify caves used by monk seals, to detect eventual threats and to make the population monitoring more effective through the detection of births and deaths, the individual identification of seals, and the determination of the pattern of use of these locations. In the following years, the use of this methodology will extend to the rest of monk seal suitable caves in Desertas and Madeira in order to obtain a general vision of the whole population.

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Using radiocarbon to study southern hemisphere humpback whale feeding ecology and migration

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Southern hemisphere (SH) humpback whales (*Megaptera novaeanglia*) undertake a yearly migration between their Antarctic summer feeding grounds and their temperate winter breeding grounds. The classical understanding of SH humpback whale ecology is that they are obligatory krill feeders, relying on blubber stores accumulated in the productive Antarctic waters to sustain the annual migration event.

Bulk stable isotope analysis (SIA) records of Australian SH humpback whales baleen plates showed that the whales were partaking in much more heterogeneous feeding behaviour than previously thought, with possible records of supplementary feeding and partial migration. Bulk SIA was unfortunately unable to distinguish with certainty between shifts in prey selection, such as feeding on fish in Antarctica and feeding on krill in Australian waters.

As Antarctic waters are naturally depleted in radiocarbon (14C) compared to temperate waters such as Australian waters, we propose that 14C is a natural tracer allowing definite differentiation between the two locations, regardless of trophic level feeding and carbon food chain baseline. In this study, radiocarbon profiles of baleen plates from adult animals belonging to the East and West Australian breeding stocks were coupled with corresponding δ13C and δ15N profiles of interest. We report the first biochemical evidence, to our knowledge, of supplementary feeding in SH Australian humpback whale population.

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Genomic insights into the origin, spread and pathogenicity of Influenza A virus in marine mammals

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Influenza A virus (IAV) circulate in avian species around the globe. While waterfowl, shorebirds, and gulls appear to form a major natural reservoir mammalian species can also harbour infection. IAV is regularly detected in marine mammals and have been the source of multiple epizootics over the past decades. Still, it remains unclear if infections are a spill-over event, or if marine mammals serve as a reservoir host where IAV can circulate, be maintained, and undergo reassortment and/or mammalian adaptation. Further, little is known about the mechanisms of cross-species transmission and pathogenicity of some IAV strains. Here we use genomic IAV data to 1) determine the global prevalence of IAV strains in marine mammals; 2) track the spatial and temporal origin and transmission routes of pathogenic IAV strains; and 3) identify mutations in the IAV genome that may be associated with marine mammal adaptation and pathogenicity. We find that among more than 10 species of marine mammals, harbour seals (*Phoca vitulina*) account for 50% of the reported IAV infections, host the most diverse assembly of IAV strains, and are the only species in which IAV is pathogenic with six epizootics since the late 1970s. Further, we find that the pathogenic IAV strains are of avian origin and have undergone several genetic changes during their transmission from bird to marine mammal. Our study indicates that IAV infections in marine mammals typically result from spill-over events from birds, that several bird species acts as carriers, and that the cross-species transmission process always is rapid and associated with multiple genetic changes in the IAV genome. Importantly, given the frequent occurrence of epizootics in harbour seals, but not other species, it seems that IAV pathogenicity in marine mammals may be related to host susceptibility rather than viral adaptation.

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Harmonization of general and local approaches to effective conservation of critically endangered population of Baltic harbor porpoise (*Phocoena phocoena*) in Polish waters

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The international large-scale Baltic acoustic survey (SAMBAH) delivered the first credible estimate of the harbor porpoise population size as well as seasonal changes in its distribution. It was important to obtain the best reliable estimation for this critically endangered population to define the safe level of human induced mortality and to confirm the urgent need for implementing the conservation measures. Relatively low density of measuring grid of porpoise detectors which was feasible to use in such a large scale project has given a general picture of the population. In the situation of severely depleted species where each individual is important for a successful long term maintenance of the species, the mitigating measures of threats must be locally diverse and adapted to the strategy of human activity to be maximally efficient. Local surveys carried out in Polish waters simultaneously to SAMBAH project showed that the picture might be different when intensifying survey effort on a local level. To propose the well-targeted mitigation measures of threats on a local level both the harbor porpoise occurrence and the fishing strategy as the main threat have been studied in two areas of the Gulf of Gdańsk, known to be the intense gillnet fishing grounds and the areas of high reported bycatch. Additionally the studied areas were known as popular seasonal touristic regions and cumulative effect of anthropopressure has been taken into account. The results of the studies have shown that basing on large scale studies it is easy to overlook the locally important areas and that such studies should be undertaken to efficiently adjust concrete measures. The results of the studies were used to develop such measures in the management plan for NATURA2000 sites.

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Computing ship strike and near miss along main shipping lanes; results of a direct observation study in the Mediterranean Sea undertaken from 2007 to 2015

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Collisions with vessels are recognized as one of the main pressure on cetacean populations in the Mediterranean. However, documented deaths related to ship-strikes are quite rare, because it is difficult to determine direct cause of death, the carcass would sink after collision, and because strikes mostly occur in high seas areas where are hardly recorded. So, at present, effect of collisions are generally determined from stranded carcasses, while there is a lack of direct observations.

In order to assess the real impact of ship-strikes, the Fixed Line Transect (FLT) Mediterranean Network started recording events of ship strike and near-miss (as proxy of ship-strike) since 2007. The Network carries out systematic monitoring of cetaceans, and relationship with anthropogenic pressures, along the main shipping lanes connecting Italy, France, Spain, Greece and Tunisia, using ferries as platforms of observation with dedicated observers. According to the protocol definitions, a near-miss is intended as animal located within 50 m in front of the vessel and 25m on the side, not showing active approaching behavior.

From June 2007 to September 2015, more than 200,000Km have been surveyed along the network, recording more than 2600 sightings and 31 near-miss events. Four species were involved in these events: mainly fin whale (75% of total near-miss events), followed by sperm whale (13%), Cuvier's beaked whale (6%) and striped dolphin (6%). Frequency of ship-strike (N=1 based on more than 250,000km) resulted of 0.004 per 1000 km traveled. Numbers of near-miss are correlated to abundance of "whales" along the different transects/seasons.

Final aim of the network is to verify the use of FLT data for extrapolating the estimated numbers of events occurring in all the Mediterranean Sea Region so to effectively assess and monitor the impact of traffic pressure on species.

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A new equation to calculate the allometric inter-pulse interval to body length relationship in Mediterranean male sperm whales

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The sperm whale is the most sexually dimorphic cetacean in terms of body length and weight, and, to date, only few studies have investigated the geometrical and physical principles that relate to body length and the potential geographic patterns of this trait in this species. Here, we present a new empirical relationship between the Inter-Pulse Interval (IPI) and total body length for Mediterranean sperm whales, considered to constitute a genetically distinct sub-population, obtained by combining a photogrammetric method and acoustic analysis. Both audio recordings used to obtain IPI estimates and pictures suitable for photogrammetric analysis were collected in the Ligurian Sea, North-Western Mediterranean, between 2008 and 2014. While the IPI was automatically computed via cepstral analysis, photogrammetric total length (TL) was obtained first by combining a digital camera and a Laser Range Finder (LRF) to measure fluke-width, and subsequently by relating the fluke-span to the total body length by using previously described equations. Overall, 44 concomitant measures of both IPI and TL were obtained. IPI and TL averaged 5.185 milliseconds (range=4.250-5.871 ms; CV=8.116 ms) and 12.071 meters (range=9.607-12.731 m; CV=8.934 m), respectively. A linear regression of IPI vs TL was computed yielding the equation TL=1.417*IPI+4.632 (r2=0.4322; p=1.246e-06). Females and immatures are infrequent in the Ligurian Sea; we therefore consider this relationship to be valid only for male sperm whales. This new allometric equation is the first to be calculated specifically for Mediterranean sperm whales, and hence to account for potential geographical differences in phenotypical traits. It hence represents a key element to understand the species macroecology in the Region and for testing hypotheses on how individuals respond to stressors, survive and reproduce according to their body condition as well as to understand sperm whales' population responses to perturbations such as habitat fragmentation and climatic variations.

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Risk assessment of port activities on cetaceans, a framework to analyse and reduce the impacts: case study on the Guiana dolphin in southern Brazil

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Ports are crucial for economic development, however, their operation can severely affect the surrounding ecosystems. The indirect effects and consequences of the port activities can influence a much bigger area, and consequently more trophic levels and even oceanic populations might be influenced. Although some impacts and their effects are already identified, the consequences for the marine life, and especially top predators as cetaceans, are often not clear and this is rarely highlighted in environmental impact studies. Therefore we are assembling available literature and previously published cases to establish a descriptive matrix, in which we list the impacts, effects, and consequences of port activities on the behaviour, social interactions, distribution patterns, habitat use, trophic dynamics and health condition of coastal cetacean species. This matrix is being validated through expert elicitation in order to obtain a risk assessment matrix and a broader view on the synergistic impacts and their consequences. This matrix can be used as a framework to objectively analyse the impacts of port activities and their consequences for cetaceans, their food sources and their habitat. The diagnosing and monitoring of these impacts and their consequences is crucial to provide adequate support for managers and other decision makers. The results will be compiled in guiding principles to improve the management of port areas. To illustrate the pertinence of this framework, the method is applied to the case-study of the Guiana dolphin in the Paranaguá Bay, adjacent to a world heritage site in southern Brazil. The understanding of the port activities and their consequences for dolphins and the marine environment is crucial to identify the priorities that have to be evaluated and monitored and to better understand the trade-offs between economical and societal development activities and conservation issues.

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Fishing's Phantom Menace: the impact of lost and discarded fishing gear on European cetaceans & pinnipeds

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The Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Programme (UNEP) estimate that about 10% of the global marine litter is comprised of fishing gear that is abandoned, lost or discarded in our oceans each year. This 'ghost' fishing gear continues to entangle marine animals indiscriminately, injuring and killing millions of pinnipeds, cetaceans, turtles and birds every year. Made mostly of plastic, it can persist in our oceans for up to 600 years.

As well as causing needless animal suffering and death, particularly to cetaceans, pinnipeds and other non-target species who become entangled in lost fishing gear, this debris causes large-scale damage to marine ecosystems and compromises yields and income in fisheries.

Governments and marine industries spend many millions of dollars annually to clean up and repair damage caused by ghost gear. It also threatens human life and health, particularly divers and those trying to navigate the oceans in both small and large vessels. The cumulative long-term effects of ghost fishing gear are likely to be extremely damaging to marine flora and fauna, as well as to the people and industries who depend on safe and healthy seas.

This paper shows the work currently underway by the Global Ghost Gear Initiative to ascertain the abundances and trends of ghost gear and the particular threat posed to marine animals through entanglement and ingestion. Specific regional case studies are presented, introducing new data on the scale and impact of ghost gear in key areas and the main species of cetaceans and pinnipeds affected.

The paper will outline how World Animal Protection and other advocacy agencies will be able to use evidence developed via the GGGI to inspire changes in policies and industry practice for the benefit of cetacean and pinnipeds in European waters.

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Estimates of grey seal predation mortality on three principal commercial demersal species in a mixed fishery and the implications for stock assessments

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The decrease in groundfish stocks in the North Atlantic coupled with the increase in grey seal populations since the mid-1900s is responsible for an enduring controversy between fishers and conservationists as regards the role grey seals have played in stock declines. Obtaining estimates of mortalities on commercial fish caused by seal predation is difficult and limited by available data. Sampling of seal diet in 1985 and 2002 by the Sea Mammal Research Unit in the UK provides an opportunity to estimate these mortalities for stocks in the West of Scotland (ICES Division VIa). We used a Bayesian state-space model to investigate stock trends in the presence of seal predation. For the first time, this study provides estimates of grey seal predation mortality on haddock and whiting, and updates the estimates for cod which together form the traditional main components of the mixed demersal fishery in this area. The inclusion of seal predation in the assessment does not change the perception of trends in spawning stock biomass but for cod, the trend in fishing mortality is significantly different. For all three species estimated fishing mortalities are lower and spawning stock biomass higher than conventional ICES assessments. Grey seal predation is greatest on cod with estimates higher than the natural mortality used in the current ICES cod assessments. This changes the perception of the stock reference points with implications for stock management. Despite large quantities of haddock and whiting being consumed, seal predation mortality is low for these species.

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Sperm whale codas can encode individuality as well as clan identity

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Sperm whales produce stereotyped click series, called codas, for communication that can be grouped into different types according to their temporal patterns. These distinctive phonations have led researchers to propose that sperm whales belong to distinct cultural clans, but it is presently unclear if they also convey individual information for communication within social groups. Each coda click comprises a slow-decaying series of pulses caused by reverberation within the spermaceti organ. The delay between pulses is a function of organ size, and therefore body size, and so is one potential source of individual information. Another potential individual-specific parameter could be the inter-click intervals within codas. To test whether these parameters provide reliable individual cues, it is necessary to ascribe codas to individuals within a group but this is difficult to do unequivocally when using remote recordings. Stereo-hydrophone acoustic tags (Dtags) were used to study the individual coda repertoires of sperm whales. A total of 802 codas from five sperm whales were separated into different coda types using principle component analysis. A discriminant function analysis was then used to distinguish 288 5Reg (meaning 5 regularly spaced clicks) codas from three sperm whales and 183 3Reg codas from two sperm whales. The results indicate that coda clicks have consistent individual features in their inter-click intervals and inter-pulse intervals which may contribute to individual identification within a social group. Additionally, two whales produced different coda types in different phases of the foraging dive cycle. Codas may therefore be used by sperm whales to convey information of identity as well as activity within a social group to a larger extent than has been previously assumed.

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Social and biological implications of medieval European whaling

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Zooarchaeology, the sub-discipline of archaeology that aims to reconstruct the relationship between man and animals in the past based on archaeological findings, is not often concerned with cetaceans. This can be ascribed to the fact that zooarchaeological cetacean remains are often too fragmented for identification and a lack of extensive cetacean reference collections for comparison, resulting in poor understanding of early cetacean human relationships. However, Medieval textual sources often talk about active whaling taking place all the way from the Basque area in Spain and southern France up to Iceland and Norway in the far north. During the medieval period whales, dolphins and porpoises were seen as “royal fish” and laws in several countries decreed that caught or stranded individual had to be given to the king. Analysis of these textual sources is combined with in-depth analysis of zooarchaeological cetacean remains, using a DNA research and the recently developed ZooMS analysis (Zooarchaeology by Mass Spectrometry) to assign these remains to a particular species. More general analysis of the archaeological context aids reconstruction of medieval cetacean-human interaction. Additionally, identification of these zooarchaeological cetacean remains will not only help to reconstruct the early beginnings of commercial whaling in Europe, but can be used as a valuable resource to reconstruct occurrence and distribution areas of cetacean species in the past. This can potentially help to understand present day effects and conditions on marine life. Furthermore, archaeological signs of whaling are seen as a valuable tool in the present-day whaling debate, it can be used to assess the changing relationship between sea mammals and humans and can be used to offer suggestion for future management practices.

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Spatio-temporal variation in click production rates of beaked whales: implications for passive acoustic density estimation

Victoria Warren[1], Tiago Marques[2], Danielle Harris[2], Peter Tyack[1], Len Thomas[2], Natacha Aguilar de Soto[2], Leigh Hickmott[3], Mark Johnson[1]

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Passive acoustic monitoring has become an increasingly prevalent tool for estimating the density of marine mammals, such as beaked whales, which vocalise often but are difficult to survey visually. Acoustic cue counts, when corrected for detection probability, can be translated into an estimate of animal density by applying an individual cue production rate multiplier. The most direct way to measure individual cue production rates is with animal-mounted acoustic recorders. This study utilised data from sound recording tags mounted on Blainville's (*Mesoplodon densirostris*) and Cuvier's (*Ziphius cavirostris*) beaked whales, in two locations per species, to explore spatial and temporal variation in regular click production rates. Understanding the variation present in these rates is essential to avoid biased density estimates. Spatial, or long-term temporal, variation in click production rate was present during the vocally active periods of both species. Cuvier's beaked whales also exhibited significant spatial and temporal variation in click production rate at a dive cycle level, which is inclusive of silent periods and therefore directly relevant to passive acoustic surveys. These results emphasise the need to undertake concurrent secondary studies to achieve appropriate click production rates for the estimation of density from passively collected acoustic data.

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ABSTRACTS / POSTERS

Bryde's whale and Atlantic spotted dolphins photo: Ana Dinis©Madeira Whale Museum

STR01

A deep diver in shallow waters – Observations of a Sowerby's beaked whale in the German Baltic Sea

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On Friday, Sep 25th 2015 three fishermen found a stranded alive whale in the German Baltic Sea at the coast of Mecklenburg-Western Pomerania. They were able to push it back into deeper waters of the Wohlenberger Wiek, a shallow bay that is <10 m deep. On Monday, Sep 28th three scientist of the German Oceanographic Museum in Stralsund went to identify the species. Detailed photographs were used to identify it as a four meter long, subadult female Sowerby's beaked whale (*Mesoplodon bidens*) supposedly in good health condition. The observed behaviour was uncommon for a beaked whale. The whale jumped a lot and slapped its tail. During her short presence she stayed mostly in the shallow waters of the southern bay. When boats approached she closed in immediately. Acoustic recordings of the whale show ultrasonic signals and modulated tonal signals. So far it could not be confirmed whether these tonal signals originated from the whale. While the animal stayed in the bay, its health status did not obviously decrease. If she fed on abundant herring (*Clupea harengus*) or garfish (*Belone belone*) ranging the bay in large schools could not be observed. The offered dead squids as food consumption did not seem to attract her. This implies that beaked whales, although mostly feeding on squids, may well withstand longer periods of low food consumption. 17 days after the first sighting the beaked whale suddenly disappeared. On Friday, Oct 23th the stranding of a dead Sowerby's beaked whale was reported from the Swedish coast Blekinge. Until now it is not sure if it is the same whale. Since 1880 thirteen strandings of Sowerby's beaked whales were reported, including this one, mostly in Kattegat and western Baltic Sea. The last stranded animal in German waters was found dead 1913 east of the Island Rügen.

STR

ACO01

A large hydrophone array to localize vocalizing blue whales (*Balaenoptera musculus*) in Skjálfandi Bay, Iceland

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Blue whales (*Balaenoptera musculus*) are feeding in Skjálfandi Bay, Iceland, every year during the month of June. Here we used a large hydrophone array to localize blue whale calls off Húsavík from 18th of June until 4th of July, 2015. The aim of the project was both to study communication in blue whales as well as to study how their communication would be affected by external noise (as for example ship noise) in terms of masking of their signals. Three sailing vessels and a speed boat were used as platforms for the recordings. Each recording vessel had a calibrated hydrophone (either Brüel & Kjær 8101 or Reson 4032) connected to an Olympus LS-10 or to a LS-14 digital recorder. The underwater sounds were recorded in one channel and a frequency-shift-keyed GPS signal was recorded in the other channel. The hydrophone was lowered to a depth of 30 meters from each recording vessel. All recordings were made in Sea State 3 or less. During the recordings the boats were separated by either 500 meters or 1km either in North – South or East – West direction. Recordings were conducted both during night time and during day time to include data with lot of boat traffic and without. Data were collected on ten different recording trips. The down-sweep blue whale calls gave adequate acoustic localizations that were used for source level estimates. The data provides important insights in to blue whale communication and how it may be affected by anthropogenic noise such as for example boat noise.

ACO

ANA01

A new colouration for the True´s beaked whale (*Mesoplodon mirus*) in the Makaronesia

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The True´s beaked whale (*Mesoplodon mirus*) is a poorly understood member of the speciose Ziphiidae family. Its distribution is thought to be the temperate waters of the North Atlantic, South Africa, Australia, New Zealand and Brazil. Here we report the first molecular confirmation of the occurrence of the True´s beaked whale in the Azores and in the Canary Islands, its southern limit in the northeast Atlantic, and describe a new colouration for the species. In November 2012, a 390 cm male True's beaked whale stranded in El Hierro, Canary Islands. Species identification was confirmed with mitochondrial DNA control region and cytochrome b gene markers. The True´s beaked whale stranded on El Hierro had a clearly delimited white area in the head, extending posteriorly from the tip of the beak to a semicircular line from behind the opercule to the mouthline and from there ventrally to cover the gular grooves. This contrasts with the conventional description of True´s beaked whales in the North Atlantic as greyish in coloration, potentially with a dark eye mark and a dark blaze in the upper part of the body, from behind the blowhole to past the dorsal fin. Furthermore, True´s beaked whales with a light patch in the melon were observed in live sightings off Azores. These records indicate that the True´s beaked whale in the North Atlantic presents variable coloration patterns. Given the presence of this species in the Azores and the Canary Islands, it would be expected that the True´s beaked whale occurs also in the area between these archipelagos, including the islands of Madeira.

ANA

GE01

A Preliminary genetic investigation on the short-beaked Common Dolphin (*Delphinus delphis*) in the Turkish seas based on mtDNA sequences

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The short-beaked common dolphin is a cosmopolitan species, showing an extremely wide distribution in all oceans including the Mediterranean and the Black Sea. Its Black Sea population has been suggested as the subspecies *Delphinus delphis ponticus* due to its genetic and morphological differences. Although significant differentiation was detected between the Black Sea and Mediterranean common dolphins based on mitochondrial DNA in previous studies, the sample size was relatively small (less than 10). In this study, mitochondrial DNA sequences of 15 individuals collected between 2003 and 2015 in the Turkish Black Sea coast (5 western, 2 eastern), Istanbul Strait (3) and Marmara Sea (5), revealed nine haplotypes, seven of which were new. Five of these new haplotypes were detected in the Turkish Straits System (TSS, consisting of the Istanbul Strait, Marmara Sea and Çanakkale Strait), connecting the Black Sea and Mediterranean Sea. Moreover, we detected genetic differentiation of the Black Sea population based on haplotype frequencies, supporting the previous inferences that the Black Sea common dolphins have been differentiated from those in the Mediterranean and the Atlantic. At the same time, the results suggest that the common dolphins in the Turkish Black Sea and TSS waters might have some degree of genetic connectivity to the Mediterranean and Atlantic populations, as the haplotype network, including the newly discovered ones, do not show any obvious geographical clusters. More samples from the Turkish waters will be sequenced with the same mtDNA marker for a better understanding of the genetic population structure of this species, within the scope of an on-going project, CetaGen.

GE

MN01

A resident group of short-beaked common dolphins (*Delphinus delphis ponticus*) regularly visiting the waters of Yuzhny Port (Grigoryevsky Bay, Black Sea) in summer

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Northwestern Black Sea waters are known for intensive human impact on them. Grigoryevsky Bay (Maliy Adzhalik) is an estuary which has been artificially transformed into a bay in early 1970-th, and a deep sea port Yuzhny is now operating there all year round. In addition, there is the Odessa Port Plant in the bay area. Total length of the bay is about 12 km, width is 0.3–1.3 km, and area is 5.8 square km. In the Black Sea short-beaked common dolphin (*Delphinus delphis ponticus*) usually avoids coastal, shallow, polluted and desalinated waters. However, our coast-based visual and photo-identification studies conducted in the area of Grigoryevsky Bay in June-September 2015 showed that short-beaked common dolphins regularly visit waters of the bay during summer which is highly unusual. Moreover, results of the photo-identification study show that the same group of common dolphins regularly visits the bay, and this group primarily consists of females with calves and juveniles. We encountered single specimens of dolphins as well as groups of different sizes between 2 and 25. We managed to identify 10 specimens of dolphins, 7 of which were encountered in the bay more than one time during the summer period. The maximum number of re-sightings of the same specimen was 6. Primary type of behavior of the dolphins in the waters of the bay was feeding. Grigoryevsky Bay is an important spawning and feeding fish habitat, and we believe that favorable feeding conditions affected unusual behavior of common dolphins now inhabiting the coastal transformed ecosystem.

MN

CO01

A strategy to fill knowledge gaps towards better conservation measures for minke whales in Scottish waters: will MPAs save the day?

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The Marine (Scotland) Act 2010 makes provision for an ecologically coherent network of Marine Protected Areas (MPAs). The network will feed into satisfying some regional obligations under the OSPAR Convention, EU Marine Strategy Framework Directive and the Convention on Biological Diversity. The network includes four proposed Nature Conservation MPAs (ncMPAs), of which three are for wide-ranging megafaunal species: two for the minke whale and one each for Risso's dolphin and basking shark. White-beaked dolphin was the third cetacean species under consideration but was dropped as no discrete areas could be found. Stakeholder engagement and a habitat modelling analysis using sightings survey data on those species was undertaken to identify areas of persistent high occurrence as potential ncMPAs. The management measures to be implemented within the proposed ncMPA boundaries are currently being developed subject to a public consultation. The aim of the proposed MPAs is to "conserve" protected features in the first instance and "recover" in cases where sufficient scientific evidence warrants such action. Implicit in the ncMPA network is the need for an ecosystems-based approach to managing the marine environment whilst maintaining sustainable use. Here we outline 13 key knowledge gaps about minke whales which currently hinder the efficient application of such an approach to enhance the development of effective management measures. Risks to minke whales from anthropogenic activities remain unquantified, chiefly: entanglement, noise and ship-strike. The drivers of minke whale distribution and diet are also key knowledge gaps. A roadmap of research priorities is proffered to focus future research and community engagement efforts towards filling the key knowledge gaps. Research efforts must focus not only within proposed MPA boundaries but throughout the region at spatial scales relevant to minke whales; a highly-migratory and wide-ranging species.

CO

ABU01

Abundance and photo-identification of bottlenose dolphins (*Tursiops truncatus*) in North Adriatic Sea: a pilot study

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North Adriatic *Tursiops truncatus* population is one of the less bottlenose dolphin's population studied in Europe. North Adriatic Sea is theatre of strong industrial activity: hydrocarbons extraction rigs, commercial naval traffic and professional fishing. So, cooperating with Bologna University, we created a task force to census and monitor cetaceans in this area. The pilot study started in May 2015 and is still in progress. Data on dolphin's position were collected through sighting forms filled by fishermen, sail schools, harbour masters. These data allowed us to identify, on a medium scale navigation chart, the area that dolphins seemed to occupy mostly. Following ACCOBAMS engaging rules, animals were approached and by photos of dorsal fin, identified. This allowed us to census individuals and count re-sightings, estimating abundance of this population, new entries or lost individuals. Program included photo-ID of dead dolphins stranded too. During this phase behavioural data (Social behaviour, Mother/calf Sexual behaviour, Play behaviour) were collected. During 2015 season, weather conditions were often inappropriate for field research. Furthermore Adriatic Sea presents shallow waters without significant slope or bay that could give references to identify hunting territories for dolphins. However 6 dolphins were photo-identified, just as areas where they usually swim in spring-summer season. Although literature shows river mouth is a good hunting field for bottlenose dolphins, we can assert after this first year of study, that In North Adriatic Sea, dolphins seem to avoid this hunting location. In fact, according with data supplied by fishermen, dolphins were not sighted nearer than 2 nautical miles from the coast. Reasons of this behaviour are still to be investigated. A long-term monitoring is needed to continue research of this species in the wild. Starting with next season, more information will be taken, as respiratory rate and bioacoustic data.

ABU

ACO02

Acoustic behaviour of blue whales (Balaenoptera musculus) in the Gulf of Corcovado, Chile, recorded on DTAGs

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The Blue whale (*Balaenoptera musculus*) is listed as 'Endangered' on the IUCN Red list of threatened species. In the Southern Hemisphere, the species was once abundant, but commercial whaling reduced it to near extinction during the twentieth century. A joint effort between WHOI and the Melimoyu Ecosystem Research Institute (MERI) is focusing on a population of Chilean blue whales in the Gulf of Corcovado, Chile, which is an important feeding ground for these animals. This investigation set out to obtain data on the
ecology, foraging and acoustic behaviour of individual blue whales , through the deployment of suction cup attached sound and orientation recording tags (DTAGs). An 18.6 m fishing vessel, the MV Centinela, was employed for two cruises, one each in March of 2014 and 2015. In 2014, five tags were deployed on four individual whales, for a total of 21 hr 11 min. In 2015, six tags were deployed on six animals, for a total of 64 hr and 45 min. Acoustic data on the 2014 tags revealed numerous calls previously identified as "SEP" calls from distant blue whales, and an apparent call exchange was recorded between a tagged juvenile whale and a distant animal. The call was also detected on the juvenile whale's accelerometers, confirming caller identification. Analysis of 2015 acoustic data is ongoing, but reveals a greater variety of sound types. Tag data will prove useful for interpretation of data collected in this area from passive acoustic monitors (PAM), both for species identification and possibly also density estimation. Thus, this work has potential to contribute to efforts to protect this important population of endangered blue whales.

ACO

HE01

Acoustic monitoring of a pregnant bottlenose dolphin (*tursiops truncatus*) under human care

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The observations under human care allow to study the behavioral patterns of the pregnancy and mother-calf relationship thanks to non-invasive methods. The same observations in the wild are not so easy.

Veterinary examinations (e.g. ultrasound) together with the collection of physiological (e.g. defecation) and behavioral data (e.g. flexion) allow to monitor the pregnancy over time and to determine the date of birth. This protocol was used to determine the birth of a Tursiops truncatus calf; the female was hosted at Zoomarine Italia, a themed Park close to Rome. In addition to the observations, we also collected acoustic data of the pregnant female and the mother-calf pair over several days and at different times. In order to better correlate the sounds production to the behaviors, the acoustic recordings were coupled with the observations, outside the pool, of the mother's and mother-calf pair's behavior. In the pool there was the female and then the mother-calf pair. The other bottlenose dolphins were in other connected pools (during these observations the gates were kept closed).

The acoustic recordings were made by an Aquarian Audio hydrophone model AS-1 with piezoelectric sensor (not pre-amplified) connected to a preamplifier and A/D converter with USB interface Dodotronic Hydromic200K and this to a laptop with Windows XP. The signals in the audio and ultrasonic band were sampled at 200kHz/16-bit with a usable bandwidth of 95 kHz. The analyses were performed using the software SeaPro (developed by CIBRA) and Audacity.

This study is a contribution to collecting acoustic recordings in controlled environment especially during the pregnancy that is a very sensitive moment of the life. Although the pool was a reflective environment that introduces reverberations, has been interesting to study the female's vocal activity (signature whistles, whistles, clicks) and the behaviors associated to sounds production.

HE

HE02

Adenocarcinoma in a grey seal *(Halichoerus grypus*

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An elderly female captive grey seal (Halichoerus grypus) was euthanased after a one month period of inappetance and weight loss following apparent trauma to the right foreflipper which failed to respond to anti-inflammatory, analgesic and antibiotic therapy. On gross post mortem examination, multifocal, well circumscribed, pale foci, up to 1cm diameter, were visible throughout the parenchyma of the liver and spleen. The prescapular and mandibular lymph nodes were grey-brown in colour and the mesenteric and gastric lymph nodes had gelatinous brown borders. Histopathology of the spleen revealed a multifocal, poorly demarcated, infiltrative, expansile, non-encapsulated, moderately cellular mass of cuboidal to pleomorphic cells throughout the parenchyma, arranged in tubules and acini, exhibiting moderate anisocytosis and anisonucleosis and between 1-4 mitoses per high-power field. A similar infiltrative neoplastic mass was present in a subcapsular site of the liver, with multifocal neoplastic emboli within venules in adjacent portal areas, and also in the one examined lymph node and sternal bone marrow; in the last site, this was also accompanied by myelofibrosis and osteolysis. The findings were consistent with a metastatic adenocarcinoma, which would account for the weight loss and malaise observed in the seal. The tissue of origin of this neoplasm could not be located, but possible sites would include the alimentary tract including the pancreas, genital tract and mammary tissue. A second tumour, a benign fibroleiomyoma, was found in the uterus. The high mitotic index associated with the adenocarcinoma and the presence of tumour emboli in peri-nodal lymphatics supported a highly malignant form of tumour. Although adenocarcimoas have been reported previously in pinnipeds, as far as the authors are aware this is the first time one has been reported in a grey seal.

HE

NT01

Advances in drone technology for cetacean research

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New technologies implementation in marine mammal research is a need. The recent use of radio-controlled airmodels, drones or UAV (unmanned aerial vehicles) in this field has led to broaden the study techniques and thus to improve the knowledge about these species. The development of a wide variety of commercial hobby or recreational models, with a consequent cost reduction and constant upgrading, allows currently to raise its application in a larger range of circumstances. In this study a drone model DJI Phantom 2 with a GOPRO Hero 3+ has been used. The flights were performed from the 47ft catamaran research platform of the EDMAKTUB Association. During 2015 surveys, high definition aerial video recordings were obtained of several cetacean species, particularly fin whale (Baleanoptera physalus) and sperm whale (Physeter macrocephalus). The images filmed show a zenital vision providing not only the sight of surfacing animals but also diving ones reaching some meters of depth depending on water transparency. Thus, many information is obtained regarding behaviour, activity, group size and structure. At the same time, the approach without or with minimal disturbance allows to develop novel techniques, as blow sampling and gathering data from captured pictures. Images analysis of pigmentation patterns or characteristic details offer new tools for photo-identification. The large possibilities of these modern technologies will depend on the objective and the species to be studied. Anyway, drones have been proven to be a valuable intrument for cetacean observation from a perspective unachievable from any other research platform.

NT

WW01

An international whale-watching certification to drive industry towards environmental excellence

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The whale-watching activity has been strongly increasing since the 1990s on the Mediterranean coast. Such a development, if unreasonable, can have serious impacts on cetacean individuals and populations. On the contrary, a sustainable activity can become a fantastic vector of economic development, cetacean conservation and public awareness. In 2005, the first study along the French Mediterranean coast revealed that two-third of operators had intrusive approaches, but most of them were willing to collaborate to improve their practices. All operators were invited to participate to the creation of whale-watching guidelines that were endorsed by ACCOBAMS in 2007. A first training course took place in 2012 and in 2014, the ACCOBAMS/Pelagos High Quality Whale-Watching® certification was created. Its specifications are based on the ACCOBAMS whale-watching guidelines and include the commitment to the Code of Good Conduct edited by Pelagos and ACCOBAMS, a 3-day training of the crew, a quality speech to passengers and a sustainable development policy on-board. Aerial detection of animals and swim-with-cetaceans are prohibited under the French certification. Operators are evaluated to ensure they commit to specifications. An evaluation committee meets every year to analyse evaluation reports and decide on potential sanctions. A major communication plan is associated with the certification with a dedicated website and several tools including a guide for tourists explaining the approach. Within the first year of implementation, 11 out of the 35 operators based on the French Mediterranean coast received the certification. In 2015, 3 more were certified, including two operators who gave up aerial detection to access the certification. This is the first indication of the effectiveness of the certification in driving the industry towards environmental excellence. Reflections are also on-going to study the feasibility of introducing permits in the area.

WW

HI01

Analysis and quantification of microplastics in the stomachs of common dolphin (*Delphinus delphis*) stranded on the Galician coasts (NW Spain)

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In Galicia, NW Spain, a stranding network run by the non-governmental organisation CEMMA since 1990. The common dolphin (*Delphinus delphis*) is the most frequently stranded cetacean and a total of more than 2600 common dolphins has been recorded on the 25 years that the stranding network has been operational. Most marine debris (composed mainly of plastics) has been recognised as a global threat to marine life because plastic ingestion can lead to injuries derived from chemical exposure. In this study we investigated the presence of plastic debris in the stomach content of 25 common dolphins stranded on the coast of Galicia between 2005 and 2010. To date, very few studies of this kind have been carried out in cetaceans even if studies of the digestive tract of several marine species have reported presence of marine debris. Based on the available literature of cetaceans and other species (fish, seabirds and turtles), we developed a protocol to study the presence of plastic debris in cetacean stomach contents. The stomach contents, routinely collected by the stranding network and fixed in alcohol, were rinsed through a set of nested sieves. Hard prey remains, fish bones, cephalopod mandibles, fish otoliths, eye lenses and crustacean remains were set aside to characterise the diet of the species. The remaining organic material was digested during three weeks using a solution of 10% KOH. All plastic items found in the stomachs were visually identified through a stereoscopic microscope. Microplastics were found in a high number of stomachs and, although its quantity varied greatly from one stomach to another, the total number of elements was generally low.

HI

HE03

Antarctic seals: Molecular biomarkers as indicators for diet, pollutant exposure and health effects

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Weddell (*Leptonychotes weddellii*), Ross (*Ommatophoca rossii*) and crabeater seals (*Lobodon carcinophaga*) are phocid seals with a circumpolar distribution around Antarctica. As long-lived and large top predators, they bio-accumulate contaminants and can be considered as sentinels of ecosystem health. Although living in a pristine environment, Antarctic seals are exposed to climate change, pollution, shipping and fisheries. To reveal and understand possible anthropogenic impacts on their immune and health status, this study measures biomarkers of xenobiotic metabolism and the immune system as sensitive, early indicators for ecosystem changes. Blood samples of 72 wild-caught seals (Weddell n=33; Ross n=12; crabeater n=27) in the Amundsen/Ross seas in 2008-2011 were investigated. mRNA transcription levels of xenobiotic biomarkers AHR, ARNT, PPARα and immuno-relevant cell mediators (cytokines IL-2 & IL-10, heat-shock-protein HSP70) were measured using hkgs YWHAZ and RPLF4 by real time RT-qPCR. Mercury and stable isotopes in fur were analysed. Hg concentration increased with body weight and standard length in all species. Crabeaters showed a significantly lower Hg concentration than Ross and Weddell seals. Stable isotopes were correlated with species, geographical position, mercury load and HSP70 transcription. Significant species-specific differences in gene-transcription were found between all species with highest levels in crabeater seals for PPARα, AHR, ARNT and IL-2. Ross seals showed highest IL-10 and HSP70 transcription, while HSP70 was exceptionally low in crabeater seals. Significant age class-dependent IL-2 gene-transcription was found in all species while subadult Weddell seals showed higher ARNT and HSP70 transcription than adults. A sex-dependent IL-10 transcription with significant higher levels in female Ross seals was observed. The species-specific, spatial, age and sex-dependent gene-transcription observed in this study probably reflect dietary habits, pollutant exposure and immune status of the investigated seals, demonstrating molecular biomarkers as important non-invasive tools that can reflect health status and the impact of anthropogenic stressors in seal species.

HE

MO01

Asses the use of VMS and fish catches data as indirect prey availability on the spatial modelization of the bottlenose and common dolphin in the Alborán Sea (western Mediterranean)

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The question of how environmental variability affects populations of marine top predators is an important one because of their role within ecosystems and their potential to influence community structure and biodiversity. This study aimed at quantifying changes in distribution, and abundance of bottlenose dolphin (*Tursiops truncatus*) and common dolphin (*Delphinus delphis*) in the Alborán Sea (western Mediterranean) in relation to variation in the prey availability. Monthly fish landing in kilograms of 283 commercial fish species landed in 13 different fishing ports villages of Andalucía were downloaded from 2000 to 2011. The Location System of Spanish Fishing Vessel (VMS) is an automated system that allows authorities to obtain satellite information on the positions of all fishing vessels over 12 meters at regular intervals of about 2 hours. The VMS tracks the movements of the ship and can provide information on their speed, direction, and indirectly fishing activity. VMS data was obtained from 2005 to 2011. All those data on fish landings and fishing activity were cross-processed using Excel and ArcGis software to get spatial correlated information. Spatial distribution of biomass of several fish species identified as target prey species according to bibliography, for the two cetacean species considered in this study, was estimated. Fisheries covariates, in particular trawling, had a greater effect (although still small) on bottlenose dolphins than on common dolphins. Effect of all fisheries covariates in the models for bottlenose dolphin and common dolphin habitat use are discussed.

MO

CO02

Assessing bottlenose dolphin conservation alongside a sustainable marine tourism industry

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Anthropogenic activities are markedly increasing in the oceans, causing widespread concern about potential effects on marine mammals and ecosystems. In the UK, a large population of bottlenose dolphins inhabits the coastal waters of Wales, where it has experienced an increase in disturbance from human-activities. The importance of the region for the species has been recognised through EU legislation with the establishment of two Special Areas of Conservation (SAC). The Welsh bottlenose dolphin population is a central attraction for visitors, generating millions of pounds income annually. Nonetheless, careful management is needed in order to conserve the species whilst safeguarding its socio-economic value. During summer 2015, land-based observations were conducted within the SACs in Cardigan Bay. The southern SAC has an enforced code of conduct for navigating around and observing dolphins, whereas the northern SAC is less regulated. Preliminary analyses show difference in dolphins' behaviour towards boats within the two SACs. Boat avoidance was the most frequently observed behaviour (62%) in the northern SAC, compared with just 19% in the southern SAC, where dolphins generally showed no change in behaviour towards boats. In the northern SAC, boats would often follow the dolphins and there was one case of people trying to get close enough to touch the dolphins. In contrast, most of the boats in the southern SAC slowed down and gradually stopped with no erratic changes in course on encountering dolphins. This study suggests the potential energetic costs to dolphins from unregulated leisure activities and highlights the efficacy of enforcing codes of conduct for bottlenose dolphin conservation. Dolphins appear to be using Cardigan Bay SAC to a lesser extent than in the past, suggesting that an area-based management scheme could promote species conservation alongside a sustainable ecotourism industry throughout Cardigan Bay.

CO

HI02

Association of floating debris and cetaceans in the northeastern Atlantic offshoreErro! Marcador não definido.

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The increasing abundance of marine debris, particularly plastics, in the world's oceans represents widespread and pervasive threats for wildlife via entanglement and ingestion. While many cetaceans species haven been reported with ingested or entangled plastic, the spatial overlap of these far-ranging predators with debris aggregations at-sea is poorly understood. Floating marine debris and cetaceans were assessed by sighting surveys (using a 68,64 m sailing vessel) performed during the summer of 2011 along 14 line transects, covering an area of 252,833 Km2 between the 50 and 220 nm limits off continental Portugal. The total abundance of floating marine litter reveled 752,740 floating objects with an average of 2,98 items/km2. Plastic items are the major source of marine litter, followed by styrofoam, derelict or lost materials from fisheries, paper/cardboard and wood material. The North regional sector of the study area presented higher diversity and abundance of marine litter, probably associated with the high number of navigation corridors and fisheries operating in the surveyed area. The second hot-spot of marine litter was reported in the South of Portugal, in the Gorringe seamount area, also an important navigation corridor and fishing area. The same was true concerning the distribution of cetaceans, with higher occurrence areas reported in the Northern Sector and a hot-spot occurring in the south sector. In the northern region, there was almost no overlap between the areas of higher litter concentration and cetaceans, emphasising that high marine debris abundance areas may be less used by cetaceans. On the other hand, the litter hot-spot completely overlaps the cetacean abundance in the southern sector. Results suggest that debris and cetacean occurrence are influenced by the same environmental factors, such as the occurrence of seamounts, marine currents, frontal zones, and the occurrence of temporary small gyres or eddies.

HI

BE01

Associations or alliances? Comparisons of social relationships between male bottlenose dolphins (*Tursiops truncatus*) in two UK populations

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Alliances are an important aspect of the social relationships between male bottlenose dolphins (*Tursiop*s sp.) in a number of well-studied populations. Alliances as mating strategies, whether long-term and stable, or labile and short-lived, enable mate location and coercion while ultimately improving the reproductive success of allied individuals. However, the presence of male alliances is not well understood in coastal UK bottlenose (Tursiops truncatus) populations from the Moray Firth (MF) and Cardigan Bay (CB). The present study utilised long-term observational data (1997-2014, and 2001-2014, respectively) to determine if male alliances existed in these regions, and whether association patterns were similar or divergent between the two discrete populations. A total of 66 males (62 sighted >2 times) from the MF, and 50 males (47 sighted >2 times) from CB were examined. Non-random preferential associations were established between males from both regions, but associations were stronger in the MF (MF mean HWI= 0.09± 0.05, and 0.03± 0.02 for CB). Significant alliances were determined between five dyads in the MF, and 14 in CB, with the strongest dyad from each population having a HWI of 0.67 and 0.44, respectively. However, males were found to use both alliances and solitary strategies together to locate and compete for receptive females. The temporal stability of associations observed in the study populations were highly similar, and were described as ‘casual acquaintances’, typical for the species occupying a ‘fission-fusion’ society. Demographic factors such as mortality, emigration and re-immigration may have also affected male associations in the respective populations. That said, differences in the ecology between the two coastal study sites may also be influential in the formation of such associations. The present examination provides further insight into long-term social dynamics between male bottlenose dolphins and broadens our understanding of mating strategies utilised by these animals in UK coastal waters.

BE

NT02

Automatized analyses of dolphin movements and activities combining accelerometry and videotracking

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Bottlenose dolphins have an extensive and complex behavioral repertoire with rapid and smooth transitions in a 3D environment. In an attempt to better quantify their activities, two captive bottlenose dolphins were trained to use a triaxial accelerometer. Data acceleration preliminary analysis shows promising results in automatic activity recognition, as the algorithm shows the ability to discern different movements. A library of movement codes is being developed that may be applied also to free-ranging bottlenose dolphins. To complement the acceleration analysis, a 3D tracking system was developed to record automatically the routines of these animals in the pool. Analysis showed that both dolphins, when using the accelerometer, had a clear preference for the deepest part of the pool, spending around 79% of their total time there, of which 7% in the bottom (5 meters depth). Trainers had less influence than expected in the movements of the animals, since dolphins only spent between 6% and 9% of the time near the trainers. Also, focal animals spent less time than expected interacting directly with dolphins in adjacent pools, only around 5.5% of the time. Combining videotracking and accelerometry analysis, it allows us to detect automatically and quantify where each behavior occurs and its duration, allowing, for instance, early recognition of unusual behaviors or stereotypic routines. These analyses may provide insights into the animals' behavior useful both to welfare management of captive dolphins and to a better understanding of the movements and activities of wild cetaceans.

NT

WW02

Behavioural responses of humpback whales (*Megaptera novaengliae*) to whale watching activities in Juneau waters, Alaska: Preliminary results

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Previous studies have shown that whale watching activities can influence humpback whale behaviour. Southeast Alaska is an important summer feeding ground for the humpback whales (*Megaptera novaengliae*) of the Central North Pacific stock. Since the only accomplished study of the influence of whale watching on humpback whales in this area in 2001, the whale watching industry has developed rapidly. Here we present the first land-based study of the behavioural responses of whales to whale watching activities in these waters. Theodolite observations were performed from June to September 2015, with a total effort of 323 hours. Behaviour, movement and respiration rates of whales were collected in presence and absence of whale watching boats. Mixed effects models were used to investigate the effect of boat interactions on humpback whale speed of travel, straightness of travel and respiration rates. The probability of resting in the presence and absence of boats was also investigated. A long-term monitoring program is required to better understand the impact of whale tourism on humpback whales in touristic areas such as the one investigated here. This will contribute positively to the sustainable management of this industry.

WW

ABU02

Blainville's beaked whale click scans as cues for abundance estimation

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Passive Acoustic Monitoring (PAM) is a powerful tool to study the distribution of cetacean species difficult to detect visually, such as beaked whales, but PAM is challenged by click misclassification when species share similar spectral click characteristics. We investigated an alternative method for counting beaked whales, the use of clicks scans (CS) as the 'cue' for cue counting rather than individual clicks. While potentially less prone than the detection of individual clicks to false detections and autocorrelation, these alternative methods require additional information on swimming behaviour and / or group size for accurate abundance estimation. To estimate the number and likely lengths of CS received by a PAM station as a function of distance to a vocalising whale, we used an estimate of the acoustic beam-pattern for Blainville's beaked whales, combined with data on the turning rates of vocalizing whales. The data derived from DTAGs attached with suction-cups to 19 whales. DTAGs sample triaxial accelerometers and magnetometers at 50 Hz allowing estimation of animal heading. Using data from 62 deep foraging dives and 225748 regular clicks, heading data were used to quantify for how long a receiver would remain within the animal's beam. Preliminary results show that the median length of a CS is 11 clicks (lower and upper quartile of 5 and 23), with 80% of CS containing at least four clicks. This may mark the minimum number of clicks for effective detection of a scan that can reduce false alarms. Inter-click interval data were useful to separate individuals that were clicking simultaneously. For a subset of DTAG deployments the estimated CS length was compared with data gathered from drifting acoustic recorders deployed in the same area, to compare our analysis with actual CS detected in the field.

ABU

BE02

Blue whales increase call rate in the presence of ship noise in the Chiloe-Corcovado region, Chile

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Blue whales (*Balaenoptera musculus spp*.) were once abundant in the Southern Hemisphere, but commercial whaling hunted them to near extinction in the previous century. The species is currently listed as endangered on the IUCN Red List of Threatened Species. The Chiloé-Corcovado region in Chile is one of the most important areas in the Southern Hemisphere for blue whales since it functions as a feeding and nursing ground. In recent years, ship traffic has increased considerably in the area and noise pollution is a major concern.

In order to examine potential effects of ship noise on blue whale calling behavior, six Marine Autonomous Recording Units (MARUs) were deployed at four different locations (Northwest Chiloé, Guafo North, Tic Toc Bay and Locos Islet) between January 2012 and April 2013. Audio files were analyzed in Matlab, by decimating and filtering into third octave bands, and then calculating the root mean square (RMS) amplitude of each band. Blue whale calls were detected using a signal to noise threshold value in a particular third octave band that was found to best represent call energy. In order to avoid false detections, the script output was corrected manually by comparing it with spectrograms. Presence of ship noise was also systematically noted. In an analysis of 768 hours of data from January and February 2012 from Northwest Chiloé, 12,804 blue whale calls were detected. Call rate was found to be significantly higher when ship noise was present vs. absent (19.2 vs. 15.6 calls per hour; Mann Whitney U test, $p<0.01$). Given that ship noise was present on average 6 hours per day, these data suggest that blue whales produce on average 21.6 more calls each day in the presence of ship noise, representing potentially both energetic and behavioral costs of anthropogenic noise to blue whales in this area.

BE

PH01

Bottlenose dolphins (*Tursiops truncatus*) occurring in coastal waters of SW Portugal: Resident or Transient?

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Common bottlenose dolphins (*Tursiops truncatus*) are one of the most widespread of cetacean species, occurring in both pelagic and coastal habitats. The species tends to form resident, transient or temporary migrant populations across its distribution range. Bottlenose dolphin presence in Portugal mainland has long been documented, but is mostly based on strandings information or focused on a well known resident population in the central region (Sado estuary). Only very recently surveys targeting this species were conducted outside this estuary, but there is no published information for other coastal areas yet. This study aims to investigate, for the first time, if bottlenose dolphins occurring in the coastal area of SW Portugal are resident or transient. Data available (geographic location, group size, composition and images of individual animals) was collected by one qualified observer onboard of platforms of opportunity (dolphin watching) between 2007 and 2015 in the coastal area between Sagres and Lagos, covering all seasons. A total of 124 successful photo-identification surveys resulted in a catalogue composed of 1570 photographs. The analysis of the natural marks of individuals allowed the identification of 288 dolphins. 38.9% of these were sighted more than once, and some of them occurred in different years and seasons, revealing some degree of residency and site fidelity to the study area. Results also indicate that we are in the presence of an open population, as new individuals are constantly being identified. This study contributes to the knowledge on the ecology of bottlenose dolphin populations occurring in coastal waters of Portugal mainland. This information has implications for conservation, as Bottlenose dolphins are listed in Annex II of the European Union's Habitats Directive and EU governments are required to consider the areas where this species occurs for the establishment of Special Areas of Conservation (SACs).

PH

STR02

Brucella surveillance in marine mammals stranded on the English Channel French coastline

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Since the first cases of brucellosis detected in stranded cetaceans and seals, an important number of *Brucella ceti* and *B. pinnipedialis* has been reported, mostly in the North-East Atlantic coastline. Naturally acquired infection of humans with a marine *Brucella* has been described three times. These findings suggest the importance of studying the prevalence of marine brucellae in term of public health. Marine mammals stranded on the French coastline of the English channel have been selected for necropsy and sampling. Our study includes 157 harbour porpoises (*Phocoena phocoena*), 44 common seals (*Phoca vitulina*), 4 gray seals (*Halichoerus grypus*) and 1 common dolphin (*Delphinus delphis*), carcasses necropsied between 1995 and 2014. The aim of the study is to assess the causes of death with a special emphasis of the prevalence of brucellosis. Two main causes of death are identified: traumatic associated with fishing net bycatch and infectious disease. Bycatch rate is clearly increasing (45% between 2000 and 2013), with a peak in March, when fishing is more intensive. Pneumonia represents the most common lesion when infection occurs. Among these necropsied animals, 496 organ samples from 206 animals were investigated by real time polymerase chain reaction. *Brucella sp*. was identified in 8.3% (18/206) of the stranded animals. The isolates were recovered from the four studied species. *Brucella sp.* was mainly found in lungs (n=13) and prescapulary and bronchial lymph nodes (n=7) in infected animals. Under microscope, positive immunohistochemical staining was obtained in tissues and lesions. In conclusion, *Brucella* infection was often found in the respiratory system in stranded animals. That highlights the need for additional research on the relevance of *Brucella* for marine hosts and their environment for the impact of public health.

STR

ACO03

Can diel rhythms of harbour porpoise click recordings reveal information on foraging behaviour and prey choice?

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Diel patterns of harbour porpoise echolocation as recorded by C-PODs reveal seasonal differences in areas of the German North and Baltic Sea. Echolocation activity over mostly sandy bottom near Borkum Reefground in the North Sea was higher during daytime in summer. In winter night time activity prevailed with only January being an exception. This coincides with the activity of sandeels that are mainly active during the day, but hibernate buried in the ground during winter, except for a short spawning period in January.

Similarly, porpoise detections in the Fehmarn Belt (Baltic Sea) clearly peaked during night time in winter at positions less than 20 m deep and shifted to more day-time activity during the summer. In deeper waters, however, nighttime activity dominated throughout the year. This may reflect porpoises taking a greater proportion of day-active gobies in shallow areas during the summer and is in line with reports of seasonal shifts in porpoise diet in the German Baltic Sea from mainly cod and herring in winter to a greater proportion of gobies in summer.

We assume that night time activity during winter recorded in both study areas reflect hunting of pelagic fish species like cod and herring, which at night follow vertical movements of benthic organisms and also show less effective flight responses. Both may make them easier for porpoises to catch.

These results show that diel rythms of porpoise click recordings are likely to reflect differences in prey choice and hunting behaviour and that these patterns should be considered when detection rates are used as proxies for absolute density of animals in a given area.

ACO

HI03

Cetacean Climate Change Vulnerability Index: results for the Madeira archipelago case study

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The need to assess the vulnerability of species to climate change and to identify adaptation options has led to the development of many qualitative and quantitative methods. Trait based vulnerability indexes are increasingly being developed and improved both for terrestrial and marine species. This methodology provides a ranking of species vulnerability by combining information on exposure and species sensitivity factors (e.g. physiological, phenological factors) including adaptive capacity factors (e.g. dispersal, population status). To our best knowledge, with the exception of the Arctic, such indexes have not yet been developed and tested to a wide range of cetacean species. In this study, we apply a new climate change vulnerability index to seven cetacean species in the Madeira archipelago (NE Atlantic). These species were selected due to displaying a threatened conservation status and/or being highly common in the area (five of them represent over 80% of the sightings). Given that island-associated short-finned pilot whales and bottlenose dolphins have been identified in this archipelago, an additional vulnerability assessment was performed specifically for these individuals/communities. Vulnerability scores were obtained for each species in a scale from 0 to 1 with an associated confidence score and identification of knowledge gaps. The index results showed that sperm whales and fin whales were identified as the most vulnerable species (0.65 and 0.60, respectively), followed by island-associated short-finned pilot whales and short-finned pilot whales (0.53 and 0.59); Bryde's whale and island-associated bottlenose dolphins scored 0.44 and 0.43, respectively. The least vulnerable species were bottlenose dolphins (0.24), common dolphins (0.23) and Atlantic spotted dolphin (0.21). In general, the major knowledge gaps identified were related with population sizes, migrations and impacts of human activities. We discuss the results obtained and provide insights for further development of the index based on the Madeira archipelago case study.

HI

ANA02

Cetacean vaginal folds: An adaptation to mating in the marine environment?

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Female cetaceans possess vaginal tissue foldings of unknown evolutionary function(s). These folds project caudally into the lumen of the vagina, can occupy much of the total vaginal space, and can obscure the linear pathway for sperm travelling from the vaginal opening to the cervix. As seawater is lethal to sperm, vaginal folds may be adaptations to prevent the incursion of seawater into the upper reproductive tract during/after copulation. We predicted that if vaginal folds function to remove seawater from the penis and/or as physical barriers and crypts to constrain seawater caudal to the cervix, there would be a proportional relationship between female reproductive tract lengths and the amount of vaginal folding. We dissected 53 frozen-thawed female reproductive tracts representing 16 species of cetaceans. The mean vaginal lengths and mean cumulative vaginal fold depths were regressed separately onto the mean total body lengths per species (all log10 transformed for allometry). A phylogenetically controlled regression (PGLS) of the residuals showed that vaginal length did not significantly predict vaginal fold depth ($P = 0.09$). However, additional data on more species and other tests of adaptations to aquatic living are needed. The substantial variation in the number, shape, size, and positioning of vaginal folds within cetaceans suggests that other selection pressures, such as sexual selection, may be important to understand functionality. Evaluations of the relationships between vaginal complexity and male reproductive anatomy and between vaginal complexity and mating behavior will help to discern among alternative functional hypotheses.

ANA

MN02

Cetaceans on the Frontier – an annual dedicated offshore cetacean survey of Irish waters

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Cetaceans on the Frontier (COTF;1-6) is an annual dedicated cetacean survey, carried out in Irish offshore waters since 2009, run by the Galway–Mayo Institute of Technology and the Irish Whale and Dolphin Group. The programme is funded under the Marine Institutes' competitive ship-time scheme, funded through the Marine Research Sub-programme of the National Development Plan. The COTF survey implements multifaceted and novel technological approaches towards meeting Ireland's conservation needs in the assessment and monitoring of offshore cetacean species. By incorporating an ecosystem approach to surveying offshore waters, birds, megafauna, plankton, microplastics and oceanographic parameters are also targeted. To date, funding in excess of €1 million has been received, allowing for the collection of over 500 hours of Passive Acoustic Monitoring (PAM) data as well as visual observations in excess of 350 hours, comprising of over 600 sightings. Overall, the data has contributed annually towards our better understanding of the distribution and abundance of offshore cetaceans, but some of the most significant results produced to date include; the largest record of offshore bottlenose dolphins (c200 individuals; Wall et al., (2013)), where photo-identification images failed to produce a match when compared extensively with inshore coastal catalogues. The first Irish offshore bottlenose dolphin biopsy sample, which confirmed the offshore population are different to the inshore populations (Louis et al., 2014). While most recently, allowed for the density estimation of common dolphins in the Celtic Sea, of 1.95±0.28 (95% Confidence Intervals of 1.47 – 2.61) dolphins per km2 which gave an overall abundance estimate of 24,494 and a CV of 0.14. COTF surveys have also helped increase capacity within Ireland's marine mammal community by providing an opportunity to newly trained MMOs and PAM operators to gain experience, but also acts as a platform to allow national and international scientists access offshore environments.

MN

PH02

Challenges in the application of mark–recapture methods to estimate population parameters of sperm whales in the Azores

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Whale-watching in the Azores strongly relies on sperm whales as one of the main target species. Management of this activity requires baseline data of population parameters (abundance, survival, reproduction) to monitor population changes. Over the past 30 years photo-identification data on sperm whales have been collected during dedicated surveys and by whale-watching operators in the Azores. This study aims to assess the suitability of mark-recapture methods to analyse this long term dataset to obtain robust population parameters. Data analysed was collected between 1984 and 2015 around the Azores central group of islands. Matching was accomplished using Phlex and Match 1.3. In total 1623 individual sperm whales were identified. Though identification rate of new individuals appears to have slowed in recent years, this result may be an artefact due to variability in photographic effort. Sighting frequencies ranged from 1-46 (median=11.5), with 60% of individuals seen once. Average interval between sightings was 2.6 days (SD=2.75). Over 85% of individuals were resighted within a single year and <3% were resighted ≥4 years. Maximum interval between individual resightings was >21 years (7670 days). Two adult males were encountered twice, with 403 (1.1 year) and 1444 (3.9 years) days of interval. A third male showed residence times of 24 (2008), 32 (2009), and 1 (2015) days, respectively. Whilst providing new insights into the behaviour of sperm whales in the archipelago, this study anticipates several analytical difficulties in mark-recapture methods; the most important being high variability and low number of individual resightings. Severe heterogeneity in capture probabilities is difficult to model (even with covariates) and will affect most estimators. Low capture probabilities of a large proportion of individuals will underestimate population size and reduce precision of all estimators. Finally, short residence times and continuous immigration into the area will complicate selection of a suitable study period.

PH

HE04

Characterization of the gut microbiome of hooded seals (*Cystophora cristata*)

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Symbiosis between mammals and their gut microbiome is important for the extraction of energy and nutrients from food and influences immune response and brain development. The sterile foetal gut is first colonized during passage through the birth canal and then by maternal, social and environmental contact. The composition of the adult microbial community depends on the initial colonization; food ingested, food deprivation periods and genetic factors in the host. Hooded seals (*Cystophora cristata*) are born isolated on sea ice; suckle high fat milk for three days and fast for four weeks before ingestion of solid food items. They represent an extreme example among mammals. We sampled and characterized the microflora from the proximal and distal gut contents of four seals of two years of age, two of each sex. The seals were born in the wild and taken in human care at the end of suckling where they were fed a herring diet (Permit 2012/030044 Norwegian Food Safety Authority). Molecular-based analysis using Illumina Hiseq resulted in 569 910 16S rRNA sequences from the four seals, and both sampling sites. Taxonomical classification applying a naive Bayesian algorithm in a total of 412 Operational Taxonomic Units (OTUs) showed *Firmicutes* as the major phylum across samples (93.3% of total sequences, on average), followed by *Actinobacteria* (4.6%) and *Proteobacteria* (1.8%). Strikingly, an average 75.2% of 433 158 sequences assigned to 'core' OTUs (i.e. phylotypes accounting at least 1% of total sequences) gave no designations at species level (<97% similarity percentage) with any phylotype from GenBank. Further analysis with hindgut and fecal samples from geographically diverse marine mammals highlighted similarities in the microbiome of those sharing comparable aquatic environments. Altogether, these analyses gave us the opportunity to obtain a reliable first glimpse of the small intestine microbiota in wild hooded seals.

HE

ABU03

Citizen Science an instrument to gain information on cetacean presence and distribution in understudied areas

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The Citizen Science model engages a dispersed network of volunteers to assist in professional research using methodologies developed by professional researchers. The public plays a role in data collection across broad geographic regions and often, over long periods of time. Citizen science has two clear roles: the first is to allow the collection of large amounts of data at lower cost than professional research, which can then be analyzed by researchers to test scientific hypotheses. The second, and in many cases not less important, role of citizen science is in engaging and educating the “citizens” recognizing them as valuable contributors to a larger goal or scientific effort. Issues arise during data collection and include data fragmentation, data inaccuracy, and lack of participant objectivity. The Citizen Science approach was tested as instrument to gain preliminary information about cetacean presence and distribution in an understudied area of the Sicily Channel. The project has been disseminated trough social media, website and by distributing to citizens cetaceans identification cards accompanied by form for sightings data collection. Boaters and recreational fishermen resulted the categories more participative. In order to avoid species identification errors only reports supported by photographic or video images have been taken into account. Bottlenose dolphin results the major reported species, being coastal areas the most frequented by active stakeholders, followed by striped dolphin and short-beaked common dolphin. Most of the sightings occurred during summer, as expected, and in the afternoon, between five and six pm, when bottlenose dolphins pass just few hundred meters away from the shore.

ABU

MN03

Coastal monitoring of small cetaceans and pinger deployment in northern Portugal

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Information on cetacean distribution and abundance along the Iberian Atlantic coast is still insufficient. Habitats Directive (92/43/EEC) attributed protection status to all cetacean species. Currently, cetacean bycatch is a major problem for both fisheries and species conservation. This study provides information on small cetacean coastal habitat use in the Mondego cape area (November 2012 to November 2013). Furthermore, the use of pingers in trammel nets was evaluated as a mitigation measure in mainland Portugal and related with data from on-board observations in the Portuguese trammel fleet. Both common dolphins and harbour porpoises were sighted in land-based observations, showing the importance of this feeding area. Higher harbor porpoise sighting rates occurred in February, October and November. In July, August and September there were no porpoise records. The highest common dolphin sighting rate was registered in November, and they were not observed in April, May and June. These variations may be due to differences in availability of prey or behavior during the reproductive cycle. Vessel traffic may also be an important factor. Sighting rate of both species decreased with the increment of vessel number, although this pattern was less evident for common dolphins. On-board observations showed that interactions with fishing gear in Portugal involve mostly common dolphins (96.7%) followed by bottlenose dolphin (1.65%) and pilot whale (1.65%). Larger groups of common dolphins overlap regions presenting a high number of nets, and higher number of interaction events. Pingers FUMUNDA led to a decrease in bycatch of common dolphin in Portugal (nets with pingers: 2 bycatch events in 196 trips; without pingers: 11 bycatch events in 156 trips) without any significant effect on CPUE. The resolution of interactions between cetaceans and fisheries is difficult because many environmental and social-economic parameters must be examined to find effective solutions aiming at the preservation of endangered species.

MN

HI04

Collaborative response to an Entangled Humpback in Iceland

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Sightings and reports of entangled whales are reliant upon outreach efforts that increase entanglement awareness. The whale watching industry is one source of entanglement reports and as whale watch effort increases entanglement reports are likely to as well. In Iceland, the whale watching industry has grown considerably in recent years, from 81,600 passengers in 2004 to 229,221 in 2014. With this growth and awareness the likelihood of entanglement reporting increases. On 30 July 2015, whale watch vessels based out of Reykjavik, Iceland sighted a badly entangled free-swimming humpback whale in Faxafloi Bay. The whale was entangled in rope and netting from its mouth to its tail. Due to the complexities of the entanglement, trained responders from the United States and the United Kingdom were invited by the Icelandic government to assist local responders on 15-16 August. Since disentanglement operations could not be completed within the first day, a satellite tag was affixed to the entangling gear to allow tracking overnight with relocation and resumption of response operations in the morning. The tag was deployed for 11 hours and tracked the whale for more than 19 km. Responders successfully dealt with the most lethal aspects of the entanglement and the telemetry buoy was removed.

The whale was re-sighted and identified by whale watching vessels 42 days later, the first sighting since disentanglement operations. While loose float line through the mouth remained, the more lethal tail entanglement had resolved and shows signs of tissue healing. Opportunistic re-sightings of the whale will allow for monitoring of the whale and any changes in its entanglement.

This entanglement response represented the first multi-national operation of International Whaling Commission (IWC)-trained responders to an entangled whale in Europe. Responders are trained according to disentanglement best practices agreed by the 88 member countries of the IWC.
HI

ECO01

Common Bottlenose dolphins in the Levantine deep sea (Akhziv Submarine Canyon)

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As a continuation of ongoing, boat-based, cetaceans' surveys along the southern and central Israeli coastline and along with a declaration process of Akhziv submarine canyon (ASC) and its surrounds as a Marine Protected Area, surveys along the northern coastline were initiated. ASC is the only nearshore deep-sea habitat off the Israeli coastline.
A total of 59 half-day dedicated surveys were conducted from November 2007 to May 2015, between Akko in the south and Rosh Hanikra in the north, within 6 miles from shore, for a total, on effort, distance of 1692 km. The survey area was gridded into 2km2 cells and for each cell, an effort-normalized, 0 to 1, cetacean index of presence (IP) was calculated.
There were 14 sightings of common bottlenose dolphin (CBD), the only species sighted, totaling 56 individuals, in 9 groups and 5 solitary animals. The predominant behavior was foraging, but, unlike Israel's central and southern coasts, no significant overlap was found with trawlers' presence. Most sightings were in cells overlaying ASC. Only 5 individuals (group of 4 and a single animal, in 2 sightings) were seen outside ASC. Median CBD IP was significantly higher inside (0.081) than outside (0.00) ASC (Mann–Whitney U test, $P<0.01$). 33 dolphins have been photo-identified in this research, at least 8 of them also sighted south to Haifa. The latter speaks against the existence of a distinct northern deep water sub-population. Several bentho-pelagic species, documented with ROVs inside ASC are known constituents of CBD's diet, locally and elsewhere in the Mediterranean.
Relatively high presence of CBD atop ASC apparently indicates a relatively rich underlying food web, as found in other submarine canyons world over. A productivity 'hot-spot' that may support a wide-range of top predators, especially in the ultra-oligotrophic Levantine Basin, should indeed be prioritized for conservation.

ECO

ECO02

Common dolphins in the Alborán Sea: facing a reduction in their suitable habitat due to an increase in sea surface temperature

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Short-beaked common dolphin Mediterranean subpopulation appears to have suffered a steep decline over recent decades and was listed in 2003 as 'Endangered' in the IUCN Red List of Threatened Species. The Alboran Sea is the last region in the Mediterranean where it is still abundant. In this study, we relate features of this species' ecology to climate change, focusing on distribution and density. This work used a two decades-long dataset on common dolphin in the Alboran Sea and a time series of environmental changes. Once established, these relationships were used in conjunction with some simulated scenarios of environmental change to predict the potential effects of further change on these species over the next 100 years. Two approaches were used: 1) projection from a regression line from local variation, and 2) a HadCM3 climate model with time-varying anthropogenic effects. Generalized Additive Models were used to model the relationship between density of the animals with SST and other environmental covariates. Results from both approaches were very similar. The predictions of density from the regression line fell within the ranges from the HadCM3 climate model, the first being based on local and locally, point to point, differentiated information, which lead us to consider the first approach as the best for this area. At the small spatial scale of the Alboran Sea and Gulf of Vera, an increase in SST will potentially yield a reduction in suitable habitat for common dolphins, with a progressive reduction in density from East to West.

ECO

ABU04

Comparing aerial and ship based encounter rates for cetaceans based on case studies in Antarctica

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In this study, we present our findings and conclusions from 4 concurrent aerial and ship based line transect distance sampling surveys on board a research vessel in Antarctica. We here present a discussion of differences in encounter rates for large whales (comprising humpback, fin and blue whale) and minke whales based on spatio temporal units where both survey methods ran in parallel and compare these findings to generalized averages across the whole survey period.

Using this approach, we show that there is a substantial effect of survey platform on target species' encounter rates depending on species group. While large whale encounter rates are about 1.5 times higher in helicopter surveys than they are from the crow's nest, minke whale encounter rates seem to be lower. We discuss potential effects of observer presence for both species group, providing a reasonable data base to describe avoidance and attraction effects on different cetacean species.

ABU

BE03

Comparing behaviour of wild and rehabilitated juvenile grey seals in the German North Sea – A pilot study

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The grey seal population in the German North Sea has been steadily growing since the late 1960s after several hundred years of absence. The colony on the island of Helgoland is growing strongest with 244 births in 2015. As birth rates have increased, more grey seal pups are separated from their mothers due to disturbances during the first weeks of their life. These animals are rehabilitated in the seal centres in Friedrichskoog and Norden-Norddeich and released again. So far it is unknown if they use their habitat similarly to their wild conspecifics. Three wild juvenile grey seals were captured and tagged with GPS data loggers on the island of Helgoland for the first time in German waters in January 2015. Four further rehabilitated individuals were tagged and released to the wild in March and May 2015. The devices were glued to the fur on the upper back of the animals and recorded GPS positions, time of day and dive depth. From January to October 2015 we gathered data of seven individuals for over seven weeks up to seven months. Spatial and temporal patterns of the individuals differed between the two study groups. Rehabilitated animals were more resident, they moved more locally with shorter distances to and less time between haul outs. The wild individuals tended to do longer trips and to change more frequently between haul out areas. Diving behaviour did not differ between the two groups. This pilot study shows that, despite some differences to the wild animals, the rehabilitated juvenile grey seals adapted well to their natural environment. It is planned to continue this study in order to increase the general knowledge on grey seals in the German North Sea, to improve the comparison of both groups and to study the potential impact of offshore wind energy developments.

BE

PH03

Comparison of the Northwest Atlantic-NWA and Northeast Atlantic-NEA Blue whale (*Balaenoptera musculus*) photo-identification catalogues.

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Beginning in 1979 Blue Whale (*Balaenoptera musculus*) photo-identification has been carried out in the Atlantic Ocean. A western North Atlantic Catalogue (NWA) has exicted for 37yrs, which includes 485 photo-identified individuals from West Greenland, to eastern Canadian waters, including individuals from the St Lawrence, Scotian Shelf, Newfoundland and Gulf of Maine. A North East Atlantic catalogue (NEA), which includes 493 photo-identiifed individuals from Denmark Strait, Iceland, Jan Mayen, Spitsbergen to the Barents Sea in summer-extending South to Northwest Africa in winter, has been collected since 1987. Most photo-IDs are from the Azores (333), where a 14% re-sighting rate of catalogued individuals occurs, and 131 from Icelandic waters. Long-range matches for the NEA catalogue includes 2 individuals between the Azores and Iceland, 1 individual between Spitsbergen and the Azores and 1 individual between Mauritania and Iceland. There has been one cross-Atlantic match between the NWA and NEA catalogues of a individual first identified in the St Lawrence in 1984 and re-sighted in the Azores in 2014, however, no other individuals were matched between the NEA and NWA catalogues, which suggests two largely discrete blue whale populations in the North Atlantic Ocean. Despite significantly less research effort, the NEA has yielded a larger catalogue in less time and shows signs of being a larger healthier population, with 16 calves sighted off the Azores and Iceland, compared to just 23 in 36yrs in the NWA.

PH

NT03

Concordances and dissimilarities in the pattern of variation of C, N, O and S stable isotopes in the baleen plate of fin whales

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Like most mysticetes, fin whales undertake annual migrations alternating high-latitude feeding grounds in summer and low-latitude breeding grounds in winter. Although the identification of the migration patterns and the location of winter grounds is important to determine the degree of mixing between populations, these factors are still poorly known for many populations and species. Baleen plates, composed of keratinous tissue, grow continuously. After formation they remain chemically inert, and therefore constitute a continuous record of variations occurring through life, thus providing an insight into the recent movements and feeding of individuals.

Here we investigate the concordance between the patterns of variation of carbon, nitrogen, oxygen and sulphur stable isotopes occurring along the baleen plates of 5 fin whales summering off West Iceland. We observed oscillations in all elemental isotope compositions, although the amplitude of these oscillations was variable. Those of δ34S followed the same pattern as those of δ15N, although they were less pronounced. δ18O oscillations were inversely correlated to those of δ15N and δ34S. δ13C oscillations were comparatively small, had large individual variability, and showed no correlation with those of the other elements. Individual variability is likely explained by individual-specific biological traits or migratory patterns. These results confirm the utility of stable isotope ratios to investigate movements and migration in mysticetes.

NT

BE04

Conditions for successful communicative experiment with dolphins

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Were carried out several experiments that had the purpose to investigate the ability of dolphins to pass each other complicate information. The experiments of J. Bastian and V.B. Kuznetsov confirmed this; the experiment of A. Zanin partly confirmed; the experiment of A.V. Agafonov has not confirmed this. Successful experiments were carried out in 1960-1970 years, and are attended by male and female. The experiment of A.V. Agafonov with a negative result was held with the participation of only females in 2014. The most interesting result of the experiment of A.Zanin, which was held in the midle of 1990s in the Crimea. In the final stage of this experiment female dolphins primarily transmit information to each other, and after that they changed they stopped doing it. Therefore it can be assumed that dolphins are capable of transmitting information, but should not be violated their hierarchical and gender relations. It is also desirable in the communicative experiment used underwater objects because may be that in a natural communication system of dolphins no exist notation for analyzing processes in the air. Also for communicative experiment should be chosen dolphin with approximately the same cognitive abilities.

BE

NT04

Creating customized programs for cetacean research using software creation tools

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Every year technology becomes more advanced and accessible. Despite that, many research groups still rely on pen and paper to collect and store data on the field and then need to pass it manually to some kind of digital format in order to store it. This method is time consuming and many times is not precise enough when data collected need to be accurate, like in behaviour collection.

This project aims to fill the gap using program creating tools: software that allows to create programs with little to none programming knowledge and export them to different platforms (Windows, Linux, Android, iOS…).

In this case “Scirra's Construct 2” was used to create the application “CetoSee”.

The tests are being done within the project “ISPRA Cetacean Monitoring Network along fixed transects” (FLT MED NET) in the Mediterranean basin whit several groups participating using ferries as platform of observation on different routes.

After this test, the next step is to create a more generic tool adaptable to wider needs.

Being able to create your own software allows the research team to adjust it to their specific needs.

NT

NT05

Detection of harbour porpoises (*Phocoena phocoena*) using an Unmanned Aerial Vehicle

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Aerial surveys are a standard method used to estimate marine mammal abundance and distribution. Unmanned aerial vehicles (UAVs) have recently attracted attention as a cost effective alternative, but to evaluate the capabilities of these systems there is a need for comparative studies with the purpose of defining correction metrics for the data collected by the UAV. We conducted trials in a narrow tidal channel in northern Norway, known for its predictable presence of harbor porpoises. We performed 6 flights using the Cryowing Micro Scout UAV, flying at an altitude of 150 meters. Images were taken with a Canon EOS-M, 18-megapixel camera mounted vertically below the platform, giving a ground resolution of 3.16 cm and covering a total area of 2.4 km2. The camera was set to take images every 2 seconds with a 72% overlap. Simultaneously, and following the same track as the UAV, land based observations were conducted using a Vantage Point system (VP), which uses camera images and landmark information to triangulate the animals' geographic location. We gathered 3033 images from the UAV, 2 of those containing absolute certain harbor porpoise observations, and 12 VP photos. The images were manually analyzed and assessed for glare, sea state, and cloud cover. Our results show that only a small proportion of the animals detected by land observers, were also detected in the UAV flights. The few numbers presented here are a result of the difficulty in analyzing the images and classifying sightings as "certain" mainly due to the amount of debris, glare, and other animals in the area. However, the fact that we captured UAV images of porpoises, which are generally known to be challenging to photograph, shows the relevance of such projects in developing appropriate methods for the applicability of new technologies for surveys of small cetaceans.

NT

NT06

Development of an acoustic mass stranding alert system

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The shores of Cape Cod, Massachusetts, USA are a “hot spot” for cetacean mass stranding events (MSEs), and thus are particularly suited for studying where, when, and why these events occur, and also for investigating potential mitigation measures. More than 600 individuals from three species (Atlantic white-sided dolphins, *Lagenorhynchus acutus*, common dolphins, *Delphinus delphis*, and long-finned pilot whales, *Globicephala melas*) have stranded in Cape Cod in the past 12 years, many in the vicinity of Wellfleet Harbor. Aside from being costly to the marine mammal species involved due to high mortality levels, MSEs are also costly in terms of the mitigation efforts employed by stranding responders. Responses usually begin once animals are near or on the beach, which makes rescue efforts more difficult. Earlier knowledge of impending events would enable more effective stranding response. Our goal is to develop an acoustic method to predict MSEs, which would enhance response efforts, potentially reducing costs, injuries and mortalities. To this end, we have deployed acoustic recorders in the entrance to Wellfleet Harbor since April of 2014. Acoustic data from 188 days have been analyzed so far, with 31 containing whistle detections. Of 11 stranding events during this period, 7 occurred within 1-4 days of an acoustic detection. Notably, all 7 strandings were of common dolphins, which is currently the species that strands most frequently in this area. Of these 7 strandings, 3 were MSEs. In addition to continuing data collection, we are now beginning to assess whether there are features consistently associated with whistle detections prior to MSEs (for example, greater density of whistles) that could help differentiate these from other whistle detections. These data suggest that detection of whistles at the entrance of Wellfleet harbor has potential to provide advance warning of MSEs of common dolphins.

NT

NT07

Development of autonomous phototrap camera systems to monitor monk seal populations

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Mediterranean monk seal (*Monachus monachus*) uses inside beaches of marine caves as reproductive and hauling out places. The monitoring of these areas is key to define the conservation status of the species. However, monk seals are very sensitive to human disturbances and the caves used are mostly located in remote areas with difficult access, where the monitoring by direct observation is not possible. We have developed a photo trap camera system to monitor those caves during long periods of time at Cabo Blanco peninsula (Mauritania/Morocco) and at Madeira archipelago (Portugal) with excellent results. With this purpose, some innovations were included to commercial photo trap cameras. The system can have an operative autonomy of between 6 and 10 months and it can withstand the hard marine conditions of the caves, even tolerating total immersion of the camera. These innovations consist basically on the development of an automatic cleaning system of the optical lenses, the use of waterproof cases to protect the electronic equipment against marine water and the use of no glow infrared flash inside the protection cases. The camera, programmed on time-lapse mode to obtain a picture per hour, obtains a regular sampling of presence/absence of seals in the cave. The system is very versatile and can be adapted to most caves or coastal habitats used by monk seals throughout all its world distribution home range. The use of these systems, allows to identify the areas used by the seals, to determine the pattern of use of these places, the detection of threats, as well as the individual identification of the animals and detection of births and deaths of pups, key parameters to monitor the conservation status of the population.

NT

ANA03

Development of the auditory cortex in the bottlenose dolphin (*Tursiops truncatus*): a quantitative analysis

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The brain of cetaceans is regarded as having different specialized features following their adaptation to the marine environment, however they retain also some primitive characteristics. This duality can be observed also at the level of the neocortex, which underwent a considerable expansion and an extreme gyrification, but with a marked reduction in thickness, as well as a poor lamination, low neural density and high glia:neuron ratio. We investigated how some morphological parameters change over the course of the postnatal development in the bottlenose dolphin. We focused on the primary auditory cortex, whose development is expected to be quite advanced in the newborn, to receive and interpret correctly the sound stimuli in the water. We compared a group of newborns with adults from the wild and from controlled environments, using a semi-automated image processing analysis. Results indicated that the cortical development in the newborn is comparable to that of the adult, with no difference in the cortical thickness or neuronal density. However we noticed a significant decrease in the total number of neurons in very old subjects (up to 40 years old) compared to newborns, and this is mainly due to the loss of small sized neurons (50-90 mm2). Future studies will aim at comparing the immunoreactivity pattern of the three groups against the three calcium-binding proteins parvalbumin, calretinin and calbindin, to verify possible age-related changes in the normal organization of the cortical column.

ANA

ECO03

Diet of harbour porpoises (*Phocoena phocoena*) and bottlenose dolphins (*Tursiops truncatus*) in Portuguese mainland waters

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Direct competition with commercial fisheries for fish resources may be a reality for some cetacean species. Under the scope of project LIFE+ MarPro, the feeding ecology of harbour porpoises (*Phocoena phocoena*) and bottlenose dolphins (*Tursiops truncatus*) was determined to evaluate levels of competition with fisheries operating in mainland Portugal. We analysed a total of 79 and 27 non-empty stomachs of harbour porpoises and bottlenose dolphins respectively, found stranded along the Portuguese mainland coast between 1997 and 2014. Fish were the most important prey group in both cetacean species' diets, followed by cephalopods and crustaceans. Diets included a total of 33 taxa in the case of harbour porpoises and 52 taxa in the case of bottlenose dolphins, suggesting that both species have a broad diet. The most important prey species for harbor porpoises, in terms of numerical importance, were dragonet (*Callionymus lyra*) (%N = 28.1), pout (*Trisopterus spp*). (%N = 18.1) and mullet species Liza spp. (12.3%). However, in terms of biomass, mullets were predominant (%W = 52.1) followed by hake (*Merluccius merluccius*) (%W = 15.2). The most important prey species in bottlenoses' diet were the European conger (*Conger conger*) (%N = 15.7; %W = 67.3), hake (%N = 13.7; %W = 8.3) and the non-commercial red bandfish (*Cepola macrophthalma*) (%N = 12.1). Both cetacean species prefer demersal prey, although they also feed on pelagic and mesopelagic prey, providing insights of their ability to explore various depths and habitats. This information concerning the only Habitats Directive Annex II cetaceans (harbour porpoises and bottlenose dolphins) can be incorporated in trophic overlap studies between cetaceans and fisheries, ultimately contributing to the implementation of future conservation and management measures in mainland Portugal.

ECO

PH04

Differences in Azorean habitat use by three migrating mysticete species: a photo-id study

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Recent satellite telemetry studies revealed different behaviours for migrating blue (*Balaenoptera musculus*), fin (*B. physalus*) and sei (*B. borealis*) whales off the Azores (mid-North Atlantic). Blue and fin whales remained weeks to a few months in the region, and movements were indicative of foraging behaviour, suggesting the Azores may be an important mid-latitude foraging habitat for these species. In contrast, sei whales transited rapidly through the region. We investigated individual residence time and inter-annual site fidelity using photo-identification data, to elucidate differences in habitat utilization among these species. Photo-identification data were collected between 2000 and 2015 during research surveys and whale-watching operations. A total of 123 blue whales, 203 fin whales and 109 sei whales were identified. Re-sighting rates were 17.1% for blue whale, 15.8% for fin whale and 6.4% for sei whale. Minimum residence time within a year varied between 1 and 45 days (median=6, *n*=11) for blue whales and, 1 and 46 days (median=2, *n*=32) for fin whales. Sei whales remained 1-2 days (median=1, *n*=7) in the study area. Twelve blue whales were sighted in different years, with a maximum interval of 8 years. Only one inter-annual match was obtained for sei whales, while none were observed in fin whales. These results confirm previous satellite telemetry studies: blue and fin whales can stay in Azores for a few weeks, while sei whales do not seem to interrupt the migration in the vicinity of the islands. However, only a small number of blue and fin whales were re-sighted each year, suggesting short residence times for most individuals, or insufficient sampling effort. Blue whale data suggests some degree of inter-annual site fidelity. This may reflect greater consistency in habitat use by blue whales, or higher recapture probabilities due to a smaller population, longer residence times and the presence of easily recognisable marks.

PH

ABU05

Distribution and abundance of bottlenose dolphin (Tursiops truncatus) along French Provencal coast, Mediterranean Sea

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Like all cetaceans, bottlenose dolphins (*Tursiops truncatus*) are strictly protected in France. Yet, our ecological knowledge of this species along French Provencal coast is still limited to ensure its proper management in the region. This study was carried out by the GECEM in the framework of Grand Dauphin Etude et Gestion en Méditerranée (GDEGeM), a collaborative project aiming at improving knowledge and conservation of the north-western Mediterranean bottlenose dolphin population. From May 2013 to February 2015, 8 surveys were carried out along the Provencal coast and resulted in 18 sightings and the identification of 147 individuals. Group size averaged 15.8 ±10.3 individuals and 71% of groups included less than 15 individuals. Juveniles occurred in 15 groups among which 5 included calves. Three births have been demonstrated over the study period. Bottlenose dolphins were sighted throughout the year with higher frequency in spring. Sighting rate was higher around Hyères islands. Only 31% of individuals were sighted more than once and 8% at least 5 times. The capture histories and the distribution of sightings clearly showed that a number of dolphins regularly use the study area. Three distinct patterns of occurrence seem to arise: year-round residents, occasional residents and transients. Abundance estimates were calculated based on Cormack-Jolly-Seber open population model and allowed to produce estimates for 5 field seasons. Bottlenose dolphin abundance estimates ranged from 20 (95% CI of 11 – 41 individuals) to 37 individuals (95% CI of 20 – 83 individuals). Analysis of behaviour did not highlight any pattern in habitat use. The cumulative discovery curve is still readily increasing, highlighting the need to pursue data collect in order to consolidate knowledge on the population.

ABU

ANA04

Double-teeth in the Pacific walrus

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Along with normal forming of dentition in rare instances the mammal have an anomalies in growth deviations (for people it less than 1 per set). One of these anomalies is double teeth, in our case it is coalesced two teeth. In general the same anomaly has been investigated for people, cats, and dogs. There is no information for marine mammal. We have investigated 96 upper and 68 lower jaws of Pacific walruses at age of 5 years old and older from the Chukchi and Bering Seas. We have found 4 occurrences of coalesced adjacent teeth at three walrus. In two cases we observed accretion of 2 rudimentary teeth on the upper jaw at one individual (Pm4-M1; the 1st individual in the age of 26 years), and in the others cases we found out accretion of functional and rudimentary teeth on upper (Pm3-Pm4; 2nd - 24 years) and lower jaws (Pm4-M1; 3rd - 22 years). Longitudinal sections are made from the middle part of these teeth. At the cuts it is visible at the level of cement layers there was coalesced. Until accretion of teeth annual cement layers were formed on as usual all over a surface. From the moment of accretion of teeth annual cement layers ceased deposit on in a place of teeth contact, and were deposited on only on their external sides. As a result on external sides of roots of the spliced teeth the quantity of annual cement layers was more than ones from their contact. Age of accretion of teeth began for the 1st individual is 11 years (1st pair) and it is 20-23 years (2nd pair), for the 2nd - 7 years, for the 3rd - 12 years. We think the causes of an origin of such deviations probably are connected with diseases or injuries.

ANA

ACO05

Echolocation parameters of Australian humpback dolphins (*Sousa sahulensis*) and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in the wild: investigating biosonar parameter shaping pressuresErro! Marcador não definido.

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Echolocation is a key sensory modality for toothed whale orientation, navigation and foraging. Yet, the evolutionary pressures that define the variation in toothed whale biosonar parameters remain largely unknown. More specifically, there is a paucity of knowledge on how sympatric delphinids and local environments have shaped the evolution and operation of biosonar source parameters in similar sized toothed whales. To address this, we identified two small delphinids of similar phylogeny inhabiting the same shallow coastal environment, to test the hypothesis that habitat and sympatric species competition will provide the greatest influence in shaping toothed whale biosonar source parameters. Biosonar clicks from Australian humpback dolphins (*Sousa sahulensis*), and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) were recorded within the same stretch of coastal habitat in Exmouth Gulf, Western Australia (WA), using a vertical seven element hydrophone array. S. sahulensis used biosonar clicks with a mean source level of 199±3 dB re 1µPa pp, mean centroid frequency of 106±11 kHz and emitted at interclick intervals of 79±33 ms. These parameters were similar to click parameters of sympatric *T. aduncus*, characterized by mean source levels of 204±4 dB re 1µPa pp, centroid frequency of 112±9 kHz and interclick intervals of 73±29 ms. Parameters are comparable to other similar sized delphinids and suggest a convergence on a high directionality index, emphasizing biosonar parameters to be independent of sympatric delphinids and driven primarily by body size. The dynamic biosonar behaviour of these delphinids may have consequently allowed for adaptations to local environments through high levels of control over sonar beam properties.

ACO

HE05

Ecological variables affecting trace element concentrations in bottlenose dolphins and harbour porpoises in mainland Portugal

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To date, only bottlenose dolphins (*Tursiops truncatus*) and harbour porpoises (*Phocoena phocoena*) have been listed on Annex II of the Habitats Directive (92/43/CEE). Their conservation status and more recently the Marine Strategy Framework Directive emphasise the need for data on cetacean ecology and anthropogenic threats. The evaluation of bottlenose dolphin and harbour porpoise ecotoxicological status is necessary to evaluate the impact of pollution on these cetacean species. Hepatic and renal trace element concentrations were evaluated in harbour porpoises (n=42) and bottlenose dolphins (n=25) stranded in continental Portugal. Considering European waters, both species presented high mercury levels, only exceeded by animals from Mediterranean and Adriatic seas, in the case of bottlenose dolphins. Differences were observed, between species, in the bioaccumulation of almost all trace elements analysed (except hepatic Pb and Zn). In general, bottlenose dolphin showed higher values compared to harbour porpoise. Analyses per species revealed no effect of sex of dolphins in the concentration of trace elements analysed. Conversely, influence of animal length, stranding location, parasite burden and nutritional state were observed. Bioaccumulation of non-essential elements and Se occurred in larger animals in both harbour porpoises and bottlenose dolphins. The influence of parasite occurrence and nutritional state was observed only in Zn concentrations in harbour porpoises, corroborating the dynamic role of Zn in nutritional condition and immune system of mammals. In bottlenose dolphins stranding location influenced hepatic levels of non-essential elements, which may relate with regional diet variation or trace element bioavailability, due to proximity to anthropogenic and natural sources in the Atlantic Iberian coast and in the Mediterranean. This study provides valuable baseline information about the contamination status of these cetacean populations thus emphasizing the need for conservation decisions, especially considering the vulnerable status of harbour porpoises in Iberia.

HE

HI05

Estimating bycatch of small cetaceans in beach seine fisheries in Portugal, 2000 –2015. Sustainability, conservation concerns and recommendations for mitigation

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The beach seine fishery is an old artisanal fishery operating in the Portuguese coast, since the XVth century. This métier is operated by small fishing communities, mainly in the northwest coast in villages with no fishing harbours. The main beach seine target species are small pelagic fish such as mackerel (*Scomber japonicas*), anchovy (*Engraulis encrasicolus*), horse mackerel (*Trachurus trachurus*) and sardine (*Sardina pilchardus*). This fishery operates in coastal shallow sandy areas, which are also important harbour porpoise areas, especially in the centre of Portugal, where the main population nucleus completely overlaps the area presenting the highest occurrence of beach seines. Bycatch events in beach seines have been monitored since 2000, in a cooperative effort between fisherman, fisheries observers, maritime authorities and researchers. Data from bycatch voluntary declarations was complemented with data from interviews performed in 2010/2011. Results showed that beach seine bycatch is higher between June and September (beach seine's highest activity period). Over 16 years, we registered 33 events of porpoise bycatch, with a total number of 47 animals and 42 deaths. Common dolphin was also registered in bycatch events (12) involving 192 animals and 38 deaths. The annual bycatch rate (only accounting dead animals) is 0,00064 for porpoises and 0,00058 for common dolphins per boat/day. Monthly bycatch was related with demersal fish landings and small pelagic species landings. Interviews revealed much higher bycatch levels. During interviews, fishermen reported a bycatch event with bottlenose dolphins. Bycatch rates obtained from interviews were 0.0044 common dolphins per boat/day, 0.0012 harbour porpoises per boat/day and 0.0002 bottlenose dolphins per boat/day. This small local fishery (considering the total fleet) is responsible for a removal of ± 5 harbour porpoises per year, corresponding to a Potential Biological Removal (PBR) of 0.27, which is very high considering the fishing fleet size (only 40 boats).

HI

HI06

Evaluating the need for active disentanglement of small cetaceans: a case study

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Interactions between cetaceans and fisheries are a widespread occurrence, with bycatch in fishing gear one of the main threats to these animals globally. Very often, bycatch is almost immediately fatal, but sometimes animals may escape with part of the fishing gear still attached to them. Such cases are not only a welfare issue due to prolonged suffering, but are also a conservation concern, as affected animals often eventually die. It is tempting to initiate potential rescue or disentanglement operations, but such interventions need to be carefully considered, particularly when involving mother-calf pairs. We use a case study, combining observations in the field and post-mortem investigations, to evaluate the justification of potential disentanglement attempts. We centre our evaluation on a mother-dependent bottlenose dolphin calf with a partial entanglement in fishing gear, over one year. A part of a trammel net was embedded in the anterior part of the dorsal fin, cutting into the tissue, and hanging off the sides of the dolphin. Despite the entanglement and the associated injuries, the dolphin was able to move, dive and feed in an apparently normal fashion. It was considered that rescue attempts were likely to be unsuccessful or potentially more detrimental, and hence no direct action was taken. Data collected subsequently suggested this decision was appropriate. We conclude that intervention is difficult and can be counter-productive, and that it should only be attempted in exceptional cases. We hope this case study can add to our collective knowledge on chronic entanglements and help guide appropriate course of action in similar cases in the future.

HI

MN04

Extinct or not? The case of harbour porpoise in the Finnish waters, northern Baltic Sea

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The harbour porpoise is the only regularly occurring species of cetacean in the Baltic Sea. The Baltic Sea population collapsed during the second half of 1900s and is now classed as critically endangered by the IUCN. The species was regularly recorded in the Finnish coast before the collapse, but is now classified as regionally extinct. The Finnish Ministry of the Environment launched a campaign to collect opportunistic sightings from the public in 2001. Up to date, ca. 70 confirmed sightings of more than 100 animals has been made during the years 2000-2015. Monitoring using C-POD acoustic detectors conducted within the projects SAMBAH and LAMBADAH in 2011-2015 indicated that the harbour porpoise is more frequently present in parts of the Northern Baltic Sea than was previously thought, however still very low in numbers. The acoustic data was visually validated. Most acoustic encounters were in offshore areas between southwest Finland and central Sweden during the cold water seasons from October to April. Contrary to that, the opportunistic sightings data shows an effort bias as the sightings are mostly made during the summer months and from popular coastal areas for recreational activities, i.e. when and where the observers are present. The results also show that there is a need for more transnational efforts to produce a more detailed picture of the occurrence and seasonal distribution patterns, including the Northern Baltic Sea area outside their previously assumed distribution. Sufficient reliable information is needed for appropriate and cost-effective conservation and management measures of this critically endangered population in its northernmost range.

MN

ECO04

Feeding ecology of the striped dolphin (*Stenella coeruleoalba*) along the Portuguese mainland coast

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Striped dolphins (*Stenella coeruleoalba*) are abundant mostly in oceanic waters and their distribution is wide in the entire Portuguese Economic Exclusive Zone. However, no information exists on the feeding habits of the species in Portuguese mainland waters. Data on stomach contents of 36 striped dolphins stranded along the country between 2002 and 2014 are presented. Preys present in stomach contents were analysed and their relative importance was determined through occurrence, numerical and biomass indices. Of about 37 species identified, fish was the most important prey group (% N = 82.2; % W = 79.2; 25 identified species), followed by cephalopods (% N = 16.9; % W = 20.8; 12 identified species) and a residual presence of crustaceans. The family Gadidae was the most abundant in numerical importance and occurence (% N = 30.6: % F = 29.6), represented by pout (*Trisopterus spp.*), silvery pout (*Gadiculus argenteus*) and blue whiting (*Micromesistius poutassou*), followed by the family Gobiidae (% N = 27.1). Sardines (*Sardina pilchardus*) standed out as the most important prey in terms of biomass (% W = 22). For cephalopods, Sepiolidae and Loliginidae species were the most frequent. Gender differences in prey preferences were observed, suggesting that males prefer demersal prey and females prefer pelagic prey, providing insights that the species is able to explore various depths and habitats. This information is an important new biological tool for striped dolphins present along mainland Portugal. Furthermore, its use can be incorporated in studies of trophic overlap with fisheries and contribute to the implementation of future conservation and management measures if necessary.

ECO

ECO05

Feeding habits of sperm whales (*Physeter macrocephalus*) in Greek Seas, Eastern Mediterranean

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All published information on the diet of sperm whales in the Mediterranean Sea comes from two stomach contents. In this study, five full stomach contents and one partial (due to a ship strike) from sperm whales stranded along the Greek coasts were analysed. Remains of mesopelagic squids were the only feeding items found: mainly beaks, but also lenses and entire or partial mantles, heads or crowns. Plastic objects or debris (bags, fishing nets, ropes etc.) were present in three cases, in one of which had caused the whale's death (85 plastic items). Although several upper beaks were identified, only lower beaks were used in this study. From 16,896 lower beaks found, 1,735 (10.27%) remained unidentified due to their morphological damage. The total number of lower beaks in each stomach varied from 101 to 11,753 (case of stomach full of plastic). In cases where identification to the species level was not possible, the genus or family was kept. A total of eleven squid species was identified. The contribution of each taxon as percentage of the total number of lower beaks from all the six stomachs was: *Histioteuthis bonnellii* 50.15%, *Histioteuthis reversa* 20.26%, *Histioteuthis spp*. 10.92%, *Octopoteuthis sicula* 6.47%, *Chiroteuthis veranii* 0.86%, *Ancistrocheirus lesueurii* 0.55%, *Onychoteuthis banksii* 0.22%, *Todarodes sagittatus* 0.12%, Ommastrephidae 0.06%, *Ommastrephes bartramii* 0.05%, *Galiteuthis armata* 0.02%, *Illex coindetii* 0.01% and *Ancistroteuthis lichtensteinii* 0.01%. Lower rostral length (LRL) was measured to the nearest 0.05 mm. For *H. bonnellii*, *H. reversa* and *O. sicula* LRL (mm) it ranged 1.90 to 13.55, 0.90 to 9.15 and 4.25 to 15.10 respectively. Considering the geographical spread of the samples, the above findings indicate that sperm whales feed exclusively on mesopelagic squid in the Greek Seas, which is likely to be the case also for the entire eastern Mediterranean Sea.

ECO

PH05

Fin whale (*Balaenoptera physalus*) photo-identification catalogue results in the Catalan coast

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Fin whales (*Balaenoptera physalus*) visit the Catalan coast (between Barcelona and Tarragona) every year. Our study focuses mainly on the Garraf coast (central-south Catalonia), covering an area of 840 km^2, where these animals are found between February and June, from 4 miles offshore. Since 2011, EDMAKTUB is witnessing the presence of these marine mammals, but the Fin Whale Project began in 2013. This is a long-term study focused on increasing the knowledge of these animals, investigating the reasons for their annual presence and developing a photo-identification catalogue. Up to date, a total of 111 animals were sighted, of which 58 individuals have been catalogued. These were classified visually, following the methodology of dorsal fin profile presented by Agler *et al*. (1990) and determining the presence/absence of notches within the fin. The chevron and the different marks and scars occurring in the skin were also analysed and took into account. 7 animals were observed on successive days during the same year and 5 were recaptured in subsequent years, sighting one of these specimens during three different years (2011, 2014 and 2015). Moreover, EDMAKTUB Association is developing a new fin whale photo-identification methodology through the analysis of aerial images taken with a drone. It is necessary to continue and strengthen the research through a monitoring program in collaboration with other organizations, in order to compare photo-identification catalogues and identify the fin whale migration along the Mediterranean Sea.

PH

HI07

First attempt to understand the effect of pingers on static fishing gear in Bulgarian Black Sea coast

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Acoustic deterrent devices (pingers) are used on static fishing gear called “dalyan” in an attempt to reduce bycatch of small cetaceans, and/or to reduce depredation by dolphins. This is the first study for understanding the effect of pingers and to determine how effective these devices may be as management tool in Bulgarian Black Sea conditions. Between March and June 2015 “dalyans” were equipped with harbour porpoise pingers in the northern part of Bulgarian coast. Observations were carried out on regular bases on active (with pingers) and on control "dalyans" (without pingers). The preliminary results showed that harbour porpoise pingers are effective in reducing damages on fishing gears. Pingers also reduced dolphins’ bycatch in “dalyan” fishing nets, without affecting target fish size and catch. This is first experimental research and more issues should be studied in the future, as the "habituation" problem.

HI

HE06

First isolation of dolphin morbillivirus in Italy

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Virus isolation of Dolphin Morbillivirus (DMV) is still regarded as the "gold standard" for definitive diagnosis of infection, though it remains a challenge when attempted with stranded cetaceans (Van Bressem *et al*., 2014). Indeed, most of what is known about Morbillivirus infections in marine mammals has come from biomolecular assays (RT-PCR), since wild-type strains are difficult to isolate and propagate in cell culture systems (*Nielsen et al*., 2008). The first cell lines employed for DMV isolation were Vero cells (African green monkey kidney); recently, a new developed Vero cell line expressing the canine signaling lymphocyte activation molecule (SLAM/CD150) showed to be a highly sensitive substrate for DMV isolation (Nielsen et al., 2008). Since 2015, Vero/dogSLAM cells are available at C.Re.Di.Ma (National Reference Centre for Diagnostic Activities on dead Stranded Cetaceans). This allowed the first retrospective isolation of DMV from an adult female striped dolphin (*Stenella coeruleoalba*) stranded along the Ligurian coast of Italy in 2008. The animal, which was emaciated, underwent necropsy and diagnostic analyses according to standardized protocols. Non-suppurative meningoencephalitis, granulomatous myocarditis and interstitial pneumonia were found. Both lungs and heart tested positive for Toxoplasma gondii by PCR and immunohistochemistry (IHC), with anti- T. gondii antibodies being also detected. DMV was identified in both lungs and brain by RT-PCR (used as screening assay) and IHC. In 2015, a frozen brain tissue sample was submitted to virus isolation using the above Vero/dogSLAM cell line. A cytopathic effect (CPE) was observed after 5 day (first passage), consisting in syncytia formation and rounding-up of cells; DMV was then confirmed by RT-PCR performed on the supernatant. This DMV isolate could help C.Re.Di.MA performing virus neutralization assays based on homologous antigen, as well as conducting thorough phylogenetic investigations and obtaining specific monoclonal antibodies.

HE

HE07

First record of the nasal mite (*Halarachne halichoeri*) in a grey seal from the German Wadden Sea

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The nasal mite (*Halarachne halichoeri)* (Acari: Halarachnidae) is a phocid seal ectoparasite that has been described to affect grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) in the North Atlantic Ocean, causing different levels of upper respiratory diseases and rhinitis. Typical clinical symptoms include sneezing, coughing and nasal discharge, possibly leading to an impairment of respiration. The earliest descriptions of this arthropod species date as far back as 1847. It is a regular finding in stranded seals along the US East Coast and has been thoroughly described in England and the North-Western Spanish coast. In July 2015 an adult female grey seal died on the German island of Sylt in the North Sea. Through the German stranding network and in the frame of the consecutive wild seal population monitoring projects in Schleswig-Holstein waters, the animal was transported to the Institute for Terrestrial and Aquatic Wildlife Research and directly necropsied in a fresh state. Examination of the external nose and the nasal cavity showed a mild presence of live nasal mites, later identified as *H. halichoeri*, including adult and larval stages. The seal was in poor nutritional status and the pathological examination revealed severe diffuse catarrhal purulent bronchopneumonia and moderate gastritis. Further parasitic findings included a severe infection of anisakid stomach nematodes and a severe infection with *Corynosoma* spp. (acanthocephala) in the small intestine. To our knowledge, this case report represents the first finding of *H. halichoeri* in grey seals in the German North Sea. It is suggested that the prevalence of *H. halichoeri* in seals from German waters may be higher than previously thought and that examinations of the nasal cavity during post mortem investigations have to be conducted systematically to gain sufficient data on the prevalence of this potentially emerging parasite mite infecting seals in the North Sea.

HE

BE05

First report of aggression of long-finned pilot whales towards adult male sperm whales in a high latitude feeding ground

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Sperm whales (*Physeter macrocephalus*) and long-finned pilot whales (*Globicephala melas*) have been widely reported to share habitat and prey along their distribution range. Despite pilot whales are not believed as predators of marine mammals, several interactions on other species of marine mammals have been observed, with a wide variety of aggression intensity, including kills of other delphinid species. Few observations of pilot whales attacking sperm whales have been reported to date, none of them focused on male sperm whales. Here we report and describe the behaviour displayed at an event observed the 09/07/2015 in a high latitude feeding ground off Andenes, Norway (69 32'N, 15 33'E) in which a small group of pilot whales harassed a sperm whale during more than one hour, at the surface, and presumably at depth during consecutive dives. The same group of pilot whales had been observed before the event took place and was repeatedly sighted for several days few miles across. The presence of pilot whales in the area was coincident with an extended absence of sperm whales before and after the aggression. We suspect this event might not be an isolated case given the frequent segregation of both species and the high rate in "blackfish" bites sperm whales bear on the flukes in the area.

BE

ABU06

First systematic investigation of cetacean distribution and abundance in the sea region within Sicily, Tunisia and Sardinia

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Considering the vagrant behavior of cetaceans, information on their wide distribution is essential for an efficient conservation plan within the Mediterranean region. Cetacean research is continuously undergoing and EU Directives and International agreement (such as the Habitat-Directive, MSFD, ACCOBAMS, EcAp) call on states to undertake surveillance; however, there are some regions where no data are available, mainly due to difficulty to reach, with usual research vessels, high-seas areas in international waters. To overtake this lack on cetacean knowledge in 2013 a conjunct monitoring started in the sea region within Sicily, Tunisia and Sardinia involving research Institutions and MPAs of the two countries. In order to insure repeated and systematic observations, ferries were used as platform of observation and the FLT (Fixed-Line-Transect) protocol developed for cetacean monitoring from ferries/large vessel was used to collect data. In summers from 2013 to 2015 the research group, along the three different transborder transects, collected data on more than 11.300km on effort. Data showed that cetaceans' Encounter Rate in the region, in summer, is 1,3/100km and that the region is important for the presence of *Physeter macrocephalus* in the northern part and *Delphinus delphis* (sighted interacting with *Stenella coeruleoalba*) in the southern part; also *Tursiops truncatus* and *Grampus griseus* were sighted in the region. New insights on the distribution, abundance and threats of cetaceans in this poorly studied area have a valuable impact in the implementation of effective conservation actions. Moreover, this survey is considered of great importance in order to implement the ACCOBAMS survey initiative and reach the objectives of the EU Marine Strategy (MSFD) and the Ecosystem Approach (EcAp) strategy for which cetacean are pertinent indicators. Ecological relevance of the region, statistical strength due the strict protocol/magnitude of effort, cost effectiveness are all aspects that evidence the efficiency of this monitoring plan.

ABU

ACO06

Fixed acoustic stations for sperm whale and bottlenose dolphins real time monitoring. The case studies of the Life projects WHALESAFE and ARION

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Within the Mediterranean Sea, marine traffic is very intense, it can lead to collisions and noise pollution, representing disturbance of feeding activity and causing potential changes in cetacean behaviour as well as injuries and, in the worst scenario, death of the animal. Two fixed acoustic stations were tested as effective tools to protect cetaceans from marine traffic disturbance inside the Pelagos Sanctuary ARION and WHALESAFE, are projects realized thanks to EU cofounding in the framework of the Life+ programme. ARION stations were installed in 2010 in the water off Portofino MPA and calibrated to monitoring bottlenose dolphins; WHALESAFE will be installed in 2016 in front of Savona and Vado harbours and calibrated for sperm whale tracking. They are interference avoidance system capable to acoustically detect and track specimens, to identify the threats and to prevent risks by issuing warning messages in real time to vessels in the area. A Protocol of Conduct for reducing disturbance are developed and agreed by involved stakeholders in cooperation with the local Coast Guard. Upon reception of the warning messages the vessels present in the area are invited to follow the protocol of conduct and the Coast Guards, partners of the projects, supervise its application. This approach ensures species protection, sustainable coexistence of cetacean and anthropic activities and promotes responsible usage of the sea. In this work technical designs are reported and difference from ARION and WHALESAFE illustrated. Each station is composed of two units, each equipped with four hydrophones. Data collected by ARION were analysed through GLM in order to study habitat preferences for bottlenose dolphins and the results used to elaborate a management plan for the species in the area. Permanence of bottlenose dolphin results influenced by sea surface temperature, hour of the day, months and showed geographic preferences inside the project area.

ACO

PH06

Fluctuations on population size of bottlenose dolphins of the Sado estuary (Portugal) for the last 30 years: a review

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The Sado estuary (Portugal) holds one of the smallest resident bottlenose dolphin populations in Europe, comprising presently 27 individuals. In the adjacent coastal area of the estuary, there is an open population of bottlenose dolphins with an estimated size of 107 individuals and with some dolphins showing large scale movements. Considering the small Sado population is threatened by several factors, attention to the interactions with neighbour populations should be taken for the benefit of its future management. The first photo-ID catalogue of the Sado population was created in 1981 and many independent catalogues were followed to the present year. In 1995, the first compilation of photo-ID data showed signs of decreasing numbers which was confirmed later. The last review of photo-ID catalogues covered studies until 1997. The present study aimed to undertake an extensive review of published and grey literature, including photo-ID catalogues of the Sado population in order to assess the flux of individuals between the two areas. The data analysed covered the Sado estuary population from 1981-2015, with a total of 123 identified individuals. Forty-one dolphins were 'coastal', possibly belonging to the adjacent coastal population. Since 1981, a total of 57 individuals were lost from the population: 12 confirmed dead, 14 unconfirmed dead (too young to survive alone) and 31 dolphins never re-sighted (possibly emigration). There were also records of missing resident individuals for a temporary period (months) which could indicate incursions outside their normal area and therefore, exposed to interactions with coastal groups. This presumably rare behaviour could play a role in the loss events, since is less likely for an individual of a highly social species, to emigrate without a support of a group. Understanding these movements in and out of a main area is crucial to understand the dynamics of this small and threaten population.

PH

MO02

Habitat modelling predictions highlight seasonal relevance of Marine Protected Areas for cetaceans

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According to the European Union Habitats Directive, EU Member States must extend the Natura 2000 network to marine ecosystems, through the designation of marine protected areas (MPAs). However, the initial state of cetacean communities across European waters is often poorly known. It is assumed that a MPA is justified where at least 1% of the national population of a species is present during at least part of its biological cycle. The aim of the present work was to use habitat models-based cetacean distributions to assess the network of existing Natura 2000 sites and offshore proposed areas of interest. The habitat models used here were computed from observational data from aerial surveys conducted during the winter 2011-2012 and the summer 2012 across English Channel, Bay of Biscay and north-western Mediterranean Sea, using GAMs with physiographic and oceanographic predictors. Based on these models, a ratio between species relative abundance predicted within each MPA boundaries and the total relative abundance predicted over the French Atlantic or Mediterranean biogeographic marine regions was computed and compared to the 1% threshold. This assessment was conducted for winter and summer independently from each other, providing information to assess the relevance of individual MPAs and MPA networks. Our results showed that existing MPAs included ridiculously low proportions of cetacean populations in both marine regions in either winter or summer. In contrast, proposed large offshore areas of interest would constitute a highly relevant network for cetacean species, with up to 61% of the Atlantic French Globicephalinae population included within these areas. However, the two kind of MPAs would be very complementary for some species, especially for the harbour porpoise in the Atlantic, since the existing MPAs fairly well covered the species in winter (27%), while it would be well covered by the offshore proposed areas in summer (41%).

MO

ECO06

Habitat use of common dolphins and bottlenose dolphins in Sesimbra region, Portugal, and its relation with the group dynamics

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Many species of delphinids co-occur in space and time. Ecological factors related to habitat type that influence food resources are major determinants in the way animals occur, select habitats, behave and interact with each other. In Portugal mainland, although cetaceans have been studied in many perspectives, few studies are related to behaviour. The aim of this study was to study the occurrence and distribution of two species of delphinids, common dolphins (*Delphinus delphis*) and bottlenose dolphins (*Tursiops truncatus*) in Sesimbra region (Portugal mainland). For these we analysed differences between the two species considering their group dynamics (activity patterns, presence/absence of calves and group size) and habitat parameters (sea surface temperature, depth and distance to coast). A total survey effort of 425 hours was performed in 133 boat-sightings between 2007 and 2015, totalizing 104 independent sightings for the two species. The two species were never observed together or using the same area at the same time. But, in 11% of common dolphin observations they were in mixed groups with striped dolphins (*Stenella coeruleoalba*). Calves were present in 59% of the common dolphin groups encounters and in 40% for bottlenose dolphin group encounters. Common dolphins were observed mostly travelling and socializing, while bottlenose dolphins were only observed travelling and feeding. In terms of habitat preferences, differences were also found, with common dolphins occurring preferentially in deepest waters and more distant to coast and bottlenose dolphins in shallower waters near shore. The results presented here suggest that the two sympatric species use this particular area in a different way, Thus, this study supports the need to conduct further research in this region and highlights the importance of understanding the mechanisms that influence the distribution of these species on a local scale to implement effective conservation and management measures.

ECO

MO03

Habitat-based spatial models of common-dolphin and minke whale in Portuguese continental waters

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The evaluation of the abundance, occurrence and health of cetacean populations is of major importance for the characterisation of the entire Portuguese continental waters (PCW) in order to manage and protect its resources. The annual aerial surveys developed within the MARPRO Life + project constitute the first standardised effort to describe and quantify the diversity in marine mammal abundance and distribution in the inshore area of PCW comprised from the coast to 50nm. A solid 5 year data-frame (2010-2014) was generated and we hereby present the results for the most common odontoceti and mysticeti species detected: common-dolphin and minke whale. These species occurrence data was analysed using both Conventional Distance Sampling and Density Surface Modelling (DSM) techniques. The DSM models environmental predictors, included latitude, longitude, bathymetry, distance to shore, sea surface temperature and chlorophyll. All the data contained in this exercise gave a precise snapshot of the dynamics of both populations and a direct perspective of their occupancy levels and distribution within the studied period. This approach is essential to define areas with significant abundance levels on species with high conservation value.

MO

HI08

Harbour porpoise detection rates start decreasing up to one day before pile driving for the offshore wind farm Global Tech I

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Many studies based on passive acoustic monitoring could show pronounced negative effects of pile driving for foundations of offshore wind farm turbines on harbour porpoise (*Phocoena phocoena*), a marine mammal listed as protected species in the EU Habitats Directive. For the German offshore wind farm *Global Tech I*, 80 tripod foundations were driven into the seabed between 2012 to 2014, about 90 km offshore in the German North Sea, and at around 40 m depth. Contrary to the assumption that negative effects start with pile driving activity, at *Global Tech I* a decrease in detection rates of porpoise clicks could already be observed up to 24 hours before pile driving started, reaching up to several kilometres from construction sites. Among factors to be considered with respect to the found pre-piling decrease of harbour porpoise detection rates are: a) enhanced ship traffic in the area before pile driving; b) vibratoric driving of piles starting up to 12 hours before pile driving; c) anticipatory behaviour of harbour porpoise driven by unknown triggers.

HI

MN05

Harbour porpoise in the coastal waters of Arabat Spit (Sea of Azov)

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Arabat Spit (Arabatskaya Strelka; Arabat Beli) is narrow sandy and shelly tongue of land between the Sea of Azov and Sivash Lake, containing unique aquatic complexes in the coastal zone. Harbour porpoise (*Phocoena phocoena relicta*) is the only cetacean inhabiting this sea area. Migrations of harbour porpoises from the Black Sea to the Sea of Azov and back, as well as prey fish movement (haarders, Azov anchovy, shad, silverside, etc.) pass along the Arabat coastline. These processes depend on biotic and abiotic factors varying from year to year. Meanwhile this significant information is scarce. Thinly scattered population during the main part of the year and practically absence of social and economic structure are very specific for Arabat Spit, and determine the ways of research, in particular the importance of polling. In the frames of our poll project (2002-2014), including some field excursions, a number of respondents informed us about sightings/strandings (32/60) in this coastal area. Observations of harbour porpoises were recorded regularly, since 1990 till 2009, mainly in summer time, because of small attendance to this area in the cold season. Registered schools did not exceed seven individuals, except in the summer 1996 (about 15 animals), and June 2009 (more than 30 animals). Stranded animals were described constantly, from 1990 to 2009, mainly in summer also; in August 1998, summer 1999, and June 2009 strandings of several animals took place. It should be noted that facts of finding of bottlenose dolphin mortal remains were reported in May 1997 and summer 1999; in all probability they belonged to animals accidentally by-caught. It is necessary to realize future complex investigations in Arabat Spit, including the creation of a monitoring system, forming of mobile student and junior groups for the regular coast control, and permanent polling of residents and specialists.

MN

ABU07

Harbour porpoise (*Phocoena phocoena*) group size and seasonal distribution in south-west Wales, UK

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In order to determine group size and seasonal patterns, harbour porpoise (*Phocoena phocoena)* distribution data was collected along the south-west Welsh coast between February 2011 and May 2013. Systematic land-based (n=268, 729 hours) and vessel surveys (n=37, 111 hours) were undertaken. Seasonal variation of harbour porpoise sightings, group size and group composition were examined. There were marked seasonal patterns in status across the survey area with two peaks of activity in spring months, where the major peak of encounters of any group size were observed in March (17% of all encounters, n=64). The data highlighted secondary peaks in May and September. Highest porpoise densities were recorded in winter (relative density 14.1 animals /100km effort) and spring (relative density 12.8 animals /100km effort) while peak sightings of individuals occurred in March (18%, n=36), May (14%, n=27) and July (11%, n=22). Sightings of pairs of two porpoise peaked in September and March (19%, n=22 and 18% n=20 respectively). Combining all survey data, mean group size across the survey area was 1.66 animals but overwhelmingly, porpoise were sighted on their own (55% of all sightings, n=205). Groups of two comprised 32% of all sightings (n=119), groups of 3 (10%, n=37), groups of 4 (2%, n=9) and finally, groups of 5-8 (1%, n=5). Porpoise were seen all year, but on a seasonal basis, and regardless of group size, 41% were observed in spring months, 24% summer, 23% in autumn and 12% in winter. Mean number of encounters (of any category of group size) per month was 30.8. The results show a clear summer movement offshore, with a migration closer inshore during autumn months. With the imminent construction of a tidal lagoon in Swansea Bay, this localised information is of particular relevance to understanding the effects of marine renewable energy technologies on cetaceans.

ABU

HE08

Helminth diversity of cetaceans: an update

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Parasites exhibit one of the most successful life-strategies on Earth, are an integral part of biodiversity, and exert a significant effect on the biology of free-living organisms and ecosystem functioning. A starting point for the study of the parasitic fauna of any host species is to have a detailed account on its diversity. In the case of parasites of cetaceans, data about diversity are scattered in a number of (mostly old) papers, and available host-parasite lists are out-dated. Here we present an update of the helminth fauna of cetaceans, providing quantitative data about diversity and host-parasite relationships. We compiled information on 793 host-parasite records. Overall, a total of 173 helminth species has been reported in 71 out of the 90 known cetacean species. However, the number of helminth species is likely underestimated as cryptic speciation frequently occurs in parasitic helminths (e.g. in *Anisakis* spp.). The most speciose group are the nematodes (60 spp.), followed by digeneans (54 spp.), cestodes (38 spp.) and acanthocephalans (21 spp.). A total of 28 species (16.2%) have been reported only once, and 44 species (25.4 %) have repeatedly been reported in single cetacean species, i.e. they have strict host specificity. The most diverse families are the Brachycladiidae and Notocotylidae (Digenea), Anisakidae, Pseudaliidae and Tetrameridae (Nematoda), Diphyllobothriidae, Phyllobothriidae and Tetrabothriidae (Cestoda), and Polymorphidae (Acanthocephala). At species level, the vast majority of helminth taxa are specific to cetaceans, but some genera are shared with pinnipeds and marine birds. This update may constitute a baseline for future diversity surveys on helminth cetaceans. From a conservation perspective, greater awareness about the helminth fauna of cetaceans should be desirable, including proper sampling during necropsies and correct taxonomic identification.

HE

HE09

Hematological, biochemical, cytological and microbiological indicators of the health status of cetaceans in the diagnosis of disease of the reproductive system

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Diseases of marine mammals are often difficult to diagnose, especially with regard to diseases of the reproductive system. The genital organs have very sophisticated defence mechanisms which includes physical barriers, immune and endocrine factors. There will be an inflammatory reaction in the security mechanism if it is broken in response to attacks from microorganisms from the outside. The selection of material took place at the Center for Oceanography and Marine Biology "Moskvarium" and additionally from the White Whale facility (in the village of Livadia in the Primorsky Territory) from five belugas (*Delphinapterus leucas*) and 12 bottlenose dolphins (*Tursiops truncatus*) from the age of 1 to 20 years. We conducted research using six indicators: a general clinical examination, haematological, biochemical, cytological and microbiological analyses, as well as hormonal status analysis. None of the animals studied had clinical disorders of the reproductive system. These animals were divided into three groups: 1) clinically healthy animals 2) conditional clinically healthy animals with borderline values of standards 3) clinically healthy animals with detected abnormalities. We identified the main cytological and microbiological parameters, indicating the presence of abnormalities in the reproductive system of the belugas and bottlenose dolphins. These data are significantly different in animals from these groups, and confirm hematologic and biochemical indicators. It should be noted that in the animals of the third group, isolated pathogenic and conditionally pathogenic microorganisms (*hem. Pseudomonas aeruginosa, Staphylococcus aureus, E. coli*) were found in the vagina even in the absence of clinical disease in their reproductive system. We found neutrophils in cytological preparations in addition to a large number of bacterial cells and yeasts but in group one and two found the vaginal micro flora containing mostly commensals low in pathogenicity. In these cytological tests leukocytes were not present.

HE

WW03

High-intensity dolphin-watching in southern Portuguese waters

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Whilst whaling began in the 17th century, the industry grew rapidly over the next few hundred years. It was in 1986 that a global whaling moratorium saw this come to a halt and the dominant type of cetacean exploitation began shifting to whale-watching. Although this tourism is obviously lower impact than whaling, it could still be harming cetacean populations around the world. Portugal receives almost a quarter of Europe's total whale-watching revenue and particularly touristic regions like the Algarve are dependent on this. This study focussed on the impact of Algarve's high-intensity dolphin-watching tourism on bottlenose dolphins (*Tursiops truncatus* (Montagu, 1821)) in terms of both disturbance to the populations and their stress reaction. It was found that despite consistent exposure to boats for many years, disturbance was still more common with increasing boat presence. Further, increasing boat count also resulted in more frequent negative responses to boat presence. The high-intensity tourism is likely having a negative impact on the bottlenose dolphins in this region which could in turn impact adversely on the overall health of the population. In a broader context, hotspots of dolphin-watching tourism could severely harm populations of bottlenose dolphins and likely other cetaceans. This highlights the need for effective management and limitations to the whale-watching industry globally to protect cetaceans from any harmful exploitation.

WW

ABU08

Humpback and fin whales off eastern Kamchatka: signs of recovery?

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Most populations of large whales declined dramatically due to commercial whaling in the 20th century. Through the mid- to late 20th century encounters with most baleen whale species in the western Pacific were extremely rare. The first signs of population recovery appeared in the beginning of the 21st century. Here we compare the results of surveys performed along the eastern Kamchatka coast in 2002 and in 2015. We found a significant increase in the number of sightings of humpback whales. In 2002, a few humpbacks were observed only in Olutorsky and Karaginsky gulfs. In 2015, we found several large feeding aggregations of humpback whales in Karaginsky Gulf, and some solitary whales and pairs occurred in Ozernoy, Kamchatsky and Avacha gulfs. The occurrence of fin whales also increased: only one pair was sighted off Kronotsky Peninsula in 2002, but in 2015 encounters with fin whales were regular in all surveyed areas. The occurrence of other whale species did not change significantly between these periods. In 2015, we encountered several Baird's beaked whale groups in Kamchatsky and Ozernoy gulfs; this species was not registered in 2002, but it may have been missed because its distribution is limited to specific areas with steep slopes. The occurrence of killer whales, grey whales, minke whales and Dall's porpoises was similar in 2002 and 2015. Our results suggest that the populations of humpback whales and fin whales in the western Pacific may be increasing locally after the decades of commercial whaling.

ABU

ECO08

Identification of Mediterranean monk seal (*Monachus monachus*) suitable caves in the island of Madeira, Portugal

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Mediterranean monk seals (*Monachus monachus*), one of the most endangered marine mammal species in the world, use almost exclusively sheltered marine caves for breeding and resting. These caves are the main location to perform observations of monk seals in order to determinate their conservation status. At the Madeira archipelago, the monk seal population is mainly using Desertas islands, although since 1997 the number of observations in the main island started increasing and nowadays they also occupy Madeira Island. Under the frame of EU project LIFE MADEIRA MONK SEAL, that has as one of its main objectives the development of a system to survey the conservation status of Mediterranean monk seals and its habitat at Madeira archipelago, the identification and characterization of marine caves of Madeira island was performed. In June 2015, the 153 km of the whole perimeter of Madeira main island was explored. 72 caves were identified and explored, from which 12 (16.67%) were considered suitable for monk seal reproduction, 44 (61.11%) of them were considered non suitable and 16 (22.22%) require further underwater exploration. The north coastline of the municipality of Machico, located at the northeast part of the island and which comprises the Natura 2000 Site of Ponta de São Lourenço, is the part of the island with more concentration of suitable monk seal caves with 11 of them (91.6%). The other suitable cave is located at Calheta municipality. During the survey, no signs of monk seals were detected in any of the explored caves. The installation of phototrap systems in these caves will be the next step to determinate their importance for the monk seal population and for the system to survey monk seal conservation status at Madeira archipelago. To conclude the identification of suitable caves around Madeira Island, underwater caves will also be located and explored.

ECO

HI09

Identification of spatial and seasonal strategy of local fishing activity as a guideline to mitigate the bycatch threat for critically endangered population of harbour porpoise in Polish Baltic waters

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High activity of the fishing gillnet fleet in the Baltic Sea has contributed to the decline of Baltic harbour porpoise population (*Phocoena phocoena*). In years 1986-2003 when fishermen voluntarily reported bycatch 70 bycaught individuals were collected in Polish Baltic Sea, of which 64 were caught in gillnets. Due to low abundance of Baltic population of harbour porpoise resulting from excessive bycatch among other threats, it was recognized by International Union for the Conservation of Nature (IUCN) as critically endangered in 2008. Voluntary reports of bycatch, live sightings and strandings of harbour porpoises provided valuable data on species occurrence range, hinting at a rough population size. Unfortunately in the current situation, when dealing with increasingly less numerous species and intense small boat gillnet fishery as a main threat, immediate protective measures are required. To implement the effective measures it is necessary to obtain detailed and credible data on both harbour porpoises occurrence and fishing effort. The aim of this study was to estimate the scale of fishing effort in the coastal areas of known porpoises occurrence based on data from logbooks, monthly catch reports and boat surveys to identify spatial and seasonal fishing strategy. The data from logbooks and reports provided information on the date of boat trips, the number and the type of fishing gears and the sector of fishing operation. To recognize the scale of threat in areas of particular high fishing activity with higher resolution field surveys were carried out to record the seasonal positions of nets in situ. The detailed knowledge of spatial strategy of small boat gillnet fishery creates a unique opportunity to adjust the least harmful and well – targeted measures of mitigating the fishery – harbour porpoise conflict on a local level.

HI

HI10

Illegal fishing in Portugal. The unseen and unreported cetacean bycatch

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The Portuguese fishing fleet is composed of ca. 8000 vessels, mainly corresponding to local fisheries (± 86% of the total fleet). This artisanal fleet mainly consists of small (≤12m), polyvalent boats, using trammel and gillnets. Independent onboard observers are recommended to obtain reliable by-catch data. However, these small sized boats preclude independent observers from boarding. Consequently, observers do not cover most of the Portuguese fleet.
Marine animal strandings indicate that a large part of cetacean mortality results from interaction with fisheries. Furthermore, illegal, unreported and unregulated fishing (IUU) seem to be common practices and might be related with high cetacean mortality.
Within the Life+ MarPro, small-scale polyvalent fishing activities were monitored along the West coast of Portugal (13 vantage points), ranging from Costa Nova (Aveiro) to Baleal (Peniche), under adequate Douglas and Beaufort conditions (≤3).
We identified 34 boats performing IUU fishing (22,82% of the small polyvalent fleet in the study area). We estimated the average number of boats performing IUU fishing (up to 4,2 boats/day) and the number of illegal nets ranging from 3 to 12,9 nets/day. We estimated a by-catch rate of 0,016 common dolphins and 0,005 porpoises, per boat per day. Harbor porpoise by-catch rates are particularly higher than those reported for polyvalent vessels over 12 meters. It was also possible to estimate a seabird by-catch rate of 0,075 seabirds per boat/day.
A significant part of the small-scale polyvalent fleet in the study area is performing IUU fishing and these practices result in marine animal mortality events that are not monitored or reported, emphasizing the need to revise the Council Regulation (EC) 812/2004, so that small scale fisheries around Europe can be monitored in detail.

HI

HI11

Impacts of noise generated by marine renewable energy devices on low frequency cetaceans - results of the MaRVEN project

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It has been shown that pile-driving sound for offshore wind farm foundations can affect harbour porpoises and harbour seals at considerable distances from the source. As pile driving reaches comparably high sound pressure levels at mainly low frequencies, there is also a high potential to affect low frequency cetaceans such as baleen whales as well. Some planned wind farm areas in Europe and beyond overlap with important habitat for baleen whales. Yet, the risks of offshore wind farm construction to these and other low frequency cetaceans are unknown. Thus, a comprehensive impact assessment of MREDS has not been possible today. In the MaRVEN study (European Commission, Directorate General for Research and Innovation) we reviewed the available scientific evidence and significance of impacts of Marine Renewables, Vibrations, Electromagnetics and Noise on marine life. We also performed measurements and noise modelling across Europe to close knowledge gaps. Here, we place the findings of the measurements and modelling in the context of low frequency cetaceans. Detailed and long-term measurements during construction of an offshore wind farm the German Bight show that, at frequencies below 1 kHz, pile driving noise was exceeding ambient sound at distances of at least 60 km from the source. These results were obtained for a 3 m diameter pile being driven. Our literature study showed that sound levels were positively correlated to pile size. Thus, the potential impact ranges of larger piles could be much larger than the ones found here. On the other hand, using numerical modelling, we found that the cumulative sound from several wind farms during operation had only a small acoustic footprint with a presumably low impact potential. The results obtained emphasise the need for future research in terms of MRED noise effects on low frequency cetaceans both on an individual and population level.

HI

HE10

Indication of iron overload in a harbor seal (*Phoca vitulina*)

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Iron overload, the increase of iron in the body, has been described in various animal species, including humans. Most described cases in wild species correspond to animals in captivity often associated with increased iron dietary uptake. To our knowledge, this is the first case of iron overload in a captive harbor seal. The adult female had a history of being more sensitive to environmental enclosure changes than the other tank mates. Feeding scheme included a daily intake of 3kg of Atlantic herring (*Clupea harengus*) with a weekly fasting day. The animal presented a progressive anorexia (8 weeks), apathy and increased serum iron levels (1681 µg/dl; reference values – 49 – 218 µg/dl). A radiographic exam showed the presence of radiopaque foreign bodies in the stomach. During an indicated laparotomy, the animal died due to cardiovascular failure. Twenty four “Euro” coins and two copper rings were removed from the stomach, which presented mild diffuse edema and mild mucosal congestion. No other significant alterations were observed. Histopathological examination revealed iron storage with no cellular damage in liver and spleen macrophages, kidney (proximal tubular epithelial cells) and pulmonary and mesenteric lymph nodes (confirmed by Prussian blue staining). The atomic absorption spectrophotometry analysis for iron revealed 17,65 g/kg in the spleen and 14,78 g/kg in the liver (wet weight, reference values – 0,248 – 0,642 g/kg)2. “Euro” coins only contain minor levels of iron. Besides the animal’s exclusive fish diet, a dietary cause seems unlikely since no iron deposition was detected in the intestine. Furthermore, no other animal of the collection presented increased iron serum values or similar symptoms. The etiology of the iron overload in this harbor seal remains unclear. Additional research, like polymorphism or genetic derangement analysis of iron metabolism genes, is required to further evaluate the cause of this disease.

HE

HE11

Indication of pathogenic *Staphylococcus* in a free-living population of Polar bears (*Ursus maritimus*)

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The bacteria of the genus *Staphylococcus* are the causative agents of purulent-septic diseases in mammals and humans. The pathogenic species of those microorganisms can cause septicemia, pneumonia, mastitis, lesions of skin and mucosa. The fact that Staphylococci are commensals of the mouth, gullet, skin, but during the resent years there are increase in the staphylococcosis incidence at the different species of animals including marine mammals. Indication of pathogen *Staphylococcus* in organisms free-living marine animals can be indexes of low level health status individuals and to be caused the pollution of environmental by the different kinds pathogens and chemicals.

Our study is concerned with the microflora of free-living population Polar bear in the Russian Arctic and investigations of role of bacteria genus *Staphylococcus* in health status of these animals.

In 2014-2015 the Marine Mammal Council collected samples from19 adult polar bears in the Russian Arctic: blood samples and smears from mucous membranes the conjunctiva, nose cavity, mouth, and of the anus. The smears were collected in accordance with rules of asepsis to tubes with the Ames medium. The studies were conducted according to standard microbiological methods. For isolation of microorganisms we used cultural methods. Identification of isolates was performed by the investigation of their biological properties including pathogenic factors (plasmocoagulase, hemolysis, toxins).

In our study we isolated *Staphylococcus* from the 79% samples. The largest number of strains of these microorganisms we have isolated from the nasal and oral cavities of animals. Staphylococci were identified to three species: *S.hyicus, S.epidermidis, S aureus*. 67% isolates of these microorganisms showed hemolysis and 21% - were positive by plasmocoagulase enzyme. The frequency isolation of cultures of pathogenic *Staphylococcus* from organism of Polar bear may indicate possible health problems of these individuals and to be a consequence of environmental pollution.

HE

HI12

Influence of boats and vessels traffic to behaviour of beluga whales of the Solovetsky reproductive gathering in 2014

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Boat traffic is one of a significant negative impact factor on beluga whales from the Solovetsky reproductive gathering (RG) in the White Sea off Cape Beluzhiy, Solovetsky Island (65°43'N, 35°31'E). A constant increasing of the boats and vessels traffic is occurring since 2003. In 2014 number of the boats increased particularly. In this study we analyzed the dependence of the reactions of the beluga whales from the various positions of the boats. The observations were conducted visually from an observation point between June and August, 2014. The following situations were identified: a power boat is passing at a distance of 1000 m and more from the aggregation; a boat is drifting after beluga whales; a vessel is standing nearly the aggregation. The results showed that a response to boats, passing at a distance, absent in 57% of cases. But there were situations when animals partially or completely left the gathering place (19 and 5%, respectively). Dolphins followed the boat in only 1 percent of cases. At the same time, the maximum percentages of leaving reactions were reported when boats pursued animals (39%), drifting behind them. The number of scouts that come near the boats has increased (7%). But, the largest percentage of the animals was observed near the boat at anchor (14%). This study shows that the tourists boats and vessels, that breaching of borders of the RG water area, affected the behavior of the beluga whales. It can be dangerous for the future of these animals, because it will interfering in normal social relations and breeding strategy.

HI

ABU09

Interannual variation (2014-2015) of fin whales (*Balaenoptera physalus*) during their migration along the coast of Garraf (North-western Mediterranean)

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Recent studies conducted by EDMAKTUB Association have proved that fin whales (*Balaenoptera physalus*) visit the area of the Garraf coast (North-eastern Iberian Peninsula) every year during spring season, displaying travelling, foraging and feeding behaviours. The Garraf coastline is composed of shallow waters situated between the provinces of Barcelona and Tarragona (North-western Mediterranean). After two years of initial research (2011-2013) followed by a two-year of rigorous study (2014-2015), important changes have been seen both in abundance of fin whales and the timing of their appearance. From February to June, visual maritime surveys consisting of random transects were conducted with a 14m catamaran as a research platform. Moreover, local fishermen and sailors have reinforced the results by contributing data. A total of 4820km were travelled while surveying the area over 112 days (over a two-year period) resulting in 84 fin whale sightings. All the animals were found at a distance of 8 to 20km from the coast (at a depth of 50-200m). However, despite the high encounter rate (0.0144sightings/km), an important decrease in the sightings has been noticed during 2015, reducing the annual encounter rate from 0.0201 in 2014 to 0.0087sightings/km. Therefore, the main environmental parameters related to their distribution have been studied: chlorophyll concentration (Chla), Sea Surface Temperature (SST), bathymetry, and even droughts during the winter and spring seasons. The results showed that the Chla concentration decrease and therefore, food availability, seems to be the main cause of the variation in abundance and distribution of the animals observed in the zone during 2015. These results would reaffirm the Catalan waters as a feeding ground for whales during its migration. We stress the need for a long-term monitoring program to take place in order to clarify the factors that define the presence of fin whales and their behaviour in this region.

ABU

HE12

Investigating Leptin mRNA expression a biomarker of "adiposity" in humpback whales (*Megaptera novaeangliae*)

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As capital breeders, humpback whales (HW) face the energetic costs of migration and reproduction with energy stores accumulated through summer feeding. These energy reserves are mostly stored in the form of lipids in blubber tissue. As such, this tissue is significantly influenced by nutritional condition and blubber fat reserves have commonly been used as an indication of body condition in whale studies. Assessments are, however, limited to stranded animals and typically relate to blubber thickness, while total adiposity remains undetermined. It is therefore essential to develop new approaches that can provide information on the nutritional status of free swimming individuals from an achievable sample.

In medical research, the role of white adipose tissue as an endocrine organ has received significant attention. Despite the fact that cetaceans have the most specialised adipose tissues of any mammal, the role of blubber as an endocrine organ has received little attention. In other mammals, body mass index and total percent body fat have been found to correlate significantly with expression of the adipose derived hormone, leptin. Based on the relationship between leptin, fat deposition and nutritional condition, this study investigates blubber leptin mRNA expression as a biomarker of adiposity in HW, using quantitative and absolute real-time PCR. Expression is quantified in different migrational (therefore assumed nutritional) cohorts of the same population and results compared to ancillary parameters of adipocyte histology indices and blubber lipid percent. This study is part of a broader program which seeks to apply novel biochemical markers for the assessment of nutritional condition in HW. Findings will be applied to research questions concerning i) elevated chemical risk associated with a migratory life history and ii) The role of nutritional stress as a co-factor in rising HW stranding events observed in some southern hemisphere populations.

HE

HI13

Is the swimming direction of harbour porpoise affected by seal scarer and/or pile driving?

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Offshore wind farm construction is accompanied by considerable noise emission, especially during pile driving. Underwater noise is emitted by deterrence devices (e.g. seal scarer) prior to pile driving and by pile driving itself. Several studies have demonstrated clear avoidance of construction sites by harbour porpoises (*Phocoena phocoena*) due to underwater noise. Therefore, it can be assumed that animals are heading away from the sound source during seal scarer and/or piling activities. However, data on the direct behavioural response of harbour porpoises is scarce. In this study, harbour porpoises were observed during the construction phase of an offshore wind farm in the North Sea using high definition video aerial survey techniques (HiDef Aerial Surveying Ltd.). With a strip width of 543 m, digital aerial surveys have the advantage of higher sighting rates compared to visual surveys. Additionally, the swimming direction of porpoises can be determined very precisely. Eight digital aerial surveys were conducted of which three surveys occurred during pile driving. During pile driving, noise emissions could be reduced to levels corresponding to the German noise criteria (160 dB SEL @ 750 m) applying noise mitigation systems. During seal scarer activity, porpoises could be observed at distances between 3 and 33 km from piled foundations. Within 1 to 10 km, and even within 11 to 20 km, porpoises showed a tendency to swim away from seal scarer sound. During pile driving, no animal could be observed at a distance of up to 10 km from piling location. Within distances between 11 to 20 km, the animals showed no clear preference for a specific swimming direction. These results indicate a further reaching avoidance effect of deterrent devices on harbour porpoises compared to pile driving noise alone, when German standards' for noise criteria were met.

HI

NT10

LADC-GEMM: towed hydrophone cetacean survey using Autonomous Surface Vehicles (ASVs)

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ASVs have a number of potential advantages as towing platforms for collecting passive acoustic data on marine mammals, compared to conventional survey vessels. ASV operation requires fewer personnel than that required to crew a conventional ship; ASVs are therefore cheaper to run and reduce exposure of personnel to HSE risk when working in remote locations. A relatively small and acoustically quiet ASV contributes less background noise than a ship and is therefore, less likely to disturb the behaviour of target species or mask their vocalisations from detection. During 2015 LADC-GEMM consortium Experimental Cruise 1 we deployed towed hydrophone arrays from two types of ASV. The ASVs were equipped with a wireless telemetry link to a support vessel, which enabled the hydrophone signals and processing software to be monitored in real-time. Here, we present the results of offline analysis of acoustic detections of marine mammals from continuous and wideband (20-160,000 Hz) sound recordings. The recordings were searched for sounds produced by Bryde's whale, delphinid species, sperm whale, beaked whales, and Kogia using automatic detectors for tonal sounds; mid-frequency and high frequency click detectors; and manual spectrogram review. We investigated the use of ASV-derived survey data for localising sperm whales using Target Motion Analysis and estimating their density and abundance by Distance Sampling. The LADC-GOMRI project aims to compare the suitability of various PAM platforms for marine mammal encounter and population surveys of the Gulf of Mexico to understand impacts of short-term and long-term environmental stresses.

NT

ECO09

Killer whale predation on pinnipeds in Northern Norway: novel insights into the ecology of Norwegian killer whales

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Feeding specialization appears to be a species characteristic in killer whales (*Orcinus orca*). Off Norway, killer whale research, conducted almost exclusively during the winter months and mostly during the 1990's, revealed the Atlantic herring (*Clupea harengus*) as a main prey. However, as shown by stable isotope values, differences in proportions of prey items consumed occur among pods, and other prey items are known to be taken. As such, seals apparently constitute a regular prey, at least for some pods. A dedicated and currently ongoing survey effort was launched in 2014 in order to investigate ecological aspects of killer whale predation on seals in northern Norway. Using a combination of behavior monitoring around haul-out sites, photo-identification and historical sighting records covering a 25-years period of time, we gathered preliminary results about the contribution of seals to Norwegian killer whales' diet. Pinnipeds are known to be a main prey item for killer whales in several regions. Because killer whales tend to be specialist-foragers with high daily energetic requirements, they can significantly impact prey supplies. While the study brings the first insights into predator numbers, kill rates and area usage, it improves our understanding of killer whale ecological impact in these waters. We suggest that results should be considered for accurate seal population management.

ECO

ACO07

Localization of Baird's beaked whales (*Berardius bairdii*) in the Russian Pacific using a beamforming array of hydrophones

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The behavior of cetaceans is observed mainly on the surface, and we know much less about they do underwater. All toothed whales emit sounds for orientation and communication. Localizing these sounds may allow us to track animals underwater. We used a small array of four hydrophones assembled in the shape of a tetrahedron with a 0.6 m distance between them. We measured the phase shift for each pair of hydrophones and used the bearings calculated for six hydrophone pairs to find the horizontal and vertical angles to the direction of the source with 5 degrees precision. Using this method we observed several groups of Baird's beaked whales near Bering Island (Commander Islands, North Pacific) where the continental slope reaches depths of 600-1000 m. The whales were in a multi-group aggregation of 35-45 individuals. During multi-channel audio recordings we made continuous observations, noting direction and distance to the surfaced animals, speed of their traveling, type of activity, dispersion of the group and times of surfacing and diving. The total duration of the recording used for localization was 22 minutes. It allowed us to understand how the whales moved and how their vocal behavior changed when they were underwater, compare to at the surface. We discovered that most of the whales who formed groups on the surface remained together during diving, but distances between them increased. Several whales separated from groups or joined groups during diving. Other whales stayed separate during the entire observation. During diving most of the whales emitted different sounds: clicks with regular intervals (3-10 Hz), clicks with irregular intervals changing sharply from 3 to 10 Hz, fast click trains at 20-100 Hz (buzzes) and whistles. When whales were at the surface, their acoustic activity was considerably reduced; most kept silent, but some emitted irregular clicks or buzzes.

ACO

PH07

Long-term site fidelity and association patterns of melon-headed whales (*Peponocephala electra*) within a Navy underwater sonar range in The Bahamas

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Our understanding of deep-water delphinid populations is deficient due to inherent difficulties in researching wide-ranging, diving organisms inhabiting inaccessible offshore areas. Melon-headed whales, *Peponocephala electra*, are a species of oceanic odontocete with a world-wide distribution but are poorly studied. This project uses longitudinal photo-identification data collected from vessel surveys throughout the northern Bahamas over an 18-year period to assess aspects of the population and community ecology of these elusive animals. P. electra were sighted 44 times between 1995-2013 within the Bahama Canyon system. Notably 20 of these encounters occurred within the US Navy-operated Atlantic Undersea Test and Evaluation Center (AUTEC), where mid-frequency active (MFA) sonar; recognised as potentially detrimental to cetaceans, is regularly used. Associations with other species were common (n = 8), with half of all mixed-species encounters occurring with rough-toothed dolphins (*Steno bredanensis*). Sightings occurred year-round and group size ranged from 25 to 500 individuals with a median group size of 150 (IQR = 153.7). Over 18,500 photos were analysed to create a catalogue of 660 distinct individuals. Resight rates were relatively high given the very large group sizes and opportunistic sampling; with individuals sighted between 1-6 times. Two hundred and eight individuals (31.5%) were sighted more than once and a maximum of 15 years between resights suggests long-term site fidelity to the AUTEC range. Association analysis suggests preferred associations between individuals with lagged association rates supporting long-term dyadic bonds. Social network analysis suggests a main population resident to the AUTEC range, with individual home ranges and density estimates demonstrating the importance of this site as a key habitat for this species. Observations of numerous peculiar dorsal disfigurements also suggest anthropogenic interactions. The occurrence and site fidelity of *P. electra* in the northern Bahamas are reported, together with insights into social structure and an evaluation of potential threats.

PH

STR03

Longitudinal study of a live-stranded female bottlenose dolphin in the Shannon Estuary, Ireland

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O'Brien et al. (2014) report an account of the live-stranding, refloating and subsequent observations of a female bottlenose dolphin (*Tursiops truncatus*) in the Shannon Estuary, Ireland in June 2012. A resident individual (#242) of the Shannon Estuary population, this female was sighted multiple times that summer and gave birth to a calf in the autumn, indicating that she was about nine months pregnant when she stranded. From 2012 to 2014, she was sighted 64 times out of a total of 385 sightings from dolphin-watching tour boats and research vessels. Her calf is now over three years old and its progress has been consistently tracked. The historic catalogue data suggest that this was #242's firstborn calf. A map of their use of the estuary illustrates sightings in a broad range of locations, especially near Béal Beach, where the stranding occurred. A two-sided dyadic significance test (0.05) within a permutation test (2,000 permutations) for the presence of preferred/avoided companions indicated that #242 had strong dyadic strength associations with six other individuals at half-weight association indices (HWI) of 0.32 to 0.6 (p-values of >0.98 indicating reliable results). Thus, the null hypothesis that her associations with these individuals were random was rejected. Further analyses from 14h of focal follows of the individual in 2014 and 2015 using 3-minute point sampling also illustrated strong associations with these individuals, particularly an adult male (HWI = 0.6) who was her nearest neighbour (excluding her dependent calf) for 4.6h. Activity state durations were calculated for #242 and divided into five categories: travel (63%), forage (16%), social (8%), rest (8%) and with boat (4%). These results are comparable to average individual activity states for this population based on 57h of focal follows. This study represents the first long-term detailed investigation of a refloated pregnant bottlenose dolphin and her calf.

STR

ECO10

Looking at one stomach content: a window into the deep-sea cephalopod and sperm whale trophic ecology

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Describing stomach contents from deep-diving cetaceans is a major opportunity to inform on feeding strategies of such cryptic predators, and on poorly known deep-sea micronekton communities. The stomach content from an entangled male sperm whale found stranded on the French Mediterranean coast in 2010 was analyzed. 4805 lower beaks of cephalopods were recovered and identified belonging to 8 species: *Histioteuthis bonnellii, H. reversa, Chiroteuthis veranyi, Octopoteuthis sp., Galiteuthis sp., Ancistrocheirus lesueuri, Ancistroteuthis lichtensteini* and *Todarodes sagittatus*. *Histioteuthis bonnellii* reached 95% of total reconstituted biomass. Six vertebral axes of small shark species (probably *Galeus melastomus*) were also recovered and constituted a rare record of elasmobranch in sperm whale diet. The representativeness of accumulated cephalopod beaks versus more digestible fish remains to describe diet composition has often been debated. Here, stable isotope analysis in the sperm whale tissues (muscle, liver, skin, internal and external blubber: δ13C -17.52±0.58‰ and δ15N 12.07±0.57‰) and in H. bonnellii (δ13C -18.40±0.52‰ and δ15N 9.66±0.77‰) and shark muscles (δ13C -18.41±0.25‰ and δ15N 11.52±0.4‰) from the stomach content itself confirmed the central place of cephalopods compared to elasmobranch in the diet of sperm whales. Using deep-divers as biological samplers is also a rare opportunity to increase our knowledge of the meso- to bathypelagic micronekton. In addition to the composition of the deep-sea cephalopod community off NW Mediterranean Sea and its size distribution, we described the trophic structure of this assemblage of cephalopods as well as the trophic ontogeny of *H. bonnellii* using stable isotope analysis. In the perspective of establishing a monitoring strategy for marine ecosystems, notably for the implementation of the European Marine Strategy Framework Directive, deep-diving cetacean stomach contents could be a central source of data and samples to document MSDF descriptors D1 (Biodiversity), D4 (Food-web) and D8 (Pollution) regarding deep-sea cephalopod communities.

ECO

CO03

Looking for harbour porpoise protected areas: why science is important

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Because harbour porpoise have dynamic movement patterns, both at the individual and population level, their conservation is scientifically and legally challenging. The European Commission has challenged the UK for its lack of designation of SACs with harbour porpoise listed as a qualifying feature on the basis of a complaint from the World Wide Fund for Nature (WWF). This presentation will outline the work undertaken by the UK in order to determine the presence of persistent 'clearly identifiable' sites in national waters, demonstrating why strong robust evidence is essential.
Utilising the Joint Cetacean Protocol (JCP), which comprises the largest collation of standardised survey data on harbour porpoise in the world, different parts of the UK Exclusive Economic Zone (EEZ), UK waters were divided into three regions to ensure geographic representivity, but also to reflect the widely differing hydrographic and oceanographic conditions around the UK. These regions have received differing survey coverage over the 18 years (1994-2011), making reliable estimation of yearly distributions a challenging task. These challenges were addressed through the use of Generalised Additive Models which focused on the identification of important habitat and were capable of predicting seasonal and yearly mean densities by integrating survey-specific information with annual-seasonal data on environmental conditions.
The top 10% of persistent high density areas for harbour porpoise over the 18 year period in UK waters were identified and proposed as SACs to UK Governments in June 2015. The outputs from the UK analysis will be compared to analyses undertaken individually by WWF and Whale and Dolphin Conservation (WDC). It is essential that SAC designations are based on the most comprehensive data available, ensuring the right areas are protected, thereby delivering the best outcomes for the species.

CO

BE06

Male humpback whale escorts disrupt nursing behavior of acoustically cryptic neonate calves

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Humpback whale cows migrate from their polar feeding grounds to their breeding grounds in tropical waters to mate and give birth. The dual purpose of female migrations creates a potential conflict between choosing an appropriate male to father the next calf versus maximizing the energy budget for the newborn calf by reducing exposure to male escorts. Male escorts have been shown to raise energy expenditure in mother-calf pairs. To further investigate this we deployed Dtags on neonate humpback whale calves on a known resting ground. During September 2014 we deployed Dtags on eight humpback whale calves and in two instances, simultaneously tagged their mothers in Exmouth Gulf, Western Australia. Average tag deployments lasted 8.5 ± 2.4 hrs. Visual focal follows were conducted for 1 hr and 2 hrs immediately prior to and after tag deployments, respectfully. Prominent behaviors observed were traveling, resting and nursing. We show that mother-calf pairs keep very close contact at all times, and that calves suckle 0.9-29.4% of the tagged time. Conversely, the presence of antagonistic male escorts induced a higher fluking rate of both the calf and the mother, disrupting nursing behavior and increased their overall energy expenditure. Therefore, it is in the calf's interest to avoid attracting male escorts, which may explain why the calves only produce weak grunting sounds with an estimated active space of a few hundred meters. We propose that this acoustic crypsis serves to maintain mother-calf contact, while reducing predation risks from killer whales and attraction of male humpback whale escorts that disrupt the critical transfer of milk from mothers to calves.

BE

H01

Manatees in Brazil as a historical aquatic resource and the first concerns towards populations' management (16th to 19th centuries)

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From the five species of the Order Sirenia, one is extinct since the late 18th century (Steller's Sea Cow *Hydrodamalis gigas*) and four are listed as Vulnerable by the IUCN Red List of Threatened Species. These species have been hunted over time since pre-history to the present, they are part of the local cultures within their riverine and coastal distribution range, and part of local folklore and legends. For that reason, the study of their environmental history and cultural importance needs to be examined. In our study we collected information from travel literature books, letters, chronicles, scientific treaties, illustrated broadsheets, leaflets and images of manatees in reports from Portuguese navigators, chroniclers, traders, missionaries, officials, soldiers and scholars. We analysed local myths and first perceptions, descriptions of its anatomy and behaviour, culinary usage, and fishing methods. More importantly, we addressed early management and conservation concerns regarding the use of manatees as resources. In the concrete cases of the Amazonian Manatee (*Trichechus inunguis*) and the West Indian Manatee (*Trichechus manatus*) in Brazil, early modern Portuguese sources provide relevant information on exploitation and uses of the species by natives and Portuguese settlers. By the late 18th century, the commercial profit of the activity, that included trading with Northern Europe, justified the establishment of the Royal Fisheries in the Amazon basin to process products such as manatees, fish and turtle eggs. Also, it led to the emergence of the first environmental concern as written by the naturalist Alexandre Rodrigues Ferreira. Here, we will discuss the evolution of captures and the need for management measures towards manatees in Brazil at the light of the Portuguese Expansion in the south Atlantic, and the appreciation of this novel natural world as a new profitable economic resource.

H

CO04

Mapping of anthropogenic noise hotspots in the Mediterranean Sea

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In the framework of the working programme 2014-2016 of the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) a work aiming at identifying noise hotspots and areas of potential conflicts with cetacean conservation was undertaken. Here we present results on the spatio-temporal extent of noise-producing activities for the period 2005-2015 and for the entire Mediterranean basin. Furthermore, areas accumulating noise-producing activities (noise hotspots) are highlighted, with a focus on zones overlapping with important cetacean habitat. Data on seismic surveys, coastal and offshore industrial projects, military exercises, and marine traffic have been collected through various means such as dedicated internet search, AIS data-bases, official online repositories, and contacts with relevant stakeholders. We recorded the position of 1446 harbours, 228 drilling platforms for hydrocarbon exploitation, 52 wind farm projects, 830 seismic exploration areas, and a number of military areas. Further, to get a representative map of ship density, through AIS data we sampled ship tracks every 10 minutes for 1 month (July 2014), resulting in 7 million ship positions. ACCOBAMS recognised map of important cetacean habitats (Resolution 4.15), was used to identify the overlap with noise hotspots. Summary GIS maps were created using a grid resolution of 40x40 km. Results revealed several noise hotspots overlapping important cetacean habitat such as the Pelagos Sanctuary, the Strait of Sicily, and the upper portion of the Hellenic Trench. Our results provide key information on the spatial extent of different noise-generating activities in the Mediterranean Sea and yield the first basin-wide overview on areas where potential conflicts between noise-producing activities and cetacean conservation may occur. Moreover, these results provide strong evidence of multiple stressors acting on the marine environment and of the need for urgent management and conservation actions.

CO

ECO11

Marine bio-telemetry of Southern Ocean marine mammals: review and recommended approaches for dive data

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The vast Southern Ocean (SO) which extends over 34.8 million km2 supports a unique biota of over 8800 species. Included in this extensive list the SO supports seven pinniped and 27 cetacean which exhibit particular habitat preferences: the ice-dependent Antarctic specialists (leopard, Ross, Weddell, and crabeater seals); those breeding on sub-Antarctic islands and foraging in the south (Antarctic and subantarctic fur seals and southern elephant seals), and those migrating seasonally from breeding sites even farther north (most cetaceans). Previously these animals were almost impossible to observe at sea, especially their use of the vertical dimension. Today, more than 50 years after the first dive-logger was deployed, increasingly sophisticated bio-telemetry methods are returning an explosion of information. Consequently the number of publications is exponentially increasing: over the last 10 years publications about pinnipeds have risen from 111 pre-2005 to over 285 this year. Publications about cetaceans increased from 4 to 15 in the last decade. Ever increasingly sophisticate electronic logging devices now record many behavioral and physiological variables, as well as in situ physical and biological habitat variables, providing great integrated insights into both diving physiology, foraging behavior and physical ocean processes. However, a wide variety of analytical methods have been developed for dive data making comparative approaches difficult. In our review we present some common ways to synthesize and analyze diving data as a tool for answering physiological and foraging questions relevant to conservation and management issues. The Antarctic ecosystem is one of the most dynamically seasonal on our planet, and most sensitive to climate change. Developing an integrated and synthetic view of how Southern Ocean specialist respond to environmental queues is an important first step to be able to develop predictive models for understanding how future climate change will affect this unique biota.

ECO

HI14

Marine traffic and potential impacts towards cetaceans within the Madeira EEZ

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Human population growth has increased environmental damaging inputs such as marine traffic. This has been associated with wildlife disturbance, which effects are expected to increase with traffic expansion. A particularly targeted group are cetaceans, known to play an important role in the sustainability and regulation of an ecosystem. Thus, an assessment of the marine traffic can provide a valuable contribute towards wildlife conservation measures. The present study took place in Madeira's Exclusive Economic Zone (EEZ), an area hosting a high diversity of cetacean species as well as island-associated populations. We used marine traffic and cetacean visual data collected during nautical surveys between 2001 and 2012 and Automatic Identification System (AIS) data collected from a land station between 2008 and 2011. Results show that Madeira offshore traffic corresponds to approximately 22% and 17% of the traffic observed in the Baltic and North seas, respectively. It is mostly composed by cargo ships navigating over fixed routes and mostly using the area as a passage zone towards different destinations. Cruise ships intersect the area mainly to reach Funchal's port. The number of recreational boats was found to be underestimated since many of them are not equipped with AIS devices. The level of Madeira inshore traffic is harder to evaluate since it is a small area encompassing a shipping route, yet it may represent 1.06% of the traffic recorded in the strait of Gibraltar, and it is manly composed by fishing boats (47%), recreational boats (24%), ships (17%), whalewatching boats (10%) and big game fishing boats (2%). Most of the inshore and offshore vessels were found to navigate over 10 kn speed. An inshore "higher use corridor" common to both vessels and cetaceans was identified, standing as a potential conflict zone. Other methodologies are proposed to address the impact of marine traffic towards cetaceans.

HI

HI15

Mediterranean monk seal and fisheries in Madeira archipelago: working towards interactions without conflict

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The Mediterranean monk seal (*Monachus monachus*) is the rarest and most endangered pinniped species worldwide. In Madeira archipelago monk seals are legally protected since 1986 and the population has grown from nearly 6-8 individuals to a now estimated 40-50, thanks to the conservation measures that are being held since then. While fisheries are one of the main threats to this species in other areas, information about the true nature of this interaction is still scarce in Madeira. This study, part of the LIFE+ project Madeira Monk Seal (LIFE13 NAT/ES/000974), aimed mainly to evaluate which fishing methods have more interactions with the seals and the attitude of fishermen during the encounters. Moreover, an approach to the fishermen about the possibility of collecting data on-board was made. Inquiries were directed to the vessel's captains and tried to cover all fishing methods that are used in Madeira. Interviews were made to 62 captains of a total of 89 vessels that are licensed to fish in Madeira's EEZ. From this 62 vessels, 36 (58%) register encounters with seals when fishing. Purse seine nets and bottom long-line were the methods that registered more interactions with monk seals (45 and 23% respectively). On 80% of the encounters, the seals disturbed the fishing event, either by scaring the fish, eating it or damaging the gear. Despite this, 75% of the fishermen that had encounters with seals recognize the importance of the species and agree with the conservation measures that are being enforced. This study established a list of priority vessels, based on the number of encounters and the availability to accept an observer on-board. The next step would be to collect data aboard the vessels and work close with the fishermen in order to continue the education towards the conservation of this important species.

HI

STR04

Mercury and selenium levels in bottlenose dolphins (*Tursiops truncatus*) stranded on the Canary Islands

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The mercury (Hg) level in the marine environment has increased significantly in recent decades, becoming a great concern because of its high toxic potential. This study reports the level of Hg and selenium (Se) in the blubber and liver collected from 30 bottlenose dolphins (*Tursiops truncatus*) stranded along the coasts of the Canary archipelago from 1997 to 2013. In the blubber, the median values for total Hg and Se were 80.83 and 7.29 μg g−1 dry weight (dw) and the hepatic content for both elements were 223.77 and 68.63 μg g−1 dw, respectively. The average level of Hg in the liver was comparable to those obtained in bottlenose dolphins from the North Sea, the Western Atlantic Ocean and several locations in the Pacific Ocean. The Mediterranean Sea and South of Australia seem to be Hg and Se hot spot areas of high levels in this cetacean species. In addition, both elements in the liver showed an increasing trend with the age of the animals with a strong positive correlation between them (rs=0.960). Surprisingly, the youngest and oldest individuals appear to be of greater toxicological risk, with a Se/Hg molar ratio different from 1. An upward temporal trend of Hg concentration in the liver was observed during the study period that makes continuous monitoring necessary. Further assessment is required to evaluate the possible toxic impact of chronic exposure in the cetaceans inhabiting the Canary waters.

STR

HE13

Metastatic pulmonary carcinoma in a long-finned pilot whale (*Globicephala melas*)

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We describe gross, histopathological and immunohistochemical features of a pulmonary carcinoma with disseminated metastases in a long-finned pilot whale (LFPW). An adult, female LFPW stranded alive in the south cost of Spain (36°05'49.5"N, -5°26'33.0"W; Algeciras, Andalucía) in 2011. The animal died shortly after. On necropsy examination multiple pulmonary nodules and generalized thoracic lymphadenomegaly were noted. Histologically, the pulmonary parenchyma, mediastinal and pulmonary associated lymph nodes, and the right adrenal gland cortex were invaded by a multifocally coalescing, poorly demarcated, unencapsulated, moderately cellular and highly infiltrative neoplasm. It was composed of disorganized acini, tubules and variably sized and dilated intercommunicating glands lined by neoplastic epithelial cells. Immunohistochemically neoplastic cells were AE1/AE3and vimentin positive. Vasculogenic mimicry and epithelial immunophenotype suggestive of mesenchymal transition were also noticed. Based on above findings a metastatic pulmonary carcinoma was determined. Primary pulmonary neoplasia has been rarely identified in cetaceans with only two descriptions of primary pulmonary squamous cell carcinoma (SCC) in an Amazon River dolphin (*Inia geoffrensis*) and in a bottlenose dolphin (*Tursiops truncatus*), hemangiomas in bottlenose dolphin, common dolphin (*Delphinus delphis*) and beluga whales (*Delphinapterus leucas*), fibromas in blue whale (*Balaenoptera musculus*) and fin whale (*Balaenoptera physalus*), and a chondroma and lipoma in a beluga whale. This is the first report of a pulmonary carcinoma in a LFPW.

HE

ABU10

Minke Whale (*Balaenoptera acutorostrata*) occurrence and distribution in Southwestern Portugal

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Very little is known about baleen whales occurrence in Portugal mainland. Although the Minke whale (*Balaenoptera acutorostrata*) is considered resident, most studies rely on stranding information. No abundance estimates are available. Distribution and relative abundance of this species in southwest Portugal are herein investigated. Boat based surveys were conducted opportunistically, off Sagres, onboard dolphin watching RIBs by a trained observer between 2005 and 2015. Surveys ran up to 12Nm from the shore. Weather conditions, GPS track, sighting position, group size and composition and behaviour were recorded. A Sighting Index (SI) (number of sightings per hour of observation) was calculated to investigate seasonality and habitat use. During 1017 boat surveys a total of 4586.85 h of search effort were conducted under Beaufort sea state ≤ 3 and are here analysed. During the study, 93 sightings of B. acutorostrata were recorded, 80 of which during search effort. Sighting distance to the shore ranged between 0.1 – 11.5Nm and depth between 20 - 200m, which is in accordance with the less than 200m usually near shore habitat described for the species. Minke whales were present during most of the study period, except one year. This may reflect abundance and variety of prey and/or oceanographic events. The mean SI was 0.017. Sightings were recorded in all seasons, however showing peaks of abundance during spring (SI=0.025) and autumn (SI=0.037). Widely distributed in Europe, the migration patterns of B. acutorostrata are generally hard to predict. The results herein presented reinforce the idea that this area might be used as part of the migration corridor though to occur between the Atlantic and the Mediterranean. Knowledge of the distribution and relative abundance of cetacean species is especially important in areas where no abundance estimates exist and this study provides important information for the knowledge of species in the area.

ABU

HI16

Minke whale entanglement in creel fishing gear: Identifying consistent areas of high risk off Western Scotland

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Entanglement in static fishing gear is a prominent cause of non-natural mortality for minke whales (*Balaenoptera acutorostrata*) in Scottish waters. In order to manage whale entanglement, it is valuable to identify areas where the risk of entanglement is high. Sightings data for minke whales and creel buoys were collected by the Hebridean Whale and Dolphin Trust, during vessel line transect surveys conducted annually between 2008 and 2014. Using this data, habitat modelling was used to relate survey, environmental, and temporal variables to minke whale occurrence throughout western Scotland. This revealed that minke whale occurrence was related to depth, peaking around 70m. Using predictive maps based on habitat modelling, the overlap between minke whale habitat and the creel fishery was measured as Risk of Entanglement. A simple method was then developed to quantify the consistency of risk over the 7 year time period. This allowed for the identification of areas where there had been a consistently low/medium/high risk of entanglement from 2008-2014. If management of minke whale entanglement in creel fishing gear in western Scotland is deemed to be valuable, the information presented here could be used to guide management to areas where efforts will be the most consistently effective over time. Furthermore, whilst this approach had not previously been considered, the method developed here for measuring risk consistency could be applied to future research, across ecosystems. The consideration of spatial risk consistency in future research could be advantageous to wildlife conservation and management.

HI

MO04

Modelling cetacean seasonal distribution in the Canary Islands. Why do nine cetacean species inhabit the archipelago year round?

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The Canary Islands hold a high biodiversity of cetaceans, but the scarcity of long-term data about their phenology, distribution and connectivity makes it difficult to track impacts from anthropogenic activities and to implement conservation management measures. Here we pool long-term time-series and effort-corrected sighting data collected during dedicated surveys as well as systematic sighting schemes from platforms of opportunity such as whale watching vessels and passenger ferries to analyse seasonal patterns of cetacean distribution using ARIMA modelling. The results show that at least nine species inhabit the archipelago year round, five of which are deep-diving whales. This is surprising given the oligotrophic character of the Canary Islands waters. We incorporate oceanographic data and apply spatial modelling to support the idea that the richness of species in the archipelago can be explained by the Canary Islands being an ecotone between temperate and subtropical waters, with meso-scale enrichment processes due to the vicinity of the upwelling off West Africa, local oceanographic dynamics and the complex geomorphology of these volcanic islands. Progressive warming of these waters, possibly as a result of climate change, might explain observed changes in the patterns of occurrence of rorquals, such as Bryde's whales. Combining data from dedicated research and opportunistic platforms increases sample size and thus strengthens the statistical power required for long-term studies of cetaceans. Our results show that such studies can be essential in order to learn about the effects that climate change and other anthropogenic impacts may have on the spatio-temporal occurrence of high seas predators. Furthermore, a wealth of data generated from different sources will inform decision making about conservation and management.

MO

MO05

Modelling habitat preferences of Bottlenose dolphins (*Tursiops truncatus*) on the west coast of Ireland

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Over the last two decades, the use of species distribution models to enhance our understanding of cetacean habitat preferences has increased. Movement and distribution of common bottlenose dolphins (*Tursiops truncatus*) along the complex topography of the west coast of Ireland are poorly understood. Visual surveys were conducted at three sites to determine the spatial and temporal distribution of this population in conjunction with environmental variables. Generalised additive models (GAMs) were used to examine the relationship between the presence/absence of these dolphins with a series of physical and environmental variables. A total of 26 dolphin encounters were tested against water depth, seabed slope, tidal state, sea surface temperature, salinity, month, and the respective distances to river mouths, salmon (*Salmo salar*) farms, and mussel (*Mytilus edulis*) farms. Salinity, distance to river mouths, and distance to mussel farms were significant predictors of dolphin presence; specifically, the positive effect of salinity peaked at 32, while the positive effect of the salmon farms decreased sharply within the first 10km. The dolphins favour areas in proximity to river mouths, possibly due to the seasonal aggregation of salmonids in their vicinity. Similarly, the attraction of wild fish towards mussel longlines could provide enhanced feeding opportunities for the dolphins. These findings support the evidence of a discrete “coastal” population of bottlenose dolphins exhibiting near-shore and shallow water preferences, with potential implications for the development of successful conservation plans.

MO

NT08

Molecular detection of cetacean morbillivirus: a new fast and sensitive detection system based on nested RT-PCR

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Cetacean morbillivirus (CeMV) (family Paramyxoviridae, genus Morbillivirus) has been identified as the most pathogenic virus for cetaceans. Over the past three decades, this RNA virus has caused several outbreaks of lethal disease in odontocetes and mysticetes in Europe, USA and Australia. Isolation and identification of CeMV RNA has remained very challenging in large whales stranded worldwide because of the poor conservation status of virus target tissues. Nested RT-PCR is used instead of conventional RT-PCR in situations in which it is necessary to increase the sensitivity and the specificity. This study describes a new nested reverse transcription polymerase chain reaction (nested RT-PCR) technique useful to amplify the small amount of the cDNA copy of CeMV when it is present in scant quantity in whales' samples. The hemagglutinin glycoprotein (H) gene region was recruited as candidate sequence for specific primers. Primer 3 software was used to identified the optimal primers pairs for detection. Positive and negative CeMV tissues were used to determined optimized parameters for nested RT-PCR. We use this technique to analyses different tissues (lung, brain, spleen and/or lymphatic tissues) from 2 fin whales (1 juvenile and 1 new - *Balaenoptera physalus*) and 4 sperm whales (3 juvenile/adult and 1 fetus – *Physeter macrocephalus*) stranded along the Italian coastline between October 2011 and September 2015. The well-characterized 200 bp fragment of the CeMV H gene obtained by nested RT-PCR was sequenced and confirmed positivity to virus for all the tested animals. In conclusion, this nested RT-PCR protocol could be considered a fast and sensitive detection technique to identified CeMV positive samples also when poorly preserved. Furthermore this is a rather unexpensive molecular approach which is easy to apply since it does not required specialized personnel.

NT

ECO12

Molecular determination of the diet of seals in the Baltic Sea

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The conflict between seals and fisheries has been present for centuries. Like any other predator the seal was a competitor for resources and from there the conflict began. In recent years, many fish stocks have declined because of overexploitation and now it is relevant to investigate how much seals can affect fish abundance and damage fishing gear. The seal populations have increased rapidly since the 1970s where a total protection was introduced in Denmark and Sweden. The consequence of high seal abundance for the already impaired fish stocks is as yet relatively unknown. Seals are opportunistic feeders, but their diet is often dominated by a few key species. These key species can vary geographically and seasonally relative to which species are most abundant.
Previous studies on seal diet have relied on identification of otoliths found in scat or stomach of the seal. This method can be inaccurate because of the erosion of hard parts in the stomach, and because seals are known to sometimes only eat parts of the fish, making the otolith count underrepresented.
This study will use molecular methods to analyse the diet of Grey seal (*Halichoerus grypus*) and Harbour seal (*Phoca vitulina*) from faeces collected on Christiansø, Denmark and Falsterbo, Sweden over several seasons. Each scat was sequenced to identify the seal species. The diet analysis will rely upon molecular analyses made with next generation sequencing. To compare the results with hard part analysis, otoliths found in the scats will be identified and counted.
The results of this study will help determine which fish stocks are preyed upon by seals, providing a tool for the continuous conservation of species in the Baltic Sea.

ECO

MN06

Monk seal sightings, identification and habitat survey in Israel

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More than 70 sightings of Mediterranean Monk Seal specimens were collected along the Israeli coastline from November 2009 until September 2015, over distances of ~80 nm, from Rosh Hanikra (North) to Ashdod (to the South). Photographic documentation was available for some of the sightings recorded in 2010, 2014 and 2015. Following photodientification methodology we were able to identified at least 2 individuals, sighted in the area of Rosh Hanikra and in the Herzelia marina (55 nm to the south) in 2010, the latter belonging to an adult female. The female was again photographed in 2014 and 2015 in Rosh Hanikra. The last sighting in Israel dated back to 1968 from the area of Rosh Hanikra, although a corpse of an unidentified seal (133 cm of length) was found ashore close to Tel Aviv in 2004. Sightings in Israel were followed by reports from neighboring countries in the Levantine basin, implying that monk seal presence and sightings is more of regional concern rather than merely local. A habitat availability survey was performed on July 2015 along the Israeli coast, following the main sightings areas. Artificial and natural habitats were checked. Although it seems that reproductively suitable habitat availability (marine caves) might be a limiting factor in Israel, nonetheless, we strongly believe that marine and costal protection should be enforced along the country's coastline to allow a natural return of the species.

MN

ECO13

Movement patterns of humpack whales (*Megaptera novaeangliae*) in the Barents Sea as revealed by satellite telemetry

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During field activities to conduct biopsy sampling, photo identification and instrumentation of baleen whales within the Barents Sea and in Svalbard waters over the years 2011 to 2014 and within the period August to September, satellite tags have been applied to eleven humpback whales in these waters. Satellite transmitters, which were Wildlife Computer SPOT5 implantable tags, were deployed with an ARTS gun. Tags produced signals over periods from 36 hours to about 4 months. The resulting tracks provided information on their movements within anticipated feeding areas in the Barents Sea and demonstrated high fidelity over several weeks to feeding regions of limited size. One of the whales demonstrated a shift between two local feeding areas about 350 km apart, a distance travelled in about 3 days. Another whale travelled continuously within an area about the size 250 km by 50 km over the 20 day period the applied tag produced signals. In August-October 2011, ecosystem surveys were conducted within the Barents Sea, also including the areas where the humpbacks were tagged and their satellite tracks recorded later on. Distribution maps from the ecosystem surveys revealed that the humpback whale tracks coincided with the kernel distributions of capelin. One of the tags did not start sending signals until 67 days after the application. At that time the whale had moved westwards to the area between Spitsbergen and Bear Island. After staying in the same general area for about two weeks, it suddenly started moving in a south-westerly direction, passing Jan Mayen on its route to Iceland which was passed to the east. The whale was tracked until the beginning of January 2012 when it was lost at 42°N, 38°W, with a heading which would bring it to some Caribbean destination.

ECO

PH08

Movements of sperm whales beyond the Pelagos Sanctuary

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The Pelagos Sanctuary is a large Marine Protected Area in the North-Western Mediterranean Sea devoted to the protection of cetaceans. However, the home range of some species, such as the sperm whale, may extend beyond its boundaries. A detailed picture of the distribution and movements of sperm whales is therefore necessary in order to understand how the Pelagos Sanctuary - and its conservation regime - compare with the home range of this species. For this purpose, the photo-ID catalogue for the Western Ligurian Sea was compared with the North Atlantic and Mediterranean Sperm Whale Catalogue (NAMSC) and with the catalogues available from different Mediterranean sectors not included in the NAMSC database: (a) the Corso-Provençal Basin (b) the Balearic Islands, (c) the Alboran Sea, (d) the Strait of Gibraltar, (e) the Eastern and the (f) Western Tyrrhenian Seas, (g) the Strait of Messina and (h) the Hellenic Trench. Of the 148 sperm whales identified in the Western Ligurian Sea, a total of 60 animals were photographically recaptured in other sectors of the Mediterranean Sea in different years indicating long-range movements of the species throughout the basin. The absence of any photographic recaptures between the Mediterranean Sea and the North Atlantic Ocean supports the genetic evidence of a distinct sub-population. By reviewing some already published data (matches with the Strait of Gibraltar until the 2011, the Corso-Provençal Basin, the Balearic Islands and the Hellenic Trench) and extending the already existing collaboration network among different institutions, the present study further emphasises the importance of sharing photo-ID data within an unified catalogue which provides a strategic tool to evaluate the population size, dispersion ability, and long-term trends of this “Endangered” subpopulation.

PH

MN07

New insight on marine mammals of the Southwest Pacific ocean: Part I - Large aerial survey (REMMOA) in the New Caledonia EEZ

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A large dedicated aerial survey has been conducted in the recently established Marine Park of the Coral Sea (New Caledonia), one of the world's largest marine protected areas. This survey is the fourth step of the REMMOA programme, whose goal is to monitor marine mammals and other marine megafauna (seabirds, turtles, rays, sharks) within the waters of the French oversea territories. Main aims were to identify the habitats associated with the highest densities or greatest biological diversities in order to identify areas of ecological interest regarding the pelagic megafauna. The survey was conducted with three planes from October to December 2014, over a total area of 542,000 km². A total of 248 sightings of marine mammals, 6,982 of seabirds, 1,150 of other megafauna species (sharks, rays, turtles) were collected along 40,500 km of transect with the distance sampling method. Sighting effort was conducted with sea state ≤3. A total of 18 taxa of cetaceans was encountered, including two species recorded for the first time in this area, Fraser's dolphin and fin whale. Sightings composition was diversified with large globicephalinae, large delphininae and beaked whale accounting for about 20% of the sightings each. Baleen whales represented 5% of the sightings, with 3 sightings of the recently recognized Omura's whale. Cetacean distribution was contrasted across study area, with higher encounter rates north and west of the main island (Grande Terre), while the area between Loyalty Islands and Vanuatu showed lower cetacean encounter rates. The slope and oceanic areas did not exhibit strong difference in encounter rate and species composition. Cetacean monitoring in the lagoon exists, but this survey is the first one to cover the offshore area. Preliminary results indicate the challenges of this large MPA in a context where the development of human activities can generate significant pressures on these species.

MN

MN08

New insight on Marine Mammals of the Southwest Pacific ocean: Part II - Large aerial survey (REMMOA) over the Wallis & Futuna EEZ

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Pelagic waters of the tropic are notoriously data deficient in terms of cetacean and other pelagic megafauna distribution, abundance and habitats. In the western South Pacific Ocean, only three cetaceans species had ever been reported from the waters around Wallis and Futuna Islands. As part of the REMMOA Project, the present study was aimed to map hotspots of relative abundance and diversity of pelagic megafauna in waters of Wallis and Futuna. The survey was conducted from November 2014 to January 2015, and covered a total surface area of 233 000 km² within the limits of the EEZ. A total of 130 hours of dedicated effort was conducted, corresponding to 22,500 km. Sampling design was computed by using Distance to ensure an equal coverage probability. 96 sightings of cetaceans, 2,753 of seabirds and 197 of other megafauna were recorded. For cetaceans, 15 different taxa or species were encountered, including 10 species and 2 genera (not identified at species level) newly reported from this region. Species composition was dominated by small delphininae (*Stenella longirostris* and *S. attenuata*) representing 28% of the sightings, while globicephalinae (*Peponocephala electra*, *Grampus griseus*, *Globicephala macrorhynchus*, *Pseudorca crassidens*, *Orcinus orca*), beaked whale (*Indopacetus pacificus* and an unidentified species) and large delphininae (*Tursiops truncatus* and *Steno bredanensis*) represented about 15% each. Kogiidae and sperm whale were also present with 8% and 1% of the sightings respectively. A few balaenopterids were encountered as well. Cetacean distribution is relatively homogenous making it difficult to identify patterns even if sightings tended to be more frequent on the slope northwest of Wallis. These results show a remarkable diversity in this area. They already provide useful elements to address many questions about local fishery management and habitat conservation strategies. Full data analyses are underway to estimate relative abundance and model habitats.

MN

ECO14

Niche overlap among blue, fin and sei whales in a mid-latitude habitat (Azores)

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Understanding the dynamics of baleen whale distribution and the potential for ecological interactions among species is essential to predict how changes (natural or anthropogenic) can disrupt their ecology and, in turn, affect ecosystem functioning. So far, most studies investigating the ecological interactions of different baleen whale species have focused on high-latitude feeding grounds. However, recent work has shown that mid-latitude habitats along migratory routes may play an important role on the feeding ecology of baleen whales. The goals of the present study were to evaluate the environmental niche overlap and potential for competition among three baleen whale species, the blue (*Balaenoptera musculus*), fin (*B. physalus*) and sei (*B. borealis*), that occur in sympatry during spring and summer months in a mid-latitude habitat (the Azores islands). We addressed those questions by developing environmental niche models (ENM) for each of the three species using a presence only modelling approach based on the maximum entropy principle and then investigating the environmental niche overlap among the three species. ENMs were created using sightings from the Azorean Fisheries Observer Program from May to November, between 2002 and 2009 (blue whales: n = 29; fin whales: n = 98; sei whales: n = 74), and a set of 14 predictor environmental variables. We then assessed monthly (April-July) overlap among ENMs of the three whale species using Schoener's niche overlap metric (D). Overall results show a higher similarity among environmental niches of blue and fin whales (mean D = 0.80) than of sei whales with fin (mean D = 0.52) or blue (mean D = 0.62) whales. These results point to greatest potential for competition between blue and fin whales while in the Azores.

ECO

ECO15

Occurrence of common dolphin (*Delphinus delphis*) in the south of Portugal

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In Portugal (excluding islands), the short beaked common dolphin (*Delphinus delphis*) is the most sighted species of cetaceans. However, information regarding their occurrence, distribution and abundance in the area is limited. It is known that common dolphins are generally associated with regions of high chlorophyll or/and upwelling. The Algarve region, located in south Portugal, is characterized by an intense wind driven upwelling season from March to October, with an almost permanent upwelling spot (Cape St Vicente), creating the ideal conditions for the appearance of dolphins in the area. Using observational data collected on-board whale watching boats during a 5-year period (2010 to 2014), we aim to understand the relation between environmental and climate variables and the density of common dolphins in the Algarve. Results revealed a higher number of groups and juveniles when upwelling values are lower, suggesting that common dolphins are associated with periods of upwelling relaxation, common during upwelling season. A possible explanation is the formation of thermal fronts caused by the expansion of warmer currents poleward due to weaker winds, and consequent retention of preys (e.g *Sardina pilchardus*) near the coast. Another factor influencing the abundance of common dolphins is NAO. Higher abundance of sardines seems to occur during low NAO periods in other areas, due to changes in winds and temperatures, which may explain the higher abundance of calves and newborns during these periods, with density rate increasing after an increase in prey availability. Finally our results are consistent with previous studies and knowledge that common dolphins tend to occur in highly productive areas, such as the Algarve region.

ECO

MN09

Opportunistic platforms as a source of citizen science during a scientific study: 'Fin whale Project'

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Since 2013 the EDMAKTUB association develops the 'Fin whale Project', a long-term study on the fin whales (*Balaenoptera physalus*) presence during their migration along the Garraf coast (South of Barcelona coast) from February to June. One of the main objectives is a two-way collaboration, making known this situation to stakeholders operating along the entire Catalonian coast and receiving their practical information about the area. As a consequence, a network of contacts with sailors, recreational and commercial fishermen (Vilanova i la Geltrú, Tarragona and Barcelona guilds) has been established. Supplying information to Edmaktub activates the involvement of a part of the seamen community in a scientific investigation project. Constant communication with these opportunistic platforms, which interact with different cetacean species, offers a more extended study area for obtaining data. They provide fin whales' sightings and their GPS position, with photos and/or videos via mobile phone or via VHF radio in real time, a posteriori and also outside the project's principal study period. This network has been expanding and getting stronger during the two-year research. As a result, the percentage of sightings provided by the contacts network increased from 28% of the total sightings in 2014 to almost 50% next year. During the study period more than 40 sightings were reported by fishermen and sailors, highlighting the value of their participation. The cooperation and the involvement of stakeholders are fundamental for the conservation of biodiversity and ecosystem functioning. Therefore, maintaining and expanding this dynamic collaboration with the opportunistic platforms as a form of citizen science is of high importance.

MN

HE14

Pathological findings in intestines of grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) from the North and Baltic Sea associated with acanthocephalosis

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Grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) are the most common seal species in the North and Baltic Seas. They are final hosts of various parasites, like acanthocephalans. Infections with acanthocephalans (*Corynosoma* spp.) are increasing in the seals´ small and large intestines. Harbour seals predominantly display an acanthocephalosis in the small intestine, namely *Corynosoma strumosum* and *Corynosoma magdaleni*. Frequently, Baltic grey seals show a severe acanthocephalosis with *Corynosoma semerme* in the caecum and colon associated with ulcerative lesions and inflammations, described as part of the Baltic Seal Disease Complex (BSDC). The lesions´ pathogenesis and the correlation of acanthocephalan infections with these alterations are unknown yet. This study focuses on differences of the intestinal lesions, their causes, effects and acanthocephalan distribution in each seal species. To examine the alterations, samples of infected North Sea and Baltic grey seal intestines, collected by the Polish and German dead animal monitoring and dissected at the ITAW, were taken for pathohistology, in order to be compared with histological findings of North Sea and Baltic harbour seal intestines with acanthocephalan infection.Both seal species displayed intestinal alterations associated with acanthocephalosis. The small intestine of either species was mildly or moderately infected, whereas grey seals showed more moderate and severe infections of the caecum and colon than harbour seals. Current- and previous-year born harbour seals displayed a mural granulomatous eosinophilic or a catarrhalic enteritis. Perennial and current-year born grey seals showed a chronic erosive to ulcerative or eosinophilic colitis plus intralesional acanthocephalans, associated with mural fibrosis and hypertrophy of the tunica muscularis. Acanthocephalans may affect the seals´ health negatively. They potentially induce the primary lesion or could be promoted by a pollutant-impaired immune system. This hypothesis, seal age effects and the role of the different *Corynosoma* spp. in this process are investigated hereby.

HE

HE15

Pathology and causes of death of stranded cetaceans on the coast of Andalusia, Spain (2011-2014)

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Between 2011 and 2014, 538 cetaceans, representing 16 species, were found stranded along the Andalusian coast. This study describes the epidemiology, pathological findings and causes of death (CD; grouped as 'pathological entities') of 104/538 (19%) stranded cetaceans (11 species). Samples were analyzed for histology, microbiology and virology. From 104, 59 (57%) were females and 45 (43%) males. Twenty seven (26%) were neonates/calves, 48 (46%) juveniles/subadults and 29 (28%) adults. Nineteen (18%) were very fresh, 54 (51%) fresh, 28 (27%) moderate autolysis, and 4 (4%) advanced autolysis. Twenty-eight (27%) stranded alive, and 76 (73%) were found dead. Thirty-three (32%) were in good nutritional status (NS), 17 (16%) moderate, 39 (37%) poor, 12 (12%) emaciated, and 3 (3%) not determined. A CD was recognized in 95/104 (91,34%) studied individuals. Within natural pathological categories, those associated with good NS involved 17/104 (16%); whereas 36/104 (35%) presented significant loss of NS. Interaction with fishing activities encompassed 19/104 (18%). Neonatal/perinatal pathology enrolled 8/104 (8%). Fatal intra-interspecific traumatic interactions included 9/104 (9%). Ship collisions were determined in 2/104 (2%). Foreign body pathology was observed in 2/104 (2%). Within natural categories CD, infectious pathogens (bacteria, virus, fungi) represent the 64%. Parasitic disease was recognized in 30% with fatal cases involving *Toxoplasma gondii* and *Crassicauda* sp. Fatal neoplastic disease included a pulmonary carcinoma with metastases in a long-finned pilot whale (*Globicephala melas*) and a hepatocelular carcinoma with metastases in a striped dolphin. A case of a fatal asphyxiation in a long-finned pilot whale due to primary bronchi obstruction caused by an European eel (*Anguila anguila*) is reported. Direct human activity is responsible for approximately 22% of cetaceans deaths, while 'natural' pathologies would account for approximately 78%. This study significantly contributes to baseline knowledge on cetacean pathology.

HE

HI17

Plastic ingestion by harbour porpoises (*Phocoena phocoena*) in The Netherlands

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Abundance of ingested debris by harbour porpoises has been mentioned as a potential indicator of marine litter in the European Marine Strategy Framework Directive (MSFD). Stomachs of harbour porpoises from The Netherlands were analysed to quantify the presence of plastics. Plastics were collected from stomachs by slow overflow, in a 1mm mesh size sieve. Plastics were categorized and from each category, the number of particles was counted and the weight was measured. The average number and mass of plastic will be expressed as “population averages”, including porpoises without ingested plastic.

HI

GE02

Population genetic structure of harbour porpoise Phocoena phocoena in Turkish Waters – What does mtDNA Control Region say?

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The Black Sea harbour porpoise (*Phocoena phocoena relicta*) mainly inhabits the Black Sea, as well as in the Turkish Straits System (TSS, consisting of the Istanbul Strait, Marmara Sea and Canakkale Strait) and the Aegean Sea although less common. It is a species of conservation concern with Endangered status in the IUCN Redlist. In previous studies, 186 individuals from the Black, Marmara and the Aegean Sea were analyzed in total based on mitochondrial DNA control region sequence variation, and 24 different haplotypes were found. In the present study, mitochondrial DNA sequences of 28 new samples of the harbour porpoise collected between 2007 and 2015 in the Turkish Black Sea coast (9 western, 10 eastern), Istanbul Strait (2), Marmara Sea (5), and northern Aegean Sea (2), exhibited five haplotypes. A unique haplotype, which previous research suggested to be predominantly found in the Marmara Sea, was also found in one individual in the same area, Silivri, strengthening the possibility of an isolated population. In addition, a haplotype previously recorded from only northern and western Black Sea was detected for the first time in the TSS, and another haplotype previously found in the northern Black Sea, TSS, and Aegean Sea were detected in the western Black Sea. The most common Black Sea haplotype was found not only in two individuals in the northern Aegean Sea, but also in one individual sampled for the first time in the southern Marmara Sea, supported the idea that harbour porpoises from the Black Sea dispersed into the Aegean Sea through the TSS, and that the Black Sea is the source of Aegean Sea porpoises. Additional samples will be sequenced with the same mtDNA marker, as well as with RAD-sequencing in the context of an ongoing project, CetaGen.

GE

GE03

Population structure of bottlenose dolphin in the Gulf of Guayaquil based on molecular analysis

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The bottlenose dolphin, *Tursiops truncatus*, has a wide distribution along the west coast of South America. In Ecuador, a resident population of bottlenose dolphins inhabits the inner estuarine area of the Gulf of Guayaquil (3S, 81W). We evaluate the conservation status of this population, population structure, phylogeographical patterns, and phylogenetic relationships using loci microsatellites and non-coding and cording-protein gene of the mitochondrial DNA. Thirty-one skin samples were collected from free-ranging dolphins in three localities in the inner estuary of the Gulf of Guayaquil. In addition, 9 skin and 17 bone samples from stranded dolphins were included into phylogenetic and phylogeographic analysis. Our phylogenetic analysis indicated that this population constitutes an isolated group with high levels of genetic differentiation from other populations of *T. truncatus*. The results also showed a significant population structure with microsatellite loci, control region, and the cytochrome oxidase I gene. In addition, the results show a high genetic diversity with microsatellites, and low genetic diversity with mitochondrial control region. Moreover, high levels of inbreeding, and no evidence of sex-bias dispersal were identified in microsatellite data. Based on the results, we suggested that this bottlenose dolphin population represents a distinct evolutionary significant unit. Since the species faces a variety of anthropogenic threats in this area, we highlight the fragility of this population and urge authorities to issue management and conservation measures.

GE

MO06

Predictive distribution habitat models for common dolphin (*Delphinus delphis*) in the N and NW waters of Spain

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The Spanish multidisciplinary survey PELACUS is carried out annually to study pelagic marine ecosystem and evaluate fishing resources of the North and Northwest shelf waters of the Iberian Peninsula. Linear transects perpendicular to the coast distant 8 nm each and up to the 1000 m isobath are prospected acoustically at a speed of 10 knots between March and April. Since 2007, a team of observers collects information on the presence of marine mammals, seabirds and large fish using line-transect methodology. Two observers, located on the upper deck, search for animals with naked-eye over a sector of 90° each. In addition, environmental and oceanographic data are recorded simultaneously to characterise pelagic habitats. Common dolphins (*Delphinus delphis*) are the most sighted cetacean species during the surveys (X ≈ 20 groups sighted per year). Regardless of its abundance and wide distribution, little is known about the environmental characteristics that define its preferred habitats. We tested the relationship between common dolphin sightings collated between 2007 and 2015 and putative explanatory variables of its distribution such as bathymetry, distance to the coast, sea surface temperature and chlorophyll-*a*. Temperature and chlorophyll-*a* data were collected from ocean remote sensing and aggregated at several temporal scales to study the distribution and abundance of this species in the study area. The variables that best predict dolphin occurrence and abundance, as well as its level of aggregation, were identified and used to obtain spatial predictions of common dolphins. Habitat models are a useful tool to identify marine areas where greater numbers of this species are expected and therefore could represent an important instrument for its conservation and management.

MO

ECO16

Preliminary assessment of sperm whale foraging habitat in the Ligurian Sea (North-Western Mediterranean Sea) by using underwater vocalizations

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Underwater vocalizations are considered a useful tool to study the ecology and behaviour of the sperm whale. In this study, sperm whale vocalizations were analysed to investigate the spatial distribution of foraging areas for this species in the North-Western Ligurian Sea. In sperm whales, 'creaks' are thought to be indicative of feeding attempts; therefore, they were used as a proxy in order to obtain an index of sperm whale feeding activity. The creak rate was calculated based on 108 audio recordings collected during sperm whale dives between 2005 and 2014. The spatial variability of the foraging activity was investigated by means of a grid of 6.8 x 9.3 km cell unit, and analysed with respect to depth (i.e. coastal areas < 300 m, continental slope between 300 and 1500 m, and pelagic area > 1500 m) and remote-sensed features (i.e. sea surface temperature SST and chlorophyll-a concentration Chl-a). Average creak rate resulted in 0.3042 creaks per minute per whale (SD=0.1502; Max= 0.6; Median=0.29). The median value was used as a threshold value to discriminate between two foraging categories: "high foraging" and "low foraging". High foraging occurred in 54.6% of the samples (creak rate > 0.29) while 40.7% were classified as low foraging (creak rate < 0.29). Although high foraging occurred in all depth classes, depth was found to discriminate different foraging behaviours. In the pelagic area (i.e. depth > 1500m), higher creak rates were in fact correlated ($P<0.05$) with most productive areas (i.e. higher Chl-a features). Additional acoustic samples are needed to confirm these results and to evaluate the occurrence of a temporal trend. Understanding the dynamics of these critical habitats may be crucial for the development of effective conservation measures of this 'Endangered' sub-population.

ECO

MN10

Preliminary results on cetaceans presence and distribution along a trans-regional fixed line transect in the Adriatic and Ionian Sea

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A collaborative monitoring programme on cetacean has been established in the Mediterranean Sea. The network of scientific bodies monitors all cetacean species along ferries routes which cross the Mediterranean basin, following a consistent protocol for data collection and data storing. Outputs of the programme are baseline for long term-large scale data on cetacean distribution, relative abundance and interaction with ferries. From 2007 to 2015 fixed line transects were monitored just in the Western Mediterranean. Starting from December 2014 systematic surveys started for the first time also in the Eastern Mediterranean basin, along a trans-regional fixed line transect of 1300km, lying in the Adriatic and Ionian Sea. During the first monitoring season (December 2014-November 2015) 9000km (190 hours) of effort were conducted in good weather condition, and 60 sightings of cetaceans belonging to 4 species (bottlenose dolphin, striped dolphin, Cuvier's beaked whale and fin whale) were realised. The mean SPUE of the whole period was 0,007 (sight/Km effort). Striped and bottlenose dolphin were the two most sighted species with respectively 26 and 22 sightings. Presence and distribution of species varied among the seasons. The mean recorded distance of cetaceans from the ferry was 315m. The interaction among ferry and cetaceans was neutral in the 52% of the sightings, positive in the 37%, negative in the 12%. Results of the 2015 monitoring campaign are discussed in detail.

MN

HE16

Prevalence and pathology associated with the presence of *Nasitrema* sp. in stranded cetaceans in the Canary Islands

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Nasitrema sp. is a genus of trematodes that infests nasal and pterygoid sacs, tympano-periotic complex and nervous system of odontocetes. Between February 2000 and December 2014 a total of 641 cetaceans stranded in the Canary Islands, 458 of them were submitted to post-mortem examination according to standardized methodology. This study is focused on 50 cases with *Nasitrema* sp. infestation (50/458, 10.92%), affecting 7 different species of odontocetes (*Steno bredanensis*, n=7; *Stenella frontalis*, n=11; *Tursiops truncatus*, n=13; *Globicephala macrorhynchus*, n=4; *Delphinus delphis*, n=5; *Stenella coeruleoalba*, n=8; *Stenella longirostris*, n=2). The highest prevalence of infestation was found in the species *Stenella longirostris* (2/3; 66.67%), while the lowest was found in *Stenella coeruleoalba* (8/90, 8.89%). *Nasitrema* sp. was mainly observed in pterygoids sacs, but also in middle and inner ear, eighth cranial nerve and brain, causing lesions that could have been responsible for the stranding and/or death of some individuals. Macroscopically, in pterygoid sacs was observed a multifocal, moderate to severe, suppurative and ulcerative sacculitis, with presence of adult flukes, hyperplasia and hyperkeratosis of the mucosa. In the cases where nervous system was affected, necrotizing and haemorrhagic vestibulocochlear neuritis, necrotizing meningoencephalitis with haemorrhages and occasional intralesional adult flukes was observed. At microscopic level, the main lesion observed was a suppurative granulomatous reaction associated with high number of trematode eggs. The results of our study support the migration theory of *Nasitrema* sp., which has been proposed by others authors, arguing that the displacement of trematodes larvae is between surrounding anatomical structures, namely, from the pterygoid sacs and the complex ear to the brain, passing through the eighth cranial nerve.

HE

HE17

Prevalence of lesions and deformities observed in common dolphins (*Delphinus* sp.) in the Hauraki Gulf, New Zealand

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Lesions and deformities on cetacea can be useful to assess the natural and anthropogenic impacts faced by a population. While several studies have examined carcasses to assess such parameters, considerably fewer studies have been undertaken on free-ranging populations. The prevalence of lesions and deformities affecting common dolphins (*Delphinus* sp.) were examined between 2010 and 2013 in the Hauraki Gulf, New Zealand. From 1,411 independent encounters, 2,083 individuals were identified from permanent nicks and notches on their dorsal fins. Of these individuals, the number of lesions and deformities on 12 body sectors was assessed. Prevalence was determined by weighting the number of lesions and deformities by the cumulative number of images for each body sector. The majority (78.0%, n=1,624) of individuals exhibited lesions, whereas only 0.5% (n=11) had deformities. Of all body segments examined, the anterior peduncle exhibited the highest percentage of lesions or deformities (91.1%). A significant difference in the prevalence of lesions between the leading and trailing edges of dorsal fins was also evident. Most lesions observed were represented by indentations and impressions (84.2%, =1,368), followed by cut-like indentations (54.1%, =878), hyper-pigmented lesions (43.1%, =700), and hypo-pigmented lesions (37.4%, =607). Deformities were observed for 0.7% (=11) of all individuals (=1,624), with 0.6% (=10) having deformed dorsal fins and the remaining 0.1% (=1) a spinal malformation. A number of possible causes of lesions and deformities were highlighted including intra- or inter-specific interactions, congenital malformations, environmental conditions, infectious origins, fisheries and vessel interactions, and/or human-induced environmental stressors. This study provides a basis for categorising lesions on free-ranging *Delphinus* and offers discussion concerning potential anthropogenic impacts faced by common dolphins within this region.

HE

HE18

Primary uterine T-cell lymphoma with metastasis in an Atlantic spotted dolphin (*Stenella frontalis*), Canary Islands, Spain

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Different variants of lymphoma have been reported in cetacean species (Stolk 1962; Howard *et al.* 1983; Yonezawa *et al.* 1989; De Guise *et al.* 1992; Bossart *et al.* 1997; Arbelo *et al.* 2014). The present study describes a primary uterine T-cell lymphoma with multiple metastases in an adult, female Atlantic spotted dolphin (*Stenella frontalis*). On gross examination, the major findings were confined to the reproductive system. The uterus was diffusely enlarged. While the walls of the uterine neck and body were diffusely thickened, the walls of the uterine horns were thinned. The ovaries were markedly enlarged and the adjacent mesosalpinx was markedly thickened. Upon section, the uterine walls showed mottled white to pink, well-delineated, firm areas. The endometrium was diffusely roughened with patchy, dull red areas. The adjacent peritoneum had variable, white to pink, firm nodules and plaque-like masses. A well-demarcated plaque of similar nature was observed in the serosa of the thoracic aorta. The mesenteric lymph nodes were moderately enlarged. Histologically, the uterine architecture was distorted and replaced by a multifocal to coalescing, poorly demarcated, unencapsulated, densely cellular and infiltrative transmural neoplasm, which extended from the endometrium to the serosa. Neoplastic cells diffusely infiltrated the mesosalpinx and multifocally the muscular layers of the keratinized gastric compartment, peritoneum, lung parenchyma, serosa of the thoracic aorta, pituitary gland, and adrenocortical layers. No tumor cells were noted in the lymph nodes evaluated. For immunohistochemical analysis a monoclonal anti-CD79a antibody (B cells) and a polyclonal anti-CD3 (T-cells) antibody were used. Approximately 95% of the neoplastic lymphoid population showed moderate, diffuse granular cytoplasmic immunolabelling for CD3 in uterine sections, whereas CD79a was negative. Based on the morphologic and immunophenotypic features of the neoplastic cells a diagnosis of primary uterine T cell lymphoma with metastases to distant organs was determined.

HE

HE19

PWMV threats Canary Islands pilot whales

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An unusual mortality event related to morbillivirus infection involving short-finned pilot whales (*Globicephala macrorhynchus*) occurred in the North-East Atlantic Ocean during the first five months of 2015. From mid-January to end-May, three whales (animal 1, 2, and 3) were found dead along the coasts of the Canary Islands. A complete standardized necropsy was performed in all the cases. During the necropsy, tissue samples were collected in duplicate: fixed in 10% neutral buffered formalin for histologic and immunohistochemistry analyses, and frozen at -80ºC, until the development of molecular virology analysis. Grossly, the most remarkable findings in animal 1 consisted of clogged nasal passages by the accumulation of large quantity of purulent material, severe suppurative otitis media, sacculitis, and laryngitis. Severe diffuse epithelial hyperplasia and hyperkeratosis was observed along the upper respiratory tract and keratinized stomach. Animal 2 presented severe proliferative dermatitis and cheilitis, and severe suppurative laryngeal tonsillitis. In animal 3, advanced autolysis precluded pathologic analysis. Histologically, moderate multifocal bronchointerstitial pneumonia, severe suppurative tonsillitis and systemic lymphoid depletion were identified in animal 1 and 2. Severe non-suppurative meningoencephalitis with neuronal and glial cell degeneration and necrosis, microgliosis and syncytial cells was observed in animal 2. Morbillivirus infection was confirmed by immunohistochemical and molecular studies. Sequence analysis of a conserved fragment of the morbillivirus phosphoprotein gene indicates that the virus is closely related to Pilot Whale Morbillivirus (PWMV). The virus strain is almost identical to the only case of PWMV reported in a short-finned pilot whale, which stranded in the Canary Islands 19 years ago. The results of this study support the previous hypothesis that pilot whales have their own species-adapted morbillivirus, but indicate that lethal infections are not as rare as previously thought.

HE

ANA05

Rare sightings of hypo- and hyper-pigmented adult short-beaked common dolphins off Madeira Island

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Sightings of anomalously all-white (leucistic) or all-black (melanistic) individuals are rare in nature. Although such sightings have been described for several marine mammal species, information on hypo- or hyper-pigmented short-beaked common dolphins (*Delphinus delphis*) is scarce in literature. This aberrant pigmentation is still poorly understood, and records of such nature in this species (given that most available information refers to *Delphinus* spp.) are mainly resumed to sightings off New Zealand, California and France. This study describes two rare sightings of anomalously pigmented D. delphis off the south coast of Madeira Island during summer 2015; spaced by 60 km distance and 36 days apart. Both individuals were full-sized, i.e. adults, and were observed displaying the same behaviour of the other members of the group. In both cases, no other species was seen in the vicinities. Both sightings were recorded from whale-watching platforms, and photographs of the anomalously individuals and respective groups were taken. The first sighting was of an all-white individual, but with normal (dark) colouration eyes. The latter characteristic indicates that the animal was not a true albino, but rather a leucistic individual. The second sighting was of a dark-pigmented individual that lacked the distinctive hourglass colour (yellow) pattern. Despite the limitations of its condition, the adulthood observed in this study confirms the potential longevity of such anomalously pigmented individuals in the wild. Similar reports as of those described here may provide a framework to better understand these animals.

ANA

HE20

Reference intervals for evaluation of the GI tract in clinically healthy bottlenose dolphins (*Tursiops truncatus*)

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Marine mammals frequently do not show clinical signs of illness early in various disease processes. Preventative medicine of the digestive system in dolphins is fundamental to ensure the welfare of these animals under human care. This study aimed to establish: a) Reference Intervals (RI) for normal cytological findings in gastric samples, b) provide a detailed description of the ultrasonographic appearance of the normal gastrointestinal (GI) region, c) characterize bacteria isolated from the gastric fluid and faeces from clinically healthy bottlenose dolphins (*Tursiops truncatus*). This project was based, for the first time, on the "Guidelines for the Determination of RI in Veterinary Species" issued by the QALSC. 31 bottlenose dolphins were examined and sampled by voluntary behaviour: they were considered healthy based on physical examination, laboratory evaluation, and histological assessment of the mucosa of the gastric chambers. Results show that no correlation was found between pH and the EC ($rs = 0.292$, $p = 0.1657$), between pH and the WBC ($rs = 0.168$, $p = 0.4321$), between EC and WBC ($rs = 0.076$, $p = 0.7240$). Also the t-test did not find a significant difference for weight ($p = 0.6739$), pH ($p = 0.7707$), EP ($p = 0.6385$), or WBC ($p = 0.6968$) between sexes. In this study, cytology was combined with the endoscopic and histological examination of stomach tissue. Endoscopy is the most useful tool for examining the upper GI tract. However, ultrasonography plays an important role in modern-day preventative medicine because it's a non-invasive technique, it's safe, and it can be performed routinely using medical behaviors. This study expands the present knowledge in bottlenose dolphins, providing additional relevant data and allowing the clinician the possibility to evaluate gastric health more extensively.

HE

STR05

Retrospective study (2000-2014) of the impact of foreign body in cetaceans stranded on the Canary Islands

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The Canary Islands are considered the area of greatest richness and diversity of cetaceans in the North Atlantic Ocean, as 30 different species have been observed, both resident and migratory. Since half of the last century, the pollution of marine environment has increased exponentially worldwide due in part to the use of plastic. The aim of this study is to estimate the impact of marine debris in cetacean population of the Canary Islands through the analysis of the presence of foreign bodies in stranded animals. Therefore, we performed a retrospective study of the necropsy cases since January 2000 to December 2014. In this period, 464 cetaceans were necropsied, out of a total number of 646 individuals stranded on the Canary Islands, and 36 specimens presented foreign body ingestion (7.76% of stranded necropsied animals). The most affected species were Cuvier's beaked whale (*Ziphius cavirostris*), sperm whale (*Physeter macrocephalus*) and Atlantic spotted dolphin (*Stenella frontalis*). Nearly all these cetaceans belong to deep-diving species 20/36 (55.56%), including 10 individuals of the Ziphiidae family (10/36; 27.78%). The foreign bodies found, mostly in the stomach compartments, were: plastics (mainly bags) (77.78%), ropes/threads (25%), metal filaments (8.33%), fragments of cloth/pieces of fabric (5.56%), and glass fragments (2.78%). The cause of death was directly associated with the presence of foreign bodies in 13 of the 36 animals (36.11%). Besides these cases, several animals presented intestinal obstruction and bleeding ulcers in the digestive tract were also observed. Although currently it is not possible to make a statistical inference to a population level, these data should be taken seriously as they suggest that marine debris ingestion is a real problem for cetaceans in this area.

STR

ABU11

Revised abundance estimates of striped and short-beaked common dolphins in the Gulf of Corinth, Mediterranean Sea

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Reliable population abundance estimates are essential for conservation, but remain challenging to obtain for cetaceans. The Gulf of Corinth, in Greece, hosts local populations of striped dolphins *Stenella coeruleoalba* and short-beaked common dolphins *Delphinus delphis*. We estimated the combined abundance of the two species (the latter only found in mixed-species groups) in years 2011-2014 using photographic identification and capture-recapture models. We considered a subset of 22,039 high-resolution, high-quality photos featuring appropriately marked dorsal fins. The proportion of unmarked individuals was calculated based on the number of photographs of marked and unmarked dorsal fins obtained daily. Our 4-year average estimate was 1,504 individuals (95% CI 1,376-1,644). This estimate is almost twice as large as a published estimate obtained in 2009 with comparable methods (835 animals; 95% CI 631-1,106). An actual 80% population increase was ruled out. The 2009 sample (23 dolphin groups) was 3.3 times smaller than the one in 2011-2014 (average of 76 sampled groups per year). Additionally, it only covered the central portion of the Gulf. To better understand the discrepancy, we tested if either insufficient spatial coverage or insufficient sample size in 2009 may have resulted in underestimation of population abundance. First, spatial resampling of the 2012 dataset within the smaller area sampled in 2009 yielded no significant difference in abundance. Second, through randomly re-sampling, we reduced the 2012 sample size to that of 2009. We performed 100 permutations, extracted a capture matrix from each simulated sample and re-estimated abundance. The resulting point estimates were extremely variable, ranging between 716 and 3,174 animals. In conclusion, while spatial coverage did not seem to affect abundance estimates, reducing the number of sampled groups negatively affected accuracy. Simulations such as those outlined here can improve abundance estimates by ensuring that they rely on an appropriate sample size.

ABU

BE07

Seal borders at sea

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Most colonial animals, including seals, undertake foraging trips from a central place. Close proximities between neighbouring colonies could lead to inter-colonial competition for resources. Several studies have shown spatial segregation in foraging areas of neighbouring colonies, possibly reducing this competition. Currently it is assumed that two mechanisms could create boundaries between foraging areas. First, if individuals are not site-faithful and minimize travel distance, borders are formed at the equidistance between colonies (the hinterland model). Second, boundaries could be formed through direct interaction between individuals, e.g. aggression. Here we study whether spatial segregation and boundaries between foraging areas could also be generated if animals would only use knowledge on food density.
We performed simulations where individuals were either faithful to their colony or were allowed to switch between them. Before each foraging trip, individuals chose a foraging site based on an estimated travel and foraging time. Foraging time was defined as a function of food density. Food density was initially homogenously distributed, but reduced over time by consumption during previous foraging trips. Individuals did not interact with others, but were assumed to have some knowledge on food density.
Despite the lack of inter-colonial interaction in the models, hard boundaries emerged in both simulations. If organisms were site-faithful, the colony size and the available foraging area determined whether animals would extend their forage range into the hinterland of neighbouring colonies. This oppression resulted in a domino effect where the foraging areas of all subsequent colonies were pushed side-ways.
The formation of hard boundaries in both models shows that accurate information on food density is sufficient to generate spatial segregation without interaction. We have tested this simulation with count and telemetry data from harbour seals in the Dutch Wadden Sea, and argue that similar principles can be applicable to other colonial species.

BE

BE08

Seasonal and spatial variation in the social network of the Welsh bottlenose dolphin (*Tursiops truncatus*) population

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Quantitative techniques, initially developed for the assessment of human sociality, are increasingly being used to assess animal social networks. Here we had the novel opportunity to explore seasonal and spatial differences in the social network structure of the bottlenose dolphin (*Tursiops truncatus*) population inhabiting Cardigan Bay and surrounding areas, using 14 years of photo-identification data. Bottlenose dolphins within this population showed differences in network structure both on a spatial and seasonal scale. When comparing locations in summer and winter, individuals were more connected in Cardigan Bay in the summer and around Anglesey to the north in the winter with less sub group clustering. Moreover, the winter network around Anglesey was significantly better connected compared to that of Cardigan Bay during the summer months. Differences in group size were also identified, with very large aggregations occurring around Anglesey in the winter months, while social groups were smaller in Cardigan Bay. We suggest that the seasonal and spatial differences in social networks were a result of seasonality in calving and the ecology of target prey. Cardigan Bay offers an ideal location for rearing young offspring and most young calves are observed here during the summer. Within Cardigan Bay, dolphins are thought to largely forage on benthic prey, whereas around Anglesey in winter, dolphins mainly target pelagic shoaling fish and this activity may result in the coordination of larger groups of individuals. The effects of seasonal movements on social networks is an understudied area of research and the identification of seasonal and spatial changes in the Welsh bottlenose dolphin network has wider implications on our understanding of the degree of social interaction between individuals and how information and disease may flow through the population.

BE

ANA06

Secrets of the dead: Examining kinship relationships in Gray's beaked whales (*Mesoplodon grayi*)

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The intimate lives of some of the rarest deep-ocean cetaceans have, until recently, been beyond our reach. Gray's beaked whales (*Mesoplodon grayi*) are rarely seen alive and nothing is known of their social habits. However, they are one of the most common cetaceans to strand around the coast of New Zealand, and the long-term collection of samples has enabled us to investigate certain aspects of their biology. Examining patterns in strandings has highlighted sex differences in the timing and distribution of mortality. We have found clear sexual dimorphism in cranial morphology and subtle geographic variation in external morphology. Gray's beaked whales have high levels of genetic variation and little population structure. Using genetic methods, we now have a window into their complex life history, yet the social dynamics of beaked whales remain a mystery. Gray's beaked whales have a southern circumpolar distribution and are unusual amongst the mesoplodonts in that they frequently strand in groups (4-6 individuals). Indeed, the holotype specimen was one of a large group of 28 whales to strand on the Chatham Islands. In this study we investigated kinship in a total of 18 groups (56 individuals) and 47 individual strandings using samples collected between 1993 and 2013. We amplified mitochondrial control region haplotypes and have examined data from 16 highly variable microsatellite loci with the aim of predicting kinship. Group sizes ranged from two to 10 animals and all but one of the individuals were genetically sexed. The programmes CERVUS and COLONY were used to predict relationships between and within groups, and we show that whales stranding together are often unrelated. Further, it is likely that during the 20 years of sample collection, we have sampled six cow-calf pairs, and two half-sib relationships, one of which is between individuals separated by 17 years and 1800 km.

ANA

ECO17

Site fidelity and rearing strategies of grey seals on Bardsey Island

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Bardsey Island, off the western tip of the Llyn Peninsula, North Wales, is a breeding location for grey seals (*Halichoerus grypus*) with some 20-30 pups being born there in recent years. Following earlier photo-ID studies between 2006 and 2010, we now have images from the 2011 to 2015 breeding seasons. To date 13 females have been observed returning to the island to breed, with around half of these pupping at the same locations each breeding season (some analysis are still pending). In addition, 3 bulls that were seen in 2013 were also observed in 2014, 2 of which were in the same area where they had been seen in 2013. This raises the possibility that the bulls and females returning to the same sites are mating with the same partners each year. The 'expected' rearing strategy for grey seals is for the pup to remain on shore where it is suckled for approximately 3 weeks before being abandoned; the pup then eventually makes its own way to the sea after another couple of weeks. However, on Bardsey another strategy has also been observed where some mothers are seen swimming with their pup, sometimes when the pup is only a few days old. Again, reasons for this behaviour are unclear; there are many factors that may influence this – site topography, weather, sea state, human disturbance, experience of mother, and health of pup/mother. Count data extracted from the Bardsey Annual reports from 1998 – 2014 suggest that seal numbers peak in the summer (mainly in June) and drop off substantially in the breeding season. Reasons for this are unclear as it is not only animals of breeding age that are observed around the island at this time, yearlings and juveniles are also seen.

ECO

STR06

Size matters: Using a relevant spatial scale to assess the ecological variability in strandings data

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There is a perennial need to monitor and detect changes to marine populations at relevant biological, ecological and management scales. Despite the multiple levels of complexity associated with the stranding process, stranded individuals provide a biological sample of the population and can yield substantial information about the health and life history of the individual at a resolution unobtainable through any other method of surveillance. For harbour porpoises in the North Sea, strandings data are collected and evaluated at a national level by several monitoring schemes. Harbour porpoise distribution throughout these waters shows a continuum of genetic variation, and demographics driven through habitat, prey availability, competition pressures, social structure and behavioural traits. These ecological drivers are largely independent of national borders or administrative management units. Additionally, trends in the composition of the stranded population could indicate significant biological or environmental processes relevant to the species conservation status, or artefacts of physical and social process. Here we examined strandings data collected by the United Kingdom Cetacean Strandings Investigation Project (CSIP) and the Dutch Harbour Porpoise Strandings Project, and assess this stranded population from the perspective of the southern North Sea as the same ecological unit. We examined trends and patterns in stranding numbers and metrics of age and sex structure, body condition, pollutant levels, disease burden, and causes of death. Profiling the composition of the stranded population in this way can reveal vital clues about the population structure within this geographic area as well as ecological and biological processes and potential pressures and threats affecting populations in these waters. We demonstrate how analyses of strandings data at an international level can improve information about causal processes relevant at an ecological scale, facilitate interpretation of live survey observations, and assist identification of critical habitat and the formation of management units and conservation areas.

STR

ACO08

Small scale static acoustic studies in Gulf of Gdańsk as potentially important contribution to the effective management of critically endangered harbour porpoise population

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The aim of many research conducted in the Baltic countries is to determine the status of critically endangered population of harbour porpoise. Results of the first joined international acoustic survey SAMBAH revealed the general picture of species distribution in the Baltic proper comprising its seasonal changes and local temporal concentrations. This picture is a milestone in state of knowledge showing some course of future research aiming especially to protect the depleted population. Considering low abundance, reproduction and spectrum of threats for the Baltic porpoises we should aim for maximum reduction of mortality caused by human activity. Hence research on porpoises presence and its seasonal changes in the areas of recognized anthropogenic threats are equally important to those conducted in areas of known population density. Such research using passive acoustics were performed during last few years in the coastal areas of Polish Baltic waters of the Gulf of Gdańsk. The area is known with its intensive human activity like fishing, tourism or investments; and also the highest number of bycatch and opportunistic observations so far. Special attention was given to its inner part, Puck Bay, where most bycatch was reported. Acoustic data collected on 48 CPOD stations in 2009-2011 indicated seasonal variations with year-round presence of porpoises there. Similar results were achieved in investigations in the coastal waters along Vistula Spit performed in 2013-2014 using 21 loggers. Both results match to general picture of seasonal variability of porpoises distribution obtained in SAMBAH with higher density in Polish waters during winter. However both local studies concentrating bigger effort in small areas have identified places where protection measures should be implemented to reduce the mortality of animals. To propose best-targeted measures the detailed knowledge about porpoise occurrence should be compared with recognized local threats occurring in the areas of concern.

ACO

BE09

Social context of repeated calls in long-finned pilot whales (*Globicephala melas*)

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Though long-finned pilot whales (*Globicephala melas*) are abundant in many areas of the world's temperate oceans, relatively little in known about their vocal repertoire and the social dynamics that influence it. Call types that are repeated make up a considerable portion of long-finned pilot whale vocalizations, as has been found with similar species such as short-finned pilot whales (*Globicephala macrorhynchus*) and melon-headed whales (*Peponocephala electra*). However, the social context in which these calls are produced has yet to be described. We have collected over 100 hours of recordings of this species in the waters off Cape Breton, Nova Scotia, Canada since 1998 in concurrence with detailed behavioural and environmental observations. Groups of pilot whales were recorded with omni-directional hydrophones using a whale-watching vessel as a platform. These recordings cover all behavioural states, as well as a range of group sizes. For this study, repeated call sequences were defined as the same call type made three or more times in succession with less than six seconds between adjacent calls. Preliminary analysis of over 15 hours of these recordings shows that approximately 70% include one or more of these repeated call sequences. They have yet to be observed in recordings of resting whales, but are present in those of foraging, socializing, and travelling groups. We expect that the rate of repeated call sequences will vary according to social context. This research will help in understanding the function of these calls, which is poorly known for many of the large dephinid species. This study builds upon the basic knowledge we have of pilot whale vocalizations through examining them in relation to social context, allowing for continued exploration of socio-acoustic dynamics in this species, as well as similar cetaceans around the world.

BE

BE10

Songs, sounds and communication in Humpback whales: A behavioral approach

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This reviews discusses the complexity of song structure and in particular how songs are used in the social life of *Megaptera novaeangliae*. It is well known that some changings in the *"patterns"* are possible during the life cycle of the individuals and also that song's structure it is largely genetically based. Changes in songs involve replacing one *"theme"* with another one. Cultural transmission plays a key role in the song's production and there are three explanations of the different mixing phenomena, in particular in the northern hemisphere. It is not really clear what is the real motivation of the singing behavior, but the most accepted idea is that songs are primarily involved in *"mating"* or in the communication between males. From an evolutionary perspective females could appreciate the ability of certain males to produce some changings in the songs; in this sense there could be some advantages in the sexual selection. Seasonal hormonal activity could have a potential role in song production. It is recommended to investigate the structure of sounds and songs produced outside from the tropical regions during the winter breeding season, using passive acoustic monitoring, especially during migration and in the summer feeding grounds. We know that underwater noise can lead to a changing in songs. The first step in the knowledge of the acoustic behavior of a species is a good description in his acoustic repertoire, and a common mistake in acoustic monitoring is the exclusion of environmental factors from data analysis. In general, the attention of researchers is focused on songs, so it is recommended to do research also about "social sounds" and "non song phonation". Finally we suggest improving the knowledge in the mechanism of sound production, because it is still not really clear and there is some lack in the literature.

BE

ABU12

Spatial and temporal variation of harbour porpoise (*Phocoena phocoena*) in south western coast of Portugal

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The presence of harbour porpoise (*Phocoena phocoena*) is scarcely documented in mainland Portugal. Most studies rely on stranding or historical information and only very recently survey effort has been dedicated to cetacean occurrence. The species is thought to be more abundant in the north and central regions, but no abundance estimates are available. Hence, this work intends to investigate its occurrence in southwest Portugal. From 2005 to 2015, a total of 1017 opportunistic surveys were carried up on board of dolphin watching boats in Sagres by a trained observer, and a total of 4586.85h of search effort were conducted under Beaufort Sea state ≤3. During surveys the following data was collected: weather conditions, GPS position and tracks, depth and SST, group size and composition, and behaviour. Surveys ran to 10 Nm off the coast, and sighting index (SI) (number of sightings per hour of observation) was calculated in order to investigate the seasonality and habitat use. During the study, 150 harbour porpoise sightings ranged between 0.2–9.4 Nm distance to the shore and 15–150m depth, which is in accordance with the literature described for the species. The occurrence of the species was not constant through time, revealing a clear decline (SI=0.062 to SI=0.024) after the first five years surveyed. Sightings were recorded all year round with a mean SI=0.033, however Spring (SI=0.054) and autumn (SI=0.59) showed peaks of abundance, possibly related to seasonal migrations due to changes in oceanographic conditions and/or distribution of prey. The harbour porpoise is considered the most threatened species of cetacean in Europe, and is listed in the Appendix II of the EU Habitats Directive. It is therefore urgent to acquire more knowledge about its distribution and abundance in the area, particularly where no abundance estimates are available, in order to better manage their conservation.

ABU

BE11

Sperm whale vocalisations around São Miguel Island (Azores)

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Sperm whales (*Physeter macrocephalus*) are among the most frequently observed cetaceans around São Miguel Island (Azores, Portugal). In addition to regular feeding clicks, they use different patterns of impulsive sounds both for predation and communication. Sperm whales sounds were recorded with a towed hydrophone during dedicated surveys around the island in 2013 and 2014. As sperm whales were not the focal species, recordings were obtained on an opportunistic basis, depending on time availability and weather conditions. Recordings were 3 to 26 minutes long. We selected 43 high signal-to-noise ratio recordings to express the emission rates of various signal types, known to be associated to capture events (creaks), to communication (codas, squeals, clangs), or whose function is uncertain (chirrups, fast pulse trains). Creaks were present in 44% of the recordings (350 minutes total duration), chirrups in 30%, fast pulse trains in 23%, codas in 21% and clangs in 7%. Overall emission rate of 0.23 creak/minute, 0.59 coda/minute and 0.66 chirrup/minute were calculated. The mean creak rate was lower than expected from previous experience in the Mediterranean Sea, but chirrup and coda emission rates were much higher. This might be related to the distinct social structure encountered around São Miguel, with frequent female and juvenile schools or sub-adults clusters. These gender and age classes could communicate more frequently than loose clusters of males and bachelors usually recorded in the northern Mediterranean Sea. The present results also suggest that sperm whales around São Miguel do not systematically use creaks to locate and approach prey. This may be linked to the nature of local prey, with creaks complemented with chirrups and fast click trains. Future analysis will look at the relationship between social structure and vocalisation modes.

BE

ANA07

Study of body size compartments of 12 marine mammal species

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Gas bubble lesions consistent with DCS similar to human divers have been described in beaked whales stranded in temporal and spatial association with military exercises. There is a growing consensus that exposure to military sonar may trigger a behavioral response in beaked whales that may lead to bubble growth through decompression as the whales alter their diving behavior. Theoretical studies can be used to model different scenarios and to estimate tissue gas burden, thus suggesting behavioral changes that may affect risk. These models usually simplify the body into “n” independent parallel compartments. A body compartment is a collection of tissues that shares the same perfusion and gas solubility properties. The principal challenge of these models is to incorporate realistic parameters for the different species and to be calibrated against empirical data. The aim of this study is to determine the weigh of each tissue so the size of each compartment can later be calculated. For this purpose, mass dissections following McLellan et al.’s (2002) method have been performed in 21 marine mammals of 12 different species: 4 Delphinus delphis, 1 Grampus griseus, 2 Globicephala macrorhynchus, 1 Kogia breviceps, 1 Mesoplodon bidens, 2 Halichoerus grypus, 1 Mirounga angustirostris, 1 Phocoena phocoena, 3 Stenella coeruleoalba, 1 Stenella frontalis, 1 Tursiops truncatus, 3 Zaplophus californianus. Integument, muscle, bones, brain, and every other organ were weighed. Preliminary results showed that phocids had higher integument weight and lower muscle mass than otariids. Within cetaceans the short-finned pilot whale and the bottlenose dolphin had larger integument weight and lower relative muscle mass than the other species studied. Preliminary results suggested that muscle was the tissue that changed the most with body weight in D. delphis. Thus, body composition is an additionally tool to evaluate the body and health condition.

ANA

HE21

Study of myoglobin concentration and oxygen stores in different muscle functional groups of cetaceans

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Marine mammals possess increased muscle myoglobin (Mb) concentration as compared to terrestrial mammals, which increases aerobic dive duration (ADL). Previous estimates of muscle oxygen (O2) stores in cetaceans have often been determined by measuring the Mb concentration in the *longissimus dorsi*, the muscle powering the upstroke of the dorsal fin, and multiplying that value by the animal's locomotor muscle mass, which assumes that muscle Mb concentration is uniform. We tested the hypothesis that Mb concentration is similar across body muscles by calculating Mb concentration in six muscle groups (mastohumeralis, dorsal scalenus, sternohyoid, epaxial, hypaxial and rectus abdominis) representative of different functional groups (caudal fin movement, pectoral fin movement, feeding and respiration) in four cetacean species (*Phocoena phocoena* n=1; *Delphinus delphis* n=4; *Stenella coeruleoalba* n=4; *Globicephala macrorhynchus* n=1). O2 stored in each functional group was determined by multiplying the mean Mb concentration value of each representative muscle by the muscle mass of that functional group, and considering the Mb-O2 binding affinity. Total muscle O2 storage was determined by summation of the O2 stores in the different muscle functional groups. Results showed that Mb concentration was heterogeneously distributed between and within muscles. Statistically significant differences in Mb concentration were found between locomotor and non-locomotor muscles of the species studied. Locomotor muscles were the major contributors to total muscles O2 stores due to both, high Mb concentration and a large muscle mass. Previous methods assuming homogeneous Mb concentration distribution underestimated muscle O2 stores when only locomotor muscles were considered and overestimated it when total muscle mass was considered compared to the present method, proving the need of a new simple method for more accurate muscle O2 stores and ADL calculations.

HE

ECO18

Survey, mapping and habitats of the cetaceans in the exclusive economic zone (EEZ) of Bulgaria Black Sea

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During 2014 and 2015 it was carried out the first comprehensive studies on the distribution and abundance of the three cetacean species that occur in the Bulgarian water area. They have been studied bottlenose dolphin (*Tursiops truncatus*), harbour purpoise (*Phocoena phocoena*) and common dolphin (*Delphinus delphis*). It was investigated the whole exclusive economic zone (EEZ) of Bulgaria, which covers the water area of 34 156 sq. km. The field studies covered the period from 12.2014 to 07.2015, and include investigation through a plane on 4 missions with previously set 20 parallel transects and survey through ship for 3 missions with previously set 6 zigzag transects. As an additional method there were used 6 vantage points, situated on coast from 10 to 30 m. above sea level for 20 days each during June and July 2015. There were registered stranding cases through purposeful walking of the seaside. In studies of aircraft, equipped with bubble windows, it was used stabilized camera with high optical features, high-quality video, infrared options and the ability to locate the exact GPS coordinates of the object. There were analyzed habitats through making models via software. As an outcome there were elaborated 20 different reports, methodologies for the three species. These include analysis of the mortality rate, anthropogenic factors, stranding cases, ecosystem models, mapping for a habitat suitability, model of distribution, numbers, migration; investigations for NATURA 2000 network, conservational status and so on.

ECO

HE22

Synchronous breathing and its implications for disease transmission in bottlenose dolphins

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Behavior plays an important role in the spread of disease. Despite this, relevant behavioral data are often lacking for wild populations. For example, in 2013-2014 mid-Atlantic bottlenose dolphins (*Tursiops truncatus*) were heavily affected by cetacean morbillivirus, but there are few data on physical contact and synchronous breathing (two modes of disease transmission) for this population. However, such data are available for other wild dolphin populations, which may provide insight into disease transmission patterns. Here, we examine an extensive, long-term (since 1988) data set of synchronous breathing (synchs) by Indian Ocean bottlenose dolphins (*Tursiops aduncus*) in Shark Bay, Australia with the goal of improving our understanding of disease transmission in affected populations. We focus on mother-calf pairs (28 calves, 11 females, 17 males) since they are highly synchronous and sociable, which may increase their likelihood of spreading and contracting disease. Calf-mother synch data resulted in an average synch rate of 7.85 ± 1.52 and 7.36 ± 0.87 synchs per hour for female and male calves respectively. However, calf-mother synch rates were affected by an interaction between age and sex ($z = -2.381$, $p = 0.017$), with female calves increasing their calf-mother synch rate with age, but not males. Calf-other (non-mother) synch data revealed that males exhibited higher calf-other synch rates (6.877 ± 0.891 synchs per hour), compared to females (0.261 ± 0.140 synchs per hour). While calf-mother synchronous breathing may be beneficial for calf behavioral and physiological development, co-breathing with others may increase disease spread and exposure. As such, male calves may be at greater risk of both transmitting and contracting respiratory diseases than females. However, in populations with little recent disease risk like Shark Bay, synchronous breathing with non-mother individuals may help male calves develop important social bonds.

HE

ANA08

Taxonomic status of the common dolphin (genus *Delphinus*) in the eastern Sub-tropical Atlantic Ocean

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The common dolphins (genus *Delphinus*) have an extensive geographical distribution and often show considerable genetic and morphological structuring on a regional scale, thus facilitating the differentiation of morphotypes that are still taxonomically under debate. In order to resolve the taxonomic uncertainties around the *Delphinus* complex from the eastern Sub-tropical Atlantic, we conducted a two-dimension geometric morphometrics analysis of the dorsal view of the skull. The main objective of this study was to provide a quantification and effective visualization of morphological variation of the skull between common dolphin morphotypes. A total of 113 common dolphin individuals belonging to the current accepted species for the NE Atlantic (*D. Delphis* from the Iberian Peninsula and *D. Capensis* from South Africa) were analysed and compared to 38 individuals belonging to an undetermined and poorly known population from Mauritania. The Mauritanian common dolphin morphotypes were divided into two sub-samples bestowing to the morphometric ratio rostral length/zygomatic width. Groups presented significant morphological differences in the size of the skull, except between the Mauritanian long-beaked morphotype and the *D. Delphis*. *Delphinus* populations from eastern Sub-topical Atlantic are morphologically distinct from *D. delphis* and *D. capensis*, and there was also a clear segregation between common dolphin short- and long-beaked morphotypes. However, hierarchical cluster analysis supported a closer morphological similarity between the Mauritanian short-beaked morphotype and *D. delphis*, and the Mauritanian long-beaked morphotype and *D. capensis*. To conclude, results indicated that the cranial components analysed were highly informative and that potentially indicated recent adaptive evolution of the populations and species.

ANA

ECO19

Temporal variations of the occurrence and habitat preferences of harbour porpoises (*Phocoena phocoena*) in the southern bight of the North Sea and the English Channel

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At a large scale, two international vessel-based surveys (SCANS I & II) were conducted in 1994 and 2005 to estimate the abundance and the distribution of the harbour porpoise (Phocoena phocoena) in European waters. These two studies, revealed a significant shift in the distribution from the north to the southern of the North Sea. The French coast is subject to several anthropogenic pressures, and correlated with the recent return of the animals, the number of strandings has significantly increased. Facing to the new spatial distribution of the species and threats occurring in this part of the North Sea, we investigated the abundance and the occurrence at a fine spatial and temporal scale of harbour porpoises. Ferry-based surveys have been conducted, year-round basis, between Dunkirk (France) and Dover (UK) (with DFDS Seaways company), between November 2011 and June 2014. On a total of 12 823 km surveyed, 1450 sightings have been recorded, and 2652 porpoises were seen. Our study revealed that the density of harbour porpoises is increasing since 2012, with highest encounter rates recorded in winter 2014 (0.65 animals/km). Both the encounter rates and the number of animals seen showed significant intra-annual variations, with a peak found between February and March. We also noted significant annual and monthly variations in the mean group size, with bigger groups recorded in 2014 (mean=2.03; SE=0.06, min=1, max=15). Finally, significant seasonal variations in the habitat preference of the species were found with animals seen closer to shore during summer and fall (mean=6.93 km and 6.9 km, respectively; ANOVA I: p-val<0.0001) and in shallower waters in fall (mean=24.54 m of depth; ANOVA I: p-val<0.0001). The distribution pattern of the species may result from a combination between abiotic and biotic factors such as salinity, tide currents and prey distribution and abundance.

ECO

WW04

Testing indicators for impact assessment of whale-watching activities in the Northern area of the Pelagos Sanctuary

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Management regulations for whale-watching (ww) are fundamental in the Pelagos Sanctuary and ACCOBAMS area. The aim of this work is to test the use of 4 indicators describing the ww vessel "behaviour": the average vessel speed during the approach, the average distance of significant speed decrease, the approach time and the time spent with the animals. The approach time and the approach speed were calculated between the detection and when the vessel was at a near proximity of 300-100m to the animal. Each indicator was calculated for sperm whale (pc), fin whale (bp), long-finned pilot whale (gm), Cuvier's beaked whale (zc), striped dolphins (sc) and bottlenose dolphins (tt). Data were collected on 3 vessels (of 2 operators) during 116 surveys. The average approach time was 3.3±1.6min pointing out that cetaceans are usually seen at a reduced distance. The speed of approach was significantly different between all species (range: from 28.4 km/h for pc to 21km/h for sc) using Kruskal-Wallis test (H=40.7, df=6, p-value=0.003). This result points out how ww approaches faster species that are more valuable compared to others, for tourists. The average distance of significant speed decrease was 490±300m for pc, bp, gm, zc. indicating the precaution of the operators to approach the big and medium species. The average speeds during the sighting (16km/h) did not vary significantly between species (H=11.9, df=6, p-value=0.06). The duration of the sighting was different accordingly to the breathing cycle of the animal and did not exceed the time imposed by the guideline of ACCOBAMS/PELAGOS SANCTUARY. The data presented here highlight that some indicators can be useful to assess the ww quality and sustainability and how the guideline to approach the animal is followed.

WW

CO05

The Bay of Bizert, a nominated Cetacean Critical Habitat for bottlenose dolphin in Tunisia

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The south Mediterranean coast is largely unstudied or researched for cetaceans. For large parts of the coast we lack basic information about which species are present and their abundance or distribution. An example of this can be found in the bay of Bizerte (Northeast Tunisia). The area hosts an active fishing community that operates side by side with a resident population of bottlenose dolphins. In the summer of 2015, a photo-identification survey was conducted to investigate the population size and to assess the interaction with the fisheries in Bizerte. The resident bottlenose dolphin population in the area is estimated to be around 70+ individuals (42 of which are distinctively marked and catalogued) spread over three groups. During the survey, 73% of the sightings were associated with feeding behavior in certain parts of the bay. This may indicate that the bay contain important feeding grounds for the species. The bay could be proposed as a potential Cetacean Critical Habitat (CCH) along the Northeastern Tunisian coast according to the EBSAs criteria in the Mediterranean (2014 CBD Malaga). It would also be interesting to investigate the possibility of introducing dolphin watching activity in the area as a secondary income source for the local community. This could reduce the pressure presented by fisheries and provide an alternative income source for the local fishing community.

CO

ACO09

The Bering Sea beluga whales (*Delphinapterus leucas*) produce ultrasonic whistles

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This study announces that beluga whales produce whistles with the higher fundamental frequencies then ever reported in this species. Ultrasonic whistles were detected in the Bering Sea population of beluga whales. Acoustic recordings were made in a feeding aggregation of beluga whales in Anadyr Estuary, the Bering Sea, Chukotka, during August-September 2013. Sampling rates were 96 kHz and 192 kHz. Ultrasonic whistles were detected in most sessions and occurred during bouts of calling but represented on average only small percentage of communicative signals detected. The fact that these signals are recorded in most encounters suggests they are a relevant part of communication system of the Anadyr Estuary beluga whales. Most ultrasonic whistles detected were simple and quite stereotyped. They had an entirely ultrasonic fundamental contour lying in the 23-35 kHz band. These whistles usually had short or middle duration, flattened or upsweep contours. Most stereotyped ultrasonic whistles were the second, terminal element in a sequential combination with the wide-band pulsed calls. These pulsed calls were usually pulsed tones with a low pulse repetition rate. The wide-band recordings of beluga whale's signals were made in the White Sea from 2007. However in spite of considerable effort, ultrasonic whistles with entire contour above 25 kHz have not been found in beluga whales in any study sites at the White Sea yet. These results demonstrate that specific sound categories can be evidence for geographic variability in beluga whales in different populations.

ACO

ECO20

The diet of grey and harbour seals around Britain: ecosystem insights and implications for fisheries

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In recent decades, grey seals around Britain have increased to a current population of around 100,000 animals while the main commercially harvested fish stocks have declined. In contrast, since around 2000, harbour seals in some regions have declined. Reduced availability of prey, including possibly grey-harbour seal competition, is a possible cause of these declines. We present comprehensive estimates of grey and harbour seal diet and explore patterns that might be indicative of ecological interactions between them and to investigate interactions with fisheries. Grey and harbour seal scats were collected seasonally throughout Scotland and east England over 12 months in 2010/11. Numbers and measurements of prey remains, corrected for complete and partial digestion, were used to estimate diet composition and annual prey consumption. Overall, 135,000 fish otoliths and cephalopod beaks were recovered from 4,200 scats. Grey seal diet was dominated by sandeel and large gadids to the west and north of Scotland and by sandeel in the North Sea. Harbour seal diet was generally more varied. Gadid and pelagic prey were taken mostly west and north of Scotland, sandeel was most prominent north and east of Scotland, and flatfish were mostly eaten in the North Sea. The total annual consumption of prey by both seal species was estimated at 100,000 tonnes west of Scotland (ICES Division VIa) and 150,000 tonnes north of Scotland and in the North Sea (ICES Subarea IV). Seal predation on commercial fish stocks was low in the North Sea but much higher west of Scotland. There is some evidence that the harbour seal declines may be linked to a decline in the abundance of sandeel but there was no clear pattern to the difference in diet between seal species in regions where harbour seals have and have not declined.

ECO

ANA09

The enteric nervous system of the bottlenose dolphin intestine: nitrergic and substance P immunoreactive neurons

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The enteric nervous system (ENS) regulates almost all the functions of the digestive system; ENS neurons are distributed from the esophagus to the internal anal sphincter and also within the extrahepatic biliary system and pancreas. ENS neurons are organized into two ganglionated plexuses, the myenteric (MP) and submucosal plexus (SMP), which control the majority of digestive activities through a wide variety of neurotransmitters. The neuronal nitric oxide synthase (nNOS), an enzyme catalyzing the production of nitric oxide, is usually found in inhibitory MP motor neurons supplying the smooth muscle cells, as well as in SMP neurons. Substance P (SP) is a peptide with a proved role as co-transmitter in the excitatory cholinergic neurons. The adaptation to aquatic life induced the development of many morphological and functional differences between terrestrial mammals and cetaceans. Among others, also the digestive system presents some remarkable features. Information regarding the ENS in cetaceans is limited to the course of the principal splanchnic nerves (von Schulte and de Forest Smith, 1918) and to a detailed topography of the chains (Agarkov and Veselovsky, 1987). However the neurochemical characteristics of the enteric innervation have been described only in part (Domeneghini et al., 1997; Russo et al., 2012; Gatta et al., 2014). Therefore here we provide a detailed description of the nitrergic and selected peptidergic systems in the MP and SMP based on formalin-fixed specimens of the intestine of the bottlenose dolphin (*Tursiops truncatus*). The distribution and morphology of nNOS- and SP-immunoreactive (IR) neurons were studied using immunohistochemistry. Results: In the MP, the percentages of nNOS- and SP-IR neurons were 28%(IQR=19-29) and 31%(IQR=22-37), respectively, while in the SMP 1%(IQR=0-2) of neurons were nNOS-IR and 41%(IQR=24-63) were SP-IR. No co-localization between the two neuronal markers was detected, suggesting the existence of two completely different and separate functional classes of neurons.

ANA

HE23

The first report of Brucella ceti associated meningoencephalitis in a Sowerby's beaked whale (*Mesoplodon bidens*)

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Brucella ceti infection has been reported in cetaceans from many parts of the world often as an incidental infection with no obvious pathology. However Brucella ceti infection resulting in lesions in the central nervous system (CNS) has been described in only four species of cetaceans; striped dolphins (*Stenella coeruleoalba*) in Europe and Costa Rica and Atlantic white-sided dolphins (*Lagenorhynchus acutus*), short-beaked common dolphins (*Delphinus delphis*) and long-finned pilot whales (*Globicephala melas*) in the United Kingdom (UK). Here we present the first report of Brucella ceti associated meningoencephalitis in a Sowerby's beaked whale (*Mesoplodon bidens*). A juvenile male was found dead stranded at Port of Ness on the Isle of Lewis, Scotland, UK in June 2015 and necropsied 40 hours later. The animal was in good nutritional condition. The left jaw was fractured across the mid-horizontal ramus and associated haemorrhage indicated this occurred ante-mortem. No swelling or remodelling of the tissues was observed, indicating this was likely a peri-mortem event (within 24 hours). There was no evidence of recent feeding, and the liver did not indicate prolonged inanition. The visceral organs were severely congested, including the lungs. The most pronounced pathology was present in the brain which had severely dilated ventricles, pronounced and dilated choroid plexuses and mildly tacky meninges. The dilated ventricles contained in excess of 150 ml of turbid cerebral spinal fluid (CSF). These findings together with the isolation of B. ceti from the CSF, ventricles and choroid plexuses confirm this to be a case of neurobrucellosis severe enough to be causal to the stranding. We report the fifth species of cetacean to have CNS lesions associated with Brucella ceti. We believe this to be the first time neurobrucellosis has been seen outside the family Delphinidae and the first beaked whale to have any pathology associated with B.ceti.

HE

HE24

The health status assessment of the free-living population of the polar bear (*Ursus maritimus*) at the Russian Arctic in 2014 – 2015

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Within of the health status assessment of the free-living population of a polar bear (*Ursus maritimus*) at the Russian Arctic both the peripheral venous blood and microbiological swabs from conjunctiva, nose cavity, mouth, rectum from 15 individuals was sampled in 2014 - 2015 by the Marine Mammal Council. Afterwards, blood smears were used for estimation of hematological, immunological, parasitological indices: leukograms; existence of parasites in blood; the peroxide activity of granulocytes of peripheral blood. This cytochemical technique revealing the activity of the “peroxidase–endogenous hydrogen peroxide system” (PEHP) in neutrophils and eosinophils was used to characterize the state of nonspecific innate immunity. The degree of activation of the system is determined by the density of granules stained with 3,3′-diaminobenzidine tetrahydrochloride. This reaction characterizes the biochemical potential of granulocytes phagocytic activity. Cytochemical reaction to activity of system "peroxidase - endogenous hydrogen peroxide" in granulocytes on blood smears was for the first time applied that to characterize the condition of the nonspecific congenital immunity of polar bear. The microbiological swabs were used for isolation of pathogenic microflora. As a result of investigations indices of the leukocytes percentage ratio in leukograms of five individuals fluctuated in the following limits: junior neutrophils – 0-1%, rod-like nuclear neutrophils – 4 – 51%, mature neutrophils – 12 – 57%, eosinophils – 1 – 19%, basophiles – 0 – 1%, monocytes – 0 – 12%, lymphocytes – 11 – 48%. Indices of peroxide activity of neutrophils fluctuated from 105 till 272, of eosinophils fluctuated from 211 till 300. The haemosporidean parasite (*Babesia* spp.) were conducted by the morphological features in blood smears from thirteen individuals. Also were isolated cultures of microorganisms: Staphylococcus (*S. aureus*, *S. hyicus*, *S. epidermidis*), *Streptococcus* spp., *Aeromonas* spp., *Pseudomonas* spp., *Candida* spp. and Enterobacteriaceae. The hemolytic *Staphylococcus* spp. were isolated from six individuals.

HE

MN11

The Irish Government's ObSERVE Programme. What it is and where it's going

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Ireland operates under a robust regulatory regime where its marine environment is concerned, this being underpinned by international agreements (e.g., OSPAR, CMS), European legal and regulatory instruments (e.g., CFP, Habitats Directive, MSFD) and national legislation (e.g., European Communities (Birds & Natural Habitats) Regulations). This legal framework includes strict protection for all cetacean species, many of which are vulnerable to the impact of man-made sound in the sea and environmental degradation. Ireland's ongoing offshore SEA process IOSEA and previous research initiatives have revealed gaps in scientific information, particularly from the Irish Atlantic Margin. In this regard the knowledge base within this challenging environment has tended to centre on more visible species and late spring-summer months. All have highlighted a further need for (a) targeted environmental data and (b) an improvement in data quality to inform management, particularly around sensitive species and habitats. In 2014 the Irish Government initiated the ObSERVE Programme, a partnership between DCENR and DAHG focused around the management of sensitive habitats for protected vertebrates. With a research emphasis on marine mammals and seabirds, new high quality scientific data are now being collected with the latest and best methods to inform management decisions by Government. Two projects are in operation for 2015-2018 under the Programme: ObSERVE Aerial and ObSERVE Acoustic, with total Government expenditure nearing €2.75 million. The core objectives of the Programme are (1) to update contemporary ecological information on the Atlantic Margin including via the use of existing and available datasets, (2) to assess the importance of waters within the study area for a wide range of marine mammal and seabird species, (3) to identify sub-areas that indicate a higher ecological importance, including for vulnerable species. The Programme also represents a potential future vehicle for high quality environmental research to better inform management of the Irish offshore.

MN

CO06

The Northwest Atlantic Seal Research Consortium: a collaborative approach to the study and conservation of seal populations in the Northwest Atlantic

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Recent increases in seal abundance and shifts in seal distribution in the Northwest Atlantic have led to increased interactions between human and seal populations. The urgency of documenting, characterizing, and mitigating these interactions has become increasingly apparent. The Northwest Atlantic Seal Research Consortium (NASRC) was formalized in 2012 following a series of workshops begun in 2009 that gathered scientists, resource managers, and the fishing community to address issues, concerns, and data gaps related to seal populations along the New England coast. NASRC's mandate is to improve our understanding of the ecological role of seals through coordinated research efforts, sharing of data, collaboration among all stakeholders, a concentrated effort to gain knowledge, and public outreach. The consortium includes the participation of scientists, community stakeholders, the fishing community, and anyone who shares an interest in unbiased scientific research. Biennial scientific meetings have been held, as well as smaller-scale topical workshops to address local issues. Priorities identified through NASRC at these meetings have been addressed by participants through research and community outreach. NASRC's ability to share information and work together towards addressing collectively identified research priorities has become a useful model, especially given limited resources. Ongoing research undertaken by NASRC participants, coupled with new efforts based on recently identified research priorities, will aid in the study and conservation of seal populations in the Northwest Atlantic.

CO

ECO21

The occurrence and habitat use of harbour porpoises in a strong tidal current in Northern Norway

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The occurrence and habitat use of harbour porpoises (*Phocoena phocoena*) in the strong tidal current of Rystraumen (69.55°N 18.73°E) in Northern Norway was monitored, in the context of a pilot study, between late August and the end of September 2015. Rystraumen is approximately 700 m wide and 1.5 km long and might be used as a feeding and transit zone for the porpoises. It is regularly used as a shipping lane and it is a potential site for development of tidal energy plants, but it is also designated as a potential future marine reserve. Two methods were applied to monitor the use of the site by porpoises: passive acoustic monitoring and visual land-based observations. Five C-PODS to record echolocation clicks from odontocetes, were deployed in Rystraumen along with 3 broad spectrum SoundTraps. Visual observations were carried out at Hella, a vantage point roughly half way along and overlooking the width of the strait. Using a camera/reticular binocular system and a number of geographic reference points on shore, harbour porpoise movements were tracked with high precision by triangulation. The acoustic activity was analysed using a classification algorithm that distinguishes harbour porpoise click trains from other acoustic signals. The results from both methods show that porpoises used the area regularly. Both non-directional (foraging or milling) and directional behaviour was observed, and the small scale spatial movements were analysed in respect to the occurrence of tidal flow. Porpoises were frequently observed using areas adjacent to the areas of strongest tidal current flows and eddies, while movements in strong tidal flows were generally short, directed and rapid. The findings of this research provide baseline data that will provide essential input, both into risk and environmental impacts assessments of future site developments, but also for habitat classification and designation as a potentially important marine reserve.

ECO

ECO22

The return of harbour porpoises (*Phocoena phocoena*) to the lower Elbe and Weser rivers following anadromous fish shoals, foraging in Hamburg harbour

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After many decades of apparent absence due to anthropogenic environmental changes, harbour porpoises nowadays have been increasingly entering the German Weser and Elbe rivers in springtime. A sightings scheme introduced in 2007 has shown their regular occurrence in the estuaries and lower courses of the Weser and Elbe rivers up to the cities of Bremen and Hamburg during the months from March through June. The spatial-temporal pattern of harbour porpoise sightings corresponds to the pattern of occurrence of anadromous fish species, especially smelt (*Osmerus eperlanus*) and twaite shad (*Alosa fallax*), swimming from the North Sea to their spawning grounds. In 2013, more than 300 sighting reports including multiple sightings were received. Especially in the Hamburg port area around 90 kilometres from the coast, harbour porpoises were observed, hunting prey in some areas in particular large groups. Data of acoustic data loggers (CPODs, Chelonia, UK) installed at four different sites in the Elbe confirm the seasonal presence as well as foraging activity. The study gives information on distribution, group size, preferred areas, behaviour and spotting places. In 2012, 11 dead whales, and in 2013, 26 carcasses were found along the banks of the Elbe river from the Hamburg port area to the city of Wedel within a short time period. Possible threats in the high-traffic waterways and port area were the whales are exposed to anthropogenic activities including intense ship traffic, fast watercraft and special sonar equipment are discussed. The recent findings of harbour porpoises entering the Weser, Elbe and other rivers at the North Sea coast can be interpreted as a return to historical behaviour and former temporal riverine distribution range.

ECO

BE12

The tropical oceanic area of the Colombian Caribbean: an important habitat for the sperm whales (*Physeter macrocephalus*)

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Thirty one species of aquatic mammals have been reported in the Colombian Caribbean region, including sperm whales (*Physeter macrocephalus*). These reports correspond to 20% of the global aquatic mammal diversity and 77% of those found in Colombia. This region has an important commercial and tourism potential; however, the basic biological and ecological information necessary to support management decisions is very scarce. For the first time in the tropical ocean waters of Colombian Caribbean, we estimated the density and recorded the behavior of sperm whales. The observations were conducted on board seismic survey vessels and using focal sampling. The studied area was situated off the departments of Choco, Antioquia, Cordoba, Sucre, Bolívar, Atlántico, Magdalena and Guajira. During four years survey in 2011, 2013, 2014 and 2015, 56,656 km2 and 334 days of searching effort were completed. We recorded 26 groups of sperm whales, an estimated number of 0.7 groups per 100 hours. The groups were formed by one to ten individuals (Mean=2.3, SD=1.8) and each group was observed for an average of 20.2 minutes (SD=24.9). A total of 58 adults and 2 juveniles were sighted (1.5 individuals per 100 hours). The estimated density of sperm whales was 1.0 per 1,000 km2. Sperm whales were recorded at distances between 20 km and 135 km from the coast, in water depths averaging 1814.8 meters (between 566 - 4,000 meters). Sightings occurred primarily in November. The sperm whales exhibited the following behaviors: slow and fast swimming, exposure of pectoral and caudal fins, resting, spyhopping and breaching. Our results show that the tropical oceanic region of the Colombian Caribbean is an important habitat for sperm whales for resting, feeding and socializing.

BE

HE25

The use of porphyrins as a non-destructive biomarker of exposure to contaminants in wild grey seals (*halichoerus grypus*) and harbor seals (*phoca vitulina*)

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Many xenobiotic compounds are widespread in the environment and can affect the animal health at different biological levels since they tend to persist in the environment and to be also accumulated in the organism. The Wadden Sea is an intertidal zone in the southeastern part of the North Sea, it lies between the coast of northwestern continental Europe. Since 2009 it is part of the UNESCO World Heritage. Porphyrins, intermediate metabolites of heme byosinthesis, are produced and accumulated in trace amounts in erythropoietic tissues, the liver and the kidneys and are excreted via urine or feces. Heme biosynthesis may be altered by environmental contaminants such as PCB's, dioxins and heavy metals, leading to change in their profile due to accumulation or excretion. Porphyrins can be detected in different biological materials at low concentrations and have therefore been proposed as sensitive biomarkers of exposure to contaminants. Grey seals and Harbour seals are species declared as "least concern" by IUCN Red List. In order to validate the use of porphyrins as non-destructive biomarkers for monitoring exposure of mammals to this environmental xenobiotic, we carried out a study with feces and blood sample of Grey seals (*Halichoerus grypus*) and Harbour seal (*Phoca vitulina*) hosted in Pieterburen Rehabilitation Center (*Zeehondencrèche Pieterburen*) and then to compare these values with samples collected from animals from the same species hosted in a zoological park and born in captivity.

HE

ACO10

The Watkins Marine Mammal Sound Database: creating an online, freely accessible resource

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One of the founding fathers of marine mammal bioacoustics, William Watkins, carried out pioneering work at the Woods Hole Oceanographic Institution for more than four decades, laying the groundwork for our field today. One of the lasting achievements of his career was the Watkins Marine Mammal Sound Database, a resource that contains approximately 2000 unique recordings of 76 species of marine mammals, with more than 20,000 annotated digital sound clips. These recordings have enormous historical and scientific value. They provide sounds professionally identified as produced by particular marine mammal species in defined geographic regions during specific seasons, which can be used as reference datasets for marine mammal detections from the growing amounts of passive acoustic monitoring (PAM) data that are being collected worldwide. In addition, the archive contains recordings that span 7 decades, from the 1940's to the 2000's, and includes the very first recordings of 51 species of marine mammals. These data provide a rich resource to efforts aimed at examining long-term changes in vocal production that may be related to changes in ambient noise levels, as well as serve as a voucher collection for many species. We are working to make this resource fully accessible online, as was Watkins' goal. The final product will enable investigators, educators, students, and the public worldwide to freely and easily access acoustic samples from identified species of marine mammals, and place these samples in a geographic and temporal context.

ACO

PH09

Phoco-ID: photo-identification study of harbour porpoises (*Phocoena phocoena*) in the Eastern Scheldt, 2011-2015

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The Eastern Scheldt, a tidal estuary located in the south-western part of the Netherlands, is resident to a small number (ca 30 ex), but in relative high abundance compared to the North Sea, of harbour porpoises (*Phocoena phocoena*) year-round. A relatively high mortality rate of this species in the area has raised concerns that the Eastern Scheldt may be functioning as an 'ecological trap' due to the Storm Surge Barrier, which might prevent individuals from migrating back into the North Sea once they have passed the barrier. In 2011, the Rugvin Foundation started with the collection of photo-ID data on harbour porpoises in the Eastern Scheldt. The photo-ID study aims to shed more light on the cause(s) of mortality and to answer questions such as: how many individuals inhabit the Eastern Scheldt, their site fidelity, birth-rate and social structure. In 2015, the effort was expanded with a dedicated multi-platform photo-ID study. In this year, data was collected using both boat- and land-based methods. Between 2011 and 2015 most data was collected with boat-based methods. Fieldwork was carried out when weather conditions were optimal with a maximum Beaufort Sea State of 2. Binoculars were used to locate harbour porpoises. If encountered, digital SLR cameras were used to capture images which were later analysed. Distinct individuals were added or matched to the photo-ID catalogue, which currently contains around 30 individuals. This study intends to present the results of the photo-ID research between 2011 and 2015, with a special emphasis on the 2015 results.

PH

ANA10

Topographical anatomy of the mastication muscles in dolphins

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In dolphins the gular musculature associated with the hyoid apparatus is active not only in the chewing-swallowing movements, but must also act to create a strong negative pressure for sucking in prey prior to swallowing. On the other hand, since dolphins do not chew, the masseter muscle (*M. masseter*) is relatively weak. This is indeed a huge difference in respect to many of the closely related terrestrial Cetartiodactyla (including the ruminants) who, being herbivorous, have an enormously developed masseter and chew frequently if not continuously. On the other hand both pterygoid muscles (*M. pterygoideus medialis*, *M. pterygoideus lateralis*) and the temporal muscle (*M. temporalis*) are important for the closure of the jaws in dolphins. The masseter muscle originates from the thin zygomatic arch with a short aponeurosis and converges strongly in the direction of its insertion at the lateral plane of the mandible. The light-microscopic preparation shows a situation resembling a 'fatty degeneration' of the masseter muscle in correlation with a distinct reduction of the number of muscle fibers. Using consecutive sections of frozen whole heads of *Tursiops truncatus* and *Stenella attenuata* we showed that the weak masseter muscle is topographically associated with the extramandibular fat body. This fat body is thought to be part of the sound perception system and involved in the hearing mechanism under water. It is therefore possible that the low bite forces of the weak masseter muscle (and partially also of the *m. temporalis*) are functionally related also to the position of the acoustic mandibular fat bodies and not only to suction feeding.

ANA

STR07

Trace elements evaluation on four stranded sperm whales

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A mass stranding of 7 females sperm whales occurred on September 16th in Punta Penna (Vasto), Italy, Central Est Adriatic Sea coast.Three subjects died and necropsies were accomplished in situ, in cooperation among Bologna, Teramo, Padua Universities and some zooprofilactic institutes. Pathological, virological, parasitological and toxicological analyses were performed in order to identify possible causes of death. At necropsy, it was found that the biggest female (potentially the matriarch) was pregnant and her male foetus was examined too. The female showed macroscopically lesions compatibles with renal calculi and dark lesions on pre scapular lymph nodes. Other two adult subjects didn't showed significant pathological signs, but all 3 adult sperm whales had no traces of squid beaks in gastric content. Starving was consequently taken into consideration, also because Adriatic Sea is not a suitable habitat for deep divers hunting. Kidney, heart, muscles, blubber, liver, uterus lymph nodes and brain were used for the quantification of trace elements, focusing mainly on mercury, using microwave digestion for sample preparation and Inductively Coupled Plasma-Optic Emission Spectroscopy (ICP-OES) technique for elements quantification, with hydride generation for mercury. Obtained results pointed out high values of mercury in all samples analyzed, in accordance with lymph node's gross pathological finding that suggests Hg accumulation in lymphatic system also due to weakened state of animals that showed anorexia. This research witnesses importance of mercury mobilization under stress conditions and prolonged fasting of sperm whales in the insurgence of pathological conditions, as it can interfere with normal immune response,depressing it and making the animals more sensitive to pathogens exposure and worsening different kinds of diseases, therefore actively contributing to sperm whales stranding.

STR

MO07

Understanding blue whales off Azores

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Every year great baleen whales appear around Azores archipelago. We have analyzed data registered from whale watching platforms off São Miguel since 2008 to 2014. We recorded 7597 sightings of 21 different species, and of those, 643 were baleen whales. Blue whale *(Balaenoptera musculus)* has been the third most sighted baleen whale (95 sightings), after fin whale *(Balaenoptera physalus)* (330) and sei whale *(Balaenoptera borealis)* (159). All blue whale sightings but one were made between March and June, been more than 75% in April-May. To identify habitat preferences we applied Generalized Additive Models (GAMs) and analyzed these presence/absence data according with several physiographic (depth, slope, distance to the coast and position), and remote-sensing variables (sea surface temperature, chlorophyll a, sea surface height). We could explain more than 40% of the blue whales distribution using all these variables. During this time we have photo-identified 88 different individuals, resighting in 2014 three whales already seen in earlier years. These findings suggest the possibility of two of them travelling together during the last two years. For a better understanding of blue whales migration, we suggest to take into account in the models other variables as distance to the oceanographic fronts, as well as try different temporal resolution variables. In another hand, comparing our photo-id catalogue with others in the Atlantic will be essential to confirm possible migration routes.

MO

ACO11

Underwater noise levels in a critical habitat for North Atlantic baleen whales

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The Azores archipelago is an important migratory habitat and feeding stop station for several species of baleen whales en route to summering grounds located in northern Atlantic waters. High levels of noise could affect them directly by causing auditory tissue injuries or indirectly by disrupting behavior, causing physiological stress, and limiting the range for successful detectability of vocalisations. In the Central Atlantic area, knowledge of underwater noise levels is very scarce, with a single measurement north of the Azores and a study on seismic airguns noise in mid-Atlantic waters. In this study, noise measurements were made using a five-year acoustic dataset recorded by bottom-mounted Ecological Acoustic Recorders (EARs) deployed at three seamounts of the Azores that baleen whales use for feeding (Condor and Açores) and migration (Gigante). Monthly averaged broadband (1-1000 Hz) Sound Pressure Levels (SPL) for these three sites show that Condor is the noisiest location with values ranging from 93.6 to 103.1 dB re 1 µPa2, followed by Gigante (from 92.6 to 98.4 dB re 1 µ Pa2) and Açores (from 89 to 95.6 dB re 1 µ Pa2). Condor also has a higher occurrence of boat noise with a maximum of 13.2 % of the time in August, a higher variability between months and a median of 3.1 % of for all months analysed. Açores and Gigante show less variability and lower maximum peaks with total median values of 1.8% and 5.5% respectively. SPLs measured at these seamounts are lower than those of the Provençal basin (e.g. south of France) and the Strait of Gibraltar. Noise levels are a critical piece of information for assessing "Good Environmental Status" (GES) of marine waters for the EU Marine Strategy Framework Directive, and are crucial to understand the potential effects of noise on baleen whale behaviour and acoustic detectability.

ACO

PH10

Using Social Media as an untapped resource for a photo-identification study of bottlenose dolphins (*Tursiops truncatus*)

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Bottlenose dolphins (*Tursiops truncatus*) are abundant and widespread in Irish waters and they are known to occur all year round. Protected under the EU Habitats Directive, there are increasing demands for cost-effective and novel methods for long term monitoring. Photo-identification is an extremely useful tool, it allows us to try and understand the population dynamics and social structure of these animals, and we can begin to look at site fidelity, preferred habitats and migratory routes. Social media and photo sharing sites are fast becoming popular channels for the general public to 'post' images of encountered cetaceans. Could social media provide an invaluable resource to study these animals? Using the images found on social media and photo-sharing sites, and existing photo-identification catalogues from the Hebridean Whale and Dolphin Trust, Manx Whale and Dolphin Watch and the Irish Whale and Dolphin Group, this study aims to investigate the occurrence and site fidelity of bottlenose dolphins around the coast of Northern Ireland and Donegal and as a result assess whether social media can be a useful data source for citizen science. 3 main social media and photo-sharing sites have been used in preliminary data collection and this has resulted in 185 images of 19 encounters, the project will continue to gather more data and cross match the images with existing catalogues.

PH

STR08

Uterine leiomyoma and prolapse in a live-stranded atlantic spotted dolphin (*Stenella frontalis*)

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A 172.5 cm-long, female Atlantic spotted dolphin (*Stenella frontalis*) stranded alive in Puerto del Carmen, Lanzarote (Canary Islands, Spain). After unsuccessful attempts at reintroduction the animal was moved into a nearby pool. During handling, it developed repetitive spasms and expelled frothy fluid through the blowhole. Stranding myopathy and development of pulmonary oedema were presumed, and because of the poor prognosis for recovery, the dolphin was euthanized and immediately submitted for necropsy examination. The animal was in good body condition. Grossly, major findings were confined to the uterus. A uterine prolapse associated with a leiomyoma (fibroid) was observed. A 7 cm segment of the reproductive tract including the cervix, uterine neck and caudal uterine body had intussuscepted and prolapsed into the cranial vaginal vault. In the leading edge of the intussuscepted/prolapsed uterine wall was a 6x3x3.5 cm leiomyoma expanding the myometrium. The leiomyoma and prolapse were associated with necrotizing exposure endometritis. Neoplasia of the female reproductive tract of cetaceans is difficult to assess in live animals, but has been reported in free-ranging and captive species. To our knowledge, the only reported uterine prolapses in cetaceans involved three female finless porpoises (*Neophocaena phocaenoides*). Although these cases were lethal in two individuals, no underlying or associated pathology was detailed. This report describes a unique case of uterine prolapse associated with cervical leiomyoma in a stranded Atlantic spotted dolphin.

STR

ANA11

Vertebral column deformity in a fin whale in Azorean waters

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There are few published reports about vertebral column malformation in cetaceans and most of them are for delphinids. In mysticetis there are only two documented cases; one fin whale fetus (*Balaenoptera physalus*) with congenital kyphosis recorded during the Antarctic whaling season and one female humpback whale (*Megaptera novaeangliae*) off the coast of Maui with a possible kyphoscolisis or an injury caused by an impact with another whale or a vessel. We report a case of lumbar deformity in an adult fin whale. A mother and calf fin whale were observed over 2 days during whale watching trips off Pico Island (Azores archipelago, NE Atlantic). Data and photographs were collected from a 8-m rigid inflatable boat (RIB) from a minimum distance of approximately 50 m. The adult fin whale shows downward curvature of the lumbar spine back to the dorsal fin consistent with lordosis. When viewed laterally, a concavity in the curvature of the vertebral column directly to the fluke was apparent. Although we don't know if this deformity is congenital or developed, itseems to be a natural lesion since there were no signs of scars or injury. The female appeared to be in good condition, swim properly and feed itself and her calf. The literature of this kind of pathology in mysticetis is sparse. The longevity of whales with vertebral column malformation is unknown and it seems to depend on the extent and complications of the anomalies. However, this case suggests the whale's deformation did not represent an impediment to her survival and reproduction success since the female was able to survive well into adulthood.

ANA

HE26

Waiting for the storm or the need of normal seal mortality facts. Necropsies on harbour seals (*Phoca vitulina*) during the Avian Influenza (AI) H10N7 epidemic in 2014/ 2015

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In March 2014, a new Avian Influenza (H10N7) infection caused increased mortality under the Swedish harbour seal population [1], continuing southwards to Denmark and Germany in the following months [2], reaching the Dutch coast in November 2014. To manage expected elevated harbour seal mortality, the Dutch Ministry of Economic Affairs funded a programme to investigate presence and impact of this new virus in the local seal population. In order to study the pathological impact of natural AI H10N7 infection and to monitor potential other causes of death in the population during this epidemic, necropsy was performed on five naturally deceased wild harbour seals. Counting of dead seals was temporarily nationally registered. The necropsied animals stranded in December 2014 and Jan 2015 on the Dutch coastline. The group comprised juvenile male (n=3) and adult female (n=2) harbour seals. Necropsy included macroscopy and histopathology, as well as PCR for AI. The juvenile seals died of parasitic pneumonia, the adults of intestinal torsion and/or uterine rupture. Four were negative in AI PCR, the last animal was AI H10N7 positive.
During the time of the study, no increased harbour seal mortality was detected on the Dutch shores. Limited by the absence of normal mortality rates, only extreme elevations could be noticed and these were absent. Consequently, under these conditions, any new mass die-off will surprise authorities.
Fewer inter-animal contacts in winter than in spring and summer may have attributed to slower spread of the virus and decreasing of associated mortality rates. Conclusions: 1. To correctly relate mortality rates to serology, pathologic investigation is vital; 2. The AI H10N7 epidemic in 2014 was on its end when it reached the Dutch coast in the winter of 2014/2015; 3. Without active monitoring of normal harbour seal mortality early changes indicating a new mass mortality event will be missed.

HE

PH11

Whale watching platforms and photo-ID techniques to study killer whale populations

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At least seven species of cetaceans has been recorded in the Strait of Gibraltar including the killer whale (*Orcinus orca*). A total of 59 individuals within five social groups have been described previously in the area and adjacent waters. Data was collected from whale watching vessels during the summer season (March-October) from 2011 to 2015. During the study period, 277 killer whale sightings (5,503.2 hours) were recorded in a 94,340km track-line covered. 34 individuals, belonging to three out of the five social groups, were confirmed during the study period interacting with artisanal fisheries. In 50% (n=136) of sightings, 70% of killer whales were correctly identified and 60% of them were come from different social groups. Up to day, the social structure of this species in the Strait of Gibraltar has been established to be composed by 5 social groups, but this results might give an insight on changes in population structure or a collaborative interaction during foraging activities. Opportunistic platforms, such as whale watching vessels, can be considered an important and effective tool to understand population of cetaceans as killer whales in the Strait of Gibraltar.

PH

CO07

What to do, when a human steps on you – assessing potential effects of tourism related disturbances on grey seal behaviour

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The German archipelago of Helgoland houses the largest grey seal (*Halichoerus grypus*) colony in German waters with up to 700 seals being present on the beach at the same time and more than 200 pups being born annually. Besides being a grey seal hot spot, the islands also represent a popular tourist destination with more than 1000 tourists visiting on a daily basis. On the three beaches of the smaller island Helgoland Düne with its 0.7 km², direct interactions between the two groups are often inevitable and management needs to account for this. For this reason we recorded and assessed the distance to grey seals kept by the visitors and the respective behaviour shown by the animals during winter and in the summer. Results show that the majority of visitors approach seals closer than the recommended safety distance of 30 meters and yet, major disturbances of the hauled out seals are infrequent. Management options are discussed with regard to the different seasons and with respect to the conflict between the protective needs of the seals and the importance of tourism as the only major source of income for the community.

CO

ACO12

What's going on? Increased alertness in hauled-out harbour seals in response to AHD sounds

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Acoustic harassment devices (AHDs) are commonly used as mitigation devices during construction of offshore windmill farms, to deter marine mammals and thus protect them from hearing damage caused by pile driving noise. However, especially for seals, it is not well known how effective this method is. Here we investigated whether a simulated AHD sound (12 kHz pure tone at random intervals, SL=165dB re 1µParms) in the water affected the behaviour of harbour seals (*Phoca vitulina*) on land at a haul-out site in Kattegat, Denmark. The seals could not hear the AHD sounds when hauled out, but the hypothesis was that hauled-out seals could react indirectly by reacting to changed behaviour of seals in the water around the haul-out site. We estimated reactions of seals on land by counting the total number of seals and the number of seals with their heads lifted before AHD signals were presented and again 10 minutes into the exposure period. Results indicate that the number of seals on land were unaffected by the AHD in the water, whereas an overall larger proportion of seals were alert during exposure, possibly indicating awareness that something unusual was happening in the water.

ACO

BE13

Who follows whom? Interspecific associations of between bottlenose dolphins and pilot whales in deep waters off La Gomera

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Off La Gomera (Canary Islands, Spain) a total of 23 cetacean species have been documented with bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrorhynchus*) being sighted most commonly, and often together in mixed groups. From 1995 through 2014 a total of 5,284 bottlenose and pilot whale sightings were recorded with aggregations of the two species observed on 569 occasions. Sighting data including group size, group formation, group composition, depth, slope, distance to coast, were analyzed statistically to answer the following questions: Do the two species randomly aggregate? Which species, if any, initiated the aggregations and which benefits or disadvantages are the driving factors? Results showed that inter-specific associations were not of random nature, as group size and group structure differed significantly within the associations as compared to single-species-sightings. Evidence was found for bottlenose dolphins initiating the interspecific associations. E.g. mixed groups were found exclusively in the preferred habitat of pilot whales in deep waters. Furthermore the characteristics of the mixed-group sightings, i.e. seasonal distribution, habitat characteristics and group structure were rather similar to the pilot whale single-species-sightings than to the bottlenose dolphin single-species-sightings. A number of hypotheses for the underlying driving factors and motivations are discussed, such as predator avoidance, feeding success and social advantages.

BE

NT09

www.aviste.me: an innovate online database of cetacean and seabird sightings

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Systematic data collection of cetacean and seabird distribution in offshore waters is challenging due to the high costs of performing oceanic surveys. Opportunistic platforms such as ferries have proven to be effective in gathering consistent data in local areas and in large offshore routes. Data are used to study the spatial and temporal distribution of the species in a complex and dynamic oceanic environment. Data become more valuable as data collection increases in temporal and spatial scales. For this, data-sharing among different entities is usually required. www.aviste.me is an online tool aimed to facilitate effort-corrected sighting data collection. Aviste.Me started working in 2014 as an online database for CETAVIST: the Cetacean and Seabird Sighting Network of the Canary Islands. Since December 2012 to September 2015, CETAVIST covered 689 transects in 1232 hours of survey onboard ferries operating within the Archipelago, gathering more than 1500 cetacean sightings of at least 15 species. Data collection from opportunistic platforms is often challenged by difficulties in identifying the observations to species level. However, this is compensated by the large sample size and temporal continuity of the surveys. CETAVIST is providing valuable information of poorly known species such as beaked whales (Ziphiidae), and temporal and spatial occurrence of species considered common or occasional in the archipelago (e.g. Fraser's dolphin, *Lagenodelphis hosei*). Furthermore, data are being used to perform distribution models of the sperm whale (*Physeter macrocephalus*), a vulnerable species threatened by ship-strikes. A goal of Aviste.me is to contribute to the integration of cetacean and seabird occurrence data in the Canary Islands and neighbouring waters, in the Mediterranean and Eastern North Atlantic. Joining efforts in long-term cooperation with other entities already gathering these data will maximize cetacean monitoring. A better understanding of the distribution of the species is essential for management towards their conservation.

NT

ECO23

Young humpback whale *Megaptera novaeangliae* feeding off Santa Catarina coastal waters, Southern Brazil, and a ship strike report

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(2) R3 Animal Association
(3) Universidade Federal de Santa Catarina

Humpback whales (*Megaptera novaeangliae*) are cosmopolitan and highly migratory animals that rarely feed in low latitude waters during their annual breeding seasons. One of the Southern Hemisphere humpback whale reproductive stocks breeds off the Brazilian coast, from Natal (4ºS), north-eastern, to Cabo Frio (23ºS), south-eastern Brazil. Migration to their feeding sites is known to be undertaken through off-shore waters, with the southern limit of departure being the coast of Rio de Janeiro state (~23ºS). This work reports on an unusual stranding of a young humpback whale that was feeding in coastal waters of Santa Catarina state (27ºS) in October 2014. Evidences of ship strike and that the one year old female had fed in no more than a few hours before death were also found. Additionally, it is the first time that *Peisos petrunkevitchi*, a species of sergestid shrimp, is described as prey item for humpback whales. This is the northernmost record of a stranded humpback whale ever found with considerable amount of food on its stomach for the coast of Brazil. Although more knowledge is required before we discuss whether the area could provide an important source of food for young humpback whales, the present ship strike highlights a possible important threat in case this ecological feature is confirmed in the future.

ECO

ABU13

Over the edge: Aerial surveys for cetacean and seabird in deep waters

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Understanding the year round occurrence, distribution, habitat use and abundance of cetaceans in any body of water is challenging, given the difficulties obtaining sufficient sightings information and weather windows. These difficulties are exacerbated with increasing distance from shore and in deeper waters. The waters included in the Exclusive Economic Zone (EEZ) off the west of Ireland is a large geographic area, covering complex bathymetry, with a high cetacean and seabird biodiversity but with limited information on seasonal distribution and habitat use. Against this background, there is a large interest in oil and gas exploration in the EEZ, with multiple applications for exploration licenses, along with developing offshore windfarms and considerable fishing activity. To address data gaps, a two year survey project (ObSERVE aerial) is being undertaken. Here we present results from aerial surveys undertaken during the summer of 2015. Tracklines were designed over five survey blocks, including a survey block over the continental shelf and surveys were conducted at a speed of 90knots and an altitude of 183m using a Britten Norman BN2 Islander fixed wing aircraft with four bubble windows. Two observers on either side of the aircraft scanned to 500m for cetaceans and recorded seabirds out to 200m; sightings were recorded by two data recorders. We surveyed 10,015km on effort, with 96.8% effort in Beaufort seastate ≤4. Twelve species of cetaceans were recorded during 332 sightings events comprising 1463 individuals. Harbour porpoise were the most frequently sighted odontocete, followed by common dolphins and white-beaked dolphins. Minke whales were the most frequently sighted mysticete. Clear summer habitat use and species distribution patterns will allow comparison with winter distribution and better inform management and conservation efforts of both taxa.

ABU

INDEX OF AUTHORS

DICTIONARY

Conference Center – Centro de Congressos do Casino da Madeira

Fundamentals / Básicos

ENGLISH	PORTUGUÊS
Yes	Sim
No	Não
All right	Tudo bem
I'm sorry /Excuse me	Peço desculpa / Com licença
Good morning	Bom dia
Good afternoon	Boa tarde
Good night	Boa noite
Goodbye	Adeus
What is your name?	Como te chamas?
My name is ...	Eu chamo-me ...
Where is ...? / I am looking for ...	Onde é … ? / Estou à procura de …
How far is it …?	A que distância fica …?
… by bus	… por autocarro
… by foot	… a pé
… by bicycle	… por bicicleta
Which direction should I take?	Que direcção devo tomar?
… to the left	… para a esquerda
… to the right	… para a direita
… straight ahead	… sempre em frente
… back there	… lá atrás
Could you please show me on the map …	Poderia indicar-me no mapa, por favor?
Could you please help me?	Poderia ajudar-me, por favor?
Welcome	Bem-vindo
Hello	Olá
How are you?	Como estás?
Very well, thank you	Muito bem, obrigado.
Where are you from?	De onde és?
I am from …	Eu sou de …
Nice to meet you	Prazer em conhecer-te
Good luck	Boa sorte
Have a nice day	Tem um bom dia
I don't understand you	Não te compreendo
Please	Por favor
How much is it?	Quanto custa?
Excuse me?	Desculpe?
Could you please write it down for me?	Poderia escrever-me, por favor?
Thank you/ Thank you very much	Obrigado / Muito obrigado
My address is …	A minha morada é …
My phone number is …	O meu número de telefone é ...

SIGNS / SINAIS

Entrance	Entrada
Exit	Saída
Pull	Puxar
Push	Empurrar
No smoking	Proibido fumar
No admission	Proibida a entrada
Emergency exit	Saída de emergência
Elevator	Elevador
Up	Subir
Down	Descer
Stairs	Escadas

Numbers / Números NUMBERS / NÚMEROS

		CARDINAL NUMBERS / NÚMEROS CARDINAIS	
0		Zero	
1	Um	1.	Primeiro
2	Dois	2.	Segundo
3	Três	3.	Terceiro
4	Quatro	4.	Quarto
5	Cinco	5.	Quinto
6	Seis	6.	Sexto
7	Sete	7.	Sétimo
8	Oito	8.	Oitavo
9	Nove	9.	Nono
10	Dez	10.	Décimo
11		Onze	
12		Doze	
13		Treze	
14		Quatorze	
15		Quinze	
16		Dezaseis	
17		Dezasete	
18		Dezoito	
19		Dezanove	
20		Vinte	
30		Trinta	
40		Quarenta	
50		Cinquenta	
60		Sessenta	
70		Setenta	
80		Oitenta	
90		Noventa	
100		Cem	
200		Duzentos	
300		Trezentos	
400		Quatrocentos	
500		Quinhentos	
600		Seiscentos	
700		Setecentos	
800		Oitocentos	
900		Novecentos	
1000		Mil	
2000		Dois mil	
5000		Cinco mil	
10000		Dez mil	
100000		Cem mil	
1000000		Um milhão	

Transportation / Transporte

TRAIN / COMBOIO Station	Estação
Central station	Estação central
Tourist information	Informações turísticas
Ticket office	Bilheteira
Ticket	Bilhete
Reduced ticket	Meio-bilhete
Platform / track	Plataforma / linha
Timetable	Horário
Departure	Partida
Arrival	Chegada
Waiting room	Sala de espera
Delay	Atraso
Direct train	Comboio directo
Express train	Alfa-pendular
Slow train	Inter-cidades
First / second class	Conforto / Turística
Reserved seat	Lugar reservado
Luggage rack	Compartimento de bagagem
Restroom	Casa-de-banho
Where is the railway station?	Onde é a estação de comboios?
A single ticket to … please.	Um bilhete único para ... por favor.
A return ticket to … please.	Um bilhete de regresso para … por favor.
How much is a single ticket to …?	Quanto custa um bilhete único para …?
At which track does the train to … leave?	Em que linha parte o comboio para …?
Excuse me, is this seat occupied?	Desculpe, este lugar está ocupado?

COACH / AUTOCARRO

Where is the bus station?	Onde é a estação de autocarros?
How can I get there?	Como consigo chegar aqui?
Is there a bus to the …	Há um autocarro para …?
At which time does the bus to … leave?	A que horas o autocarro para … parte?
At which time will we arrive at …?	A que horas iremos chegar a …?

Accommodation / Alojamento

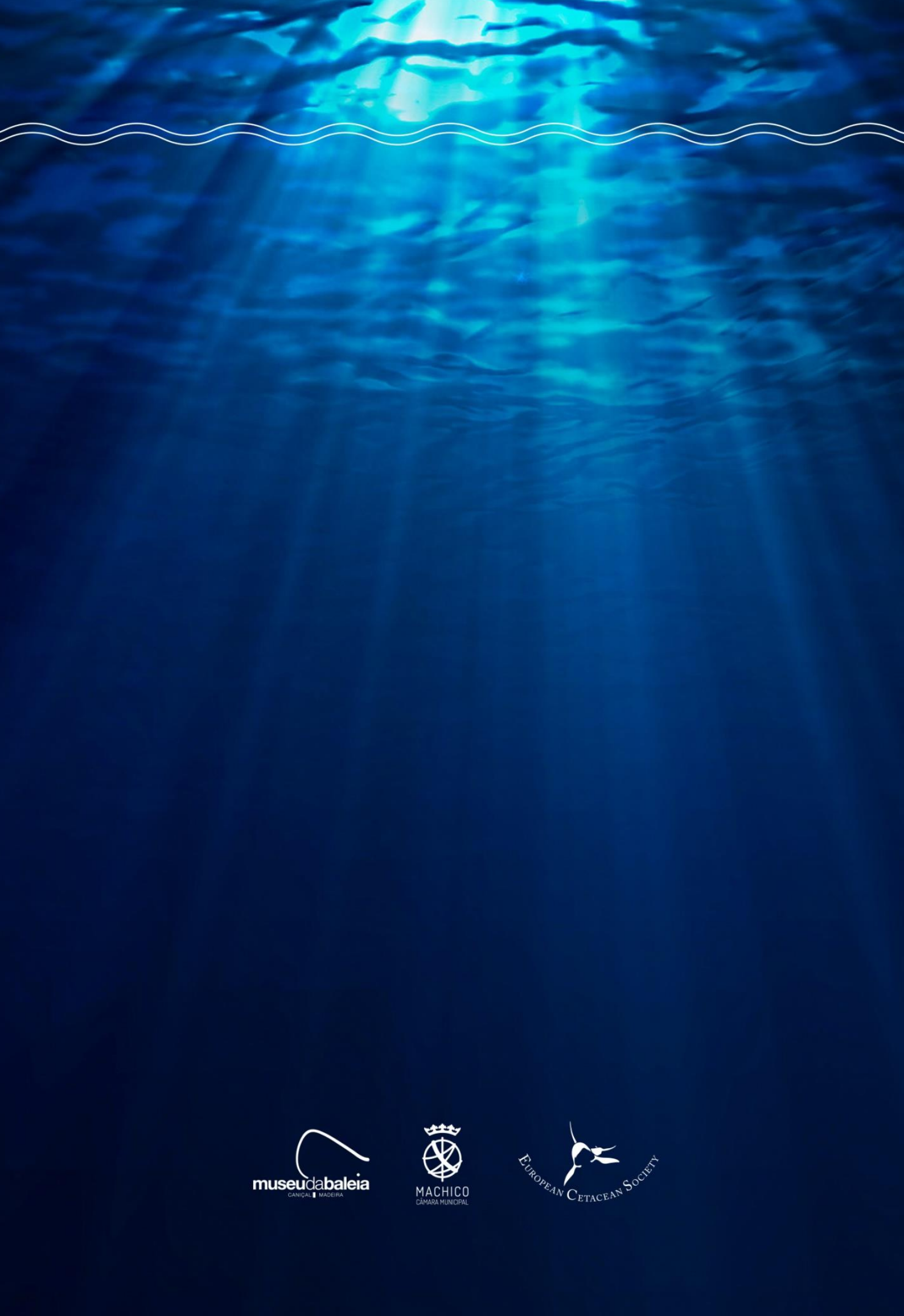
Hotel	Hotel
Guest house	Pensão
Youth hostel	Pousada da juventude
Reception desk	Balcão de recepção
Bathroom	Casa-de-banho
Showers	Chuveiros
I have booked a room on the name …	Eu reservei um quarto no nome de ...
I would like a room	Eu gostaria de ter um quarto
a single room	um quarto simples
a double room	um quarto duplo
a three-bed room	um quarto com três camas
Could I have a room with a bathroom?	Poderia ter um quarto com casa-de-banho?
Ash-tray	Cinzeiro
Coat rack	Roupeiro

Meal / Alimentação

Bottle	Garrafa
Cup	Caneca
Fork	Garfo
Knife	Faca
Spoon	Colher
Teaspoon	Colher de chá
Glass	Copo
Breakfast	Pequeno-almoço
Lunch	Almoço
Dinner / supper	Jantar
Menu	Ementa
Table	Mesa
Napkin	Guardanapo
Plate	Prato
Matches	Fósforos
Toothpick	Palito
Tip	Gorgeta
Self service	Serviço-próprio
Tea	Chá
Beer	Cerveja
Wine (red, white, rosé)	Vinho (tinto, branco, rosé)
Ice cream	Gelado
Pepper	Pimenta
Salt	Sal
Bread	Pão
Butter	Manteiga
Yogurt	Iogurte
Cheese	Queijo
Appetizer	Entrada
Meat	Carne
Fish	Peixe
Salad	Salada
Vegetable	Vegetal
Vegetarian	Vegetariano
Sandwich	Sanduiche

TIME / TEMPO

Hour	Hora
Minute	Minuto
Second	Segundo
What time is it?	Que horas são?
It is … o'clock?	São … horas.
At what time?	A que horas?
How long will it take?	Quanto tempo irá durar?
In the morning	Pela manhã
At noon	Ao meio-dia
In the afternoon	Pela tarde
Evening	Noite
At night	De noite
At day	De dia
Week	Semana
This week	Esta semana
Today	Hoje
Tomorrow	Amanhã
Monday	Segunda-feira
Tuesday	Terça-feira
Wednesday	Quarta-feira
Thursday	Quinta-feira
Friday	Sexta-feira
Saturday	Sábado
Sunday	Domingo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