

ICMMPA 2: Endangered Spaces, Endangered Species November 7–11, 2011 Fort-de-France, Martinique Editor: Erich Hoyt



EDITOR

Erich Hoyt

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September 2012

PROCEEDINGS OF THE SECOND INTERNATIONAL CONFERENCE ON MARINE MAMMAL PROTECTED AREAS

ICMMPA 2: Endangered Spaces, Endangered Species

November 7–11, 2011 Fort-de-France, Martinique

Editor: Erich Hoyt



Dall's porpoise in Commander Islands Biosphere Reserve, Russia. Photo by Tatiana Ivkovich, Russian Cetacean Habitat Project, Whale and Dolphin Conservation Society ICMMPA Conference Proceedings

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Bottlenose dolphins in proposed Hebrides Marine Reserve, Scotland Photo by Charlie Phillips, Whale and Dolphin Conservation Society

Executive Summary and Main Conclusions

Some 150 marine mammal protected area (MMPA) researchers and managers as well as government and conservation group representatives from 42 countries and overseas territories convened in Martinique in the French Caribbean from 7-11 November 2011 for the Second International Conference on Marine Mammal Protected Areas (ICMMPA 2). The goal: to seek solutions to shared problems related to marine mammal conservation and to MMPA network and site design, creation and management. A secondary goal was to orient those working in MMPAs to set those protected areas in the broader context of marine management, in order to ensure that MMPAs are not marginalized as marine spatial planning work advances. Unlike most scientific meetings, the ICMMPA stresses workshops, panels, and open forum discussions to emphasize collaboration, communication and networking among MMPA practitioners.

The conference was co-hosted by the French MPA Agency (Agence des aires marines protégées) and the US National Oceanic and Atmospheric Administration (NOAA). Fifteen other international and regional sponsors, as well as a dozen supporting organizations, were actively involved, most either based in Martinique or with representation in the Caribbean.

The conference theme of "Endangered Spaces, Endangered Species" was explored in keynote talks, panels and workshops focusing on monk seals, sirenians, river dolphins and other small and large cetaceans. In several workshops and plenary talks, special attention was given to the vaquita, the most endangered, space-restricted marine mammal in the world. Delegates agreed that it will require a broad public campaign in order to generate the political will to stop the gillnet fishing that is squeezing the last life from the "shy porpoise with the little black smile".

Plenary sessions were divided into panels, followed by discussions, focusing on

- Special considerations for particularly endangered marine mammals and whether MPAs are the right tool.
- Refining our understanding of marine mammal critical habitat and hotspots to inform MMPA designation.
- Using marine spatial planning and ecosystem-based management to address broad threats to marine mammals.
- Managing MMPAs for localized threats and mitigation by spatial protection and other means.
- Development of MMPAs in the wider Caribbean region.
- Regional cooperation for MMPA scientific and technical networking.

The workshops focused on marine mammals and oil spills, decision-making with limited data, best practices for whale watching in MMPAs, integrating marine mammal data in marine spatial planning, forging agreements to establish effective MMPA networks, and the widespread mortality attributed to fisheries bycatch.

ICMMPA 2 was hosted in the Caribbean to afford synergies and networking opportunities for the Wider Caribbean, including sessions on the eastern tropical Pacific, northeast South America, as well as on the nine river dolphin countries of South America. These sessions built upon or instituted new regional alliances, some of which were formed at the first ICMMPA in Hawaii.

Key Recommendations and Conclusions that emerged from the conference workshops were as follows (from global and regional levels to the taxa-specific level). Please note that the full set of recommendations is available in the proceedings.

Of global relevance, the members of the "scientific information and marine spatial planning" workshop agreed, among other things:

- To provide information and advice on how to use marine mammal science to inform decision-making and to ensure that relevant information about marine mammal important areas gets incorporated into the Convention on Biological Diversity (CBD) process of ecologically or biologically significant areas (EBSA) identification.
- To form a task force for developing guidelines for best practical ways to engage with the shipping industry, International Maritime Organization (IMO) and other sectors.
- To develop a best practices guide and standards for marine mammal spatial planning.
- To develop an action plan to identify and address critical data gaps including use of Delphic expert-knowledge approaches to complement data collection.

Additional global recommendations from various workshops were directed to the ICMMPA and associated MMPA researchers, managers and NGOs:

- To coordinate the preparation of a document providing guidance for the MMPA community in the form of essential underlying principles for effective development of bilateral and multilateral partnership and networking agreements and outlining appropriate legal mechanisms, best practices for development and implementation of agreements and illustrative case studies.
- To bring together stakeholders to focus on bycatch as an important part of MMPA management plans and legislation. This could include initiatives for the development and testing of marine mammal safe fishing gear, as well as serving as a focal point for knowledge about marine mammal populations, fishing type and effort within MPA boundaries, as well as for capacity-building initiatives related to disentanglement and prevention.

- To encourage international organizations such as the International Maritime Organization (IMO), International Tanker Owners Pollution Federation Ltd (ITOPF), among others, to work with the marine mammal community for oil spill response contingency planning, drills and preparedness, as well as to work with appropriate national authorities or international/regional bodies (such as the regional activity centers) to ensure that MMPAs and marine mammals are included in such plans.
- To work with stakeholders and local communities to explore, establish or refine appropriate management frameworks for marine mammal watching activities, including voluntary and/or regulatory measures, covering the various training, regulatory and compliance aspects.

Regionally, it was recommended that countries, managers and scientific teams of the Wider Caribbean and Eastern Pacific collaborate:

- To develop a plan to synthesize existing data, including expert opinion in maps that can be used as communication tools, and to be able to make comparisons between qualitative and quantitative summaries to include socio-economic information.
- To use existing data inventories to identify and prioritize filling data gaps and to consider the use of large scale and standardized as well as opportunistic and cost-effective surveys to gather additional data.

The country and community representatives, MMPA managers and researchers of the North East South America MAMA COCO SEA Project (Regional cooperation for marine mammal conservation) agreed to complete a workshop background paper outlining the aims, strategies envisioned and possible synergies leading to the organization of a workshop for 2012 in Suriname to establish the current state of knowledge on marine mammals and their habitats, threats and management framework by country and to set up a regional action plan with capacity building for marine mammal conservation.

The monk seal workshop agreed that a group of monk seal scientists, managers and advocates be formed to find common values and solutions to monk seal problems, as well as to raise awareness, understanding and motivation by the public to help encourage governments to honor their commitments to saving monk seals; and that local communities, especially fishermen be engaged in monk seal conservation.

Riverine and estuarine mammal researchers, managers and NGOs recommended that upstream-downstream connectivity and ecologically viable flow be taken into account in the design and management of protected areas, and that the goals of the South American River Dolphin Protected Area Network (SARDPAN) be strengthened and fulfilled to, among other things, research and convey science-based information to protected area stakeholders.

Sirenian researchers, managers and NGOs agreed to use a regional approach for creating, managing and evaluating the effectiveness of MPAs and MPA networks for sirenians including promotion of

the goals of regional management plans. They also recommended the consideration of reintroduction programs to improve sirenian conservation but with careful, transparent consideration of science, local cultural values, potential threats, legal constraints and full stakeholder involvement.

Two themes common to all levels – global, regional and species specific – emerged from the conference discussions and recommendations:

- That marine mammal researchers, managers and NGOs need to work out better ways to engage stakeholders and local communities as well as the wider public to help with local conservation efforts as well as to encourage governments toward effective conservation measures.
- Sustained funding must be found to help the recovery of threatened and endangered species.

During background discussions at the conference and over the past year, both of these themes have been considered as a possible part of an enhanced mission for the ICMMPA steering committee – i.e., the International Committee on Marine Mammal Protected Areas.

The location of the conference in the Caribbean celebrated the French declaration of the Agoa Sanctuary, itself one of the conference sponsors. Agoa has legal status already but there are more detailed plans for the 143,618 km² area, which covers the French exclusive economic zone (EEZ) in the Caribbean, to make it into an MPA with expanded highly protected zones and a management plan. During the conference, a presentation from the Netherlands Antilles regarding Dutch waters of the Caribbean formally opened the possibility that these waters could be added to the Agoa Sanctuary or joined as part of a network that could measurably help marine mammal conservation in the Greater Caribbean. On the conference's final day, a marine mammal protected area partnership, the "Martinique Declaration", was forged between the Agoa Sanctuary, Stellwagen Bank National Marine Sanctuary, the Dutch Caribbean project, the Marine Mammal Sanctuary of the Dominican Republic and the Regional Activity Center for the SPAW Protocol (SPAW-RAC).

The ICMMPA conferences will continue with a proposed conference for Australia in late 2013 or 2014. Behind the scenes the International Committee for Marine Mammal Protected Areas plans to help address the needs expressed in the recommendations and to promote better networking and problem solving through the growing constituency developed from the first two conferences and in the plans for the next conference.

Conference Welcome and Opening Talks

The Second International Conference on Marine Mammal Protected Areas (ICMMPA 2) opened with a warm statement of welcome to the French Caribbean from **Raymond Saint-Louis-Augustin**, Mayor of Fort-de-France. His remarks were followed by the introduction of a noted figure in the history of public awareness of marine mammals, **Albert Falco**, Calypso Captain and collaborator of Jacques-Yves Cousteau, diver and honorary conference chairman. Capt. Falco talked about the continuing need to protect the seas from overfishing, oil spills and other catastrophes, as well as the need to empower people to protect the environment.

"My generation – and I regret it deeply," said Capt. Falco, "hasn't done much to preserve nature; however, it offered me so much that until my last breath, I will try hard to make people realize the extreme importance to create preserved areas as well as marine mammal sanctuaries in order for the next generations to enjoy the discovery of all these marine species that nature has enabled to thrive on our blue planet."

These opening remarks were followed by official talks from national and international bodies with an important stake in marine mammal habitat conservation:

Ferdy Louisy, President of the National Park of Guadeloupe and Vice-President of the National Parks of France, spoke about conserving marine mammals as an important aspect of protecting the entire marine ecosystem. He spoke about France's ambitious program to develop marine protected areas worldwide in the entire French 11 million km² EEZ, the first major declaration of which came in October 2010 with the naming of the Agoa Sanctuary covering all French Caribbean waters. However, he noted that protection for French waters was not enough, that the problems are clearly on an oceanic scale and that we all need to support international collaborations and worldwide habitat conservation for marine mammals.

Ryan Wulff, the US Deputy Commissioner to the IWC, from NOAA, noted that the US has built on its support of the first ICMMPA in Maui, Hawaii, through its various agencies concerned with marine mammals, habitat protection and marine spatial planning. In view of the theme of the conference being "Endangered Spaces, Endangered Species," he said that the United States agrees that this is a relevant topic for discussion. NOAA has taken a number of domestic measures to help the recovery of endangered species and has collaborated with international partners on research, training and management activities aimed at increasing our knowledge and cooperation on marine mammals and protected areas. NOAA's international marine mammal initiatives include the Specially Protected Areas and Wildlife (SPAW) Protocol in the Caribbean and International Whaling Commission (IWC) commitments, among others.

Jihyun Lee, Environmental Affairs Officer from the Secretariat of the Convention on Biological Diversity (CBD), talked about



Captain Albert Falco, honorary conference chairman and former Cousteau collaborator, talked to participants about the continuing need to protect the seas from overfishing, oil spills and other catastrophies, as well as the need to empower people to protect the environment. Photo by Agence Kréöl

the 10-year Strategic Plan 2011-2020 for Biodiversity adopted by the Conference of the Parties to the CBD at its 10th meeting in 2010 in Nagoya, Japan. This includes commitments from the 193 Parties to achieve 20 Aichi Biodiversity Targets. Target 11 commits Parties, by 2020, to have at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, to be covered through effectively and equitably managed, ecologically-representative and wellconnected systems of protected areas.

The science-driven CBD has adopted scientific criteria for identifying ecologically or biologically significant areas (EBSAs), for which States are requested to apply enhanced management and conservation measures, including marine protected areas. The CBD Secretariat, therefore, works closely with various international and regional partners, such as the ICMMPA, in scientifically describing the areas meeting the criteria for EBSAs through convening a series of regional workshops. Among considerable other work, CBD is currently preparing a report on the effects of underwater noise on marine biodiversity including marine mammals.

Lee reminded the participants that, in 2012, the world will renew its commitment to sustainable development by convening the United Nations Conference on Sustainable Development (Rio+20) which will assess the progress made in meeting global commitments and addressing new and emerging challenges. To facilitate efforts at global, regional and national levels on achieving biodiversity targets and highlighting the role of marine biodiversity in advancing the common goal of sustainable development, the CBD has given the International Biodiversity Day 2012 the theme of marine and coastal biodiversity for the first time. The CBD invites everyone to join hands with the Convention parties and partners to make all these global opportunities meaningful and successful in achieving the common vision of marine biodiversity conservation and sustainable use.

Fernando Félix, from the Permanent Commission for the South Pacific (CPPS), based in Ecuador, made remarks on behalf of Ole Vestergaard from United Nations Environment Programme (UNEP). Félix is currently helping to coordinate the LifeWeb Project in collaboration with UNEP focusing on the waters of the Eastern Pacific bordering Central and South America. He noted the particular importance of Pacific and Caribbean waters covered by the UNEP LifeWeb project as habitats for calving, mating and feeding marine mammals. Still, these waters are suffering the impacts from human activity. Management of transboundary waters is important in marine spatial planning and for the creation of marine protected area networks. The LifeWeb project is a good example of how UNEP's marine and coastal work is grounded in ecosystem-based management principles.

Dan Laffoley, representing the International Union for Conservation of Nature (IUCN) Global Marine and Polar Programme and as Marine Vice-Chair for the World Commission on Protected Areas, talked about the critical importance of the meeting and urged participants to be visionary in their discussions in moving the agenda forward.

Laffoley noted his original inspiration from Cousteau and that in the 40 ensuing years the ocean has been changed and few places remain natural. He noted that the World Summit on Sustainable Development (WSSD) in 2002 gave us the basis for building networks of marine protected areas and the Convention on Biological Diversity reaffirmed the targets for protecting the marine environment.

There are now enough data and combined global efforts to know that the CBD target of 10% will probably be reached by 2040 rather than the original aim of 2020 unless more concerted action is taken. There is a sense of pessimism around, but there is also cause for optimism because we know that we are actually making progress and opportunities exist to scale up efforts. In 2010, there were almost 6,000 marine protected areas, covering about 1.17% of the total ocean area, and more recent figures bring that percentage up to 1.42%. However, there is of course still some way to go to achieve our targets and one of the key issues is that many more places in the open ocean need to be protected. We're neglecting pelagic waters of countries and the vast high seas.

Laffoley outlined some of the main challenges:

- Scaling up to achieve much larger MPA goals on the high seas.
- Organizing more accurate mapping of MPAs.

- Forging better connections with ocean users.
- Fast-tracking of marine policy.
- Addressing maritime traffic including noise.
- Addressing management of specific fishing gears.
- Developing more ways of getting people involved, such as creating mobile phone applications to make the ocean and marine conservation more accessible to the policy makers and the wider public.
- Forging new partnerships to spread the word, such as the agreement with the America's Cup sailing race which has launched its Healthy Ocean Project in partnership with IUCN, Sylvia Earle and Mission Blue.

Laffoley presented an animated Google Earth Tour specially made for the conference with the assistance of Google, IUCN and the Whale and Dolphin Conservation Society.¹ The tour uses the Google Earth oceans version launched in 2009, which tries to give the ocean a realistic 3D appearance and, through it, to tell the story of marine animals and ecosystems. Importantly, this provides the opportunity to use multimedia technology accessible on computers and smart phones, where people can discover MPAs and call up information on marine mammals. It also allows the identification of areas that need to be protected. It is one thing to inspire people about the ocean, but it is essential to provide ways of engaging.

The final opening and official talks came from Martinique:

Jocelyn Régina, President of the Culture and Heritage Commission, General Council, Martinique, spoke about the importance of the Agoa Sanctuary project covering the French Caribbean waters to protect the breeding grounds of humpback whales. The general council has made it a priority for the development of nature protection of coral reef systems and to strengthen protected areas. It is working to raise awareness in the local community of the importance of the ocean in general and the Agoa Sanctuary in particular for tourism and the raising of awareness of MMPAs. By working together to protect the ocean, introducing simple measures, we can pass on our seas to future generations in a much better state than we find them today. Protecting the ocean is also about providing jobs in fishing and our children are learning that the sea is not just an extent of water but a place that is home to a fragile population and a place that produces 80% of the planet's oxygen. It is vital that children know more about the sea and how it can be protected.

Daniel Chomet, President, Natural Park, Martinique, stressed the fragility of the ocean which now faces many problems including global warming, ocean acidification, habitat degradation, and pollution. Many marine species are endangered because of these issues. We all need to take an active part in the shared management of the Agoa Sanctuary. We want to develop the tools that will help with the protection of coastal areas.

The Google Earth Tour can be seen at

www.youtube.com/watch?v=2-ZW1U1eNIU

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Laurent Prévost, Prefect of Martinique, presented a message from Nathalie Kosciusko-Morizet, French Minister of the Environment and Sustainable Development, asserting France's commitment to the protection of marine mammals. She said that we must work together to find solutions at local, regional and international levels for marine conservation to protect the environment for marine mammals and reduce the impact of human activities pollution, bycatch, ship strikes and collisions. France has made it a priority to develop marine protected areas; 10% of the seas under French national jurisdiction up to the 200 nautical mile limit will be protected. France's commitment is both regional and international, and this conference shows how committed the local actors are - a key part of regional cooperation. Sustainable development and human activities both have claims on the oceans and we need to find tools in fisheries and tourism to make both sides work together. An important recent development can be seen in the form of the Cartagena Convention. Fourteen countries in the Caribbean have ratified the Convention's protocol and this should help in strengthening cooperation. For its part, France is supporting the implementation of the protocol with a team based in Guadeloupe.

Kosciusko-Morizet congratulated everyone on the work that has gone into protected areas. She affirmed that France would continue to play its part through the Agoa project and with regional and international cooperation to enable the construction of a network of protected areas for marine mammals. Dan Laffoley from IUCN presented an animated Google Earth Tour specially made for the conference that people can use to discover MPAs around the world that are important for marine mammals. Photo by Agence Kréöl



Dugong near Marsa Alam, Egypt Photo by Julien Willem, Wikimedia Commons

Keynote 1: Australian Policy on Marine Mammal Conservation

Hon. Tony Burke, MP

Minister for Sustainability, Environment, Water, Population and Communities, Australia

The Hon. Tony Burke, MP and Minister for Sustainability, Environment, Water, Population and Communities, Australia, introduced Australia's strong commitment to marine mammal protection and how Australian policies regarding marine bioregional planning and marine protected areas are contributing to enhanced marine mammal conservation. Australia has a range of policies in places that deliver protection of whales, dolphins, sea lions and dugong. It also engages in a wide range of domestic and international marine mammal research initiatives. Currently Australia is collaborating with the America's Cup to promote ocean conservation.



Conference delegates participated actively during the plenary sessions. Photo by Agence Kréöl



Steller sea lion bull, Alaska. Photo by Dave Withrow, National Marine Mammal Laboratory, AFSC, NOAA Fisheries

Panel 1: Special Management Considerations for Particularly Endangered Marine Mammals

Coordinator: Lorenzo Rojas Bracho (Instituto Nacional de Ecología – INE, México)

Introduction and Objectives

The objective of Panel 1 was to explore one aspect of the main conference theme of "Endangered Spaces, Endangered Species", namely whether specific considerations need to be made for habitat protection for marine mammal species and populations that are particularly endangered. The panel commented on the situation from the perspective of a number of species groupings including small cetaceans (e.g., vaquita), large cetaceans (especially North Pacific and North Atlantic right whales, blue whales and western gray whales), pinnipeds (e.g., monk seals, Steller sea lions) and sirenians (all species).

Summaries of Presentations

Using MPAs to save endangered small cetaceans: Is this the right tool?

Lorenzo Rojas Bracho (Instituto Nacional de Ecología – INE, México) and **Randall Reeves** (Chair, IUCN SSC Cetacean Specialist Group, and Okapi Wildlife Associates, Canada)

IUCN lists three species, six subspecies and ten geographical subpopulations of small cetaceans as either critically endangered or endangered. In virtually all cases the endangerment involves some kind of a conflict with human activities, and all too often one that is not easily accepted, characterized, and resolved.

For any conservation tool to be applied successfully, it is necessary to identify, understand, and be able to classify risk factors according to their importance as drivers of endangerment. Bycatch is a common denominator in almost all cases of endangered small cetaceans, but usually other factors are also involved, such as habitat deterioration, reduced prey abundance, disturbance by human activities, or compromised health due to contaminant exposure. These factors, however, can be hard to identify with certainty, and even more difficult to address decisively.

In at least some instances, establishment of one or more protected areas can be part of a legally comprehensive framework within which to pursue conservation action on multiple fronts; the vaquita provides a good example. Designation in itself may signify that the species or population is in trouble and needs special protection. It should also bring an implied responsibility (including the provision of resources) for managers to act

Conservation:

Meffe et al. (1999): "An ideal relationship between humans and nature would safeguard the viability of all biota and the ecosystems on which they depend, while allowing human benefit, for present and future generations, through various consumptive and non-consumptive uses."

Biologist John Reynolds talked about sirenian habitat conservation during Panel 1: Special Management Considerations for Particularly Endangered Marine Mammals. Photo by Agence Kréöl

immediately to reduce known threats and at the same time investigate other likely risk factors.

Tragically, after some 15 years of the biosphere reserve in the Upper Gulf of California there are only an estimated 245 vaquitas remaining which is 57% lower than estimated in 1997. The only hope for the possible recovery of this species is to eliminate bycatch completely and to do that requires removal of all gillnets – easier said than done despite great efforts by committed people.

Two other cases are, first, the eastern Taiwan Strait Indo-Pacific humpback dolphin which suffers from habitat loss, industrial pollution and bycatch. Various MPA scenarios have been proposed but the question is whether the designation of a protected area would really help save this population given the enormous problems of habitat degradation caused by intense human pressure.

In the case of the Hector's dolphin in New Zealand, there was a greater than 50% decline from 1970 to 2009 mainly due to bycatch from gillnets. This species is only projected to recover if bycatch is eliminated, and then, only slowly.

So to the question of whether MPAs will help, the answer is yes and no, depending on the scale and nature of the problems and the effectiveness of the measures put in place.

Optimizing the value of MPAs for conservation of sirenians

Benjamin Morales Vela (El Colegio de la Frontera Sur, México) and John Reynolds, III (Mote Marine Laboratory, Florida, USA)

Conservation crises did not develop overnight, nor will solutions to those crises. Effective solutions are urgently needed for conservation of sirenians, all of which are threatened, as they occupy coastal and riverine habitats in proximity to people and their activities. A well integrated set of actions, including the creation of functional marine (or aquatic) protected areas is vital. To date, the enormous potential importance of protected areas has often not been realized for sirenian conservation because managers and governments fail (among other things) to identify goals, provide adequate enforcement, develop and sustain funding, and conduct assessments and make adaptive changes.

We offer case studies to illustrate where and how protected areas for sirenians can be effective for conservation, and we reinforce the following attributes that can promote success in either developed or developing countries: community involvement; planning to reflect regional legal frameworks and goals specific to sirenians; encouragement of legal frameworks and the political will to make them work; targeted education and awareness programs; adequate spatial scale; long-term funding; significant co-management; an adaptive management approach; adequate enforcement presence; capacity building, including succession planning, for all partners; active, applied research to inform management; and alternative livelihoods for affected community members.

Sirenians are found within the territorial waters of approximately 90 countries. One MPA case study is the Chetumal Bay Manatee Protected Area which stretches over parts of Belize and México. MPAs are only fully effective if they are supported by authorities and the local populations have appropriate measures incorporated into sufficiently well-funded management plans. This hot spot for manatees in the Caribbean has experienced uncertain funding streams and communication and coordination issues between Belize and México.

An example of a general MPA that has benefits for marine mammals is the Great Barrier Reef Marine Park and World Heritage Area encompassing 350,000 km². The focus here has been multispecies and protection of ecosystem processes and this in turn provides great protection for dugongs.

Design elements for pinniped protected areas

Dennis Heinemann (Marine Mammal Commission, USA)

Few marine protected areas have been designed primarily for pinnipeds. Further, little attention has been given to the general MPA design principles that should be applied to pinniped protected areas (PPAs), or to the life history and ecological characteristics of pinnipeds that will be important to designing effective areabased protection and management.

Different types of pinniped protected areas serve different purposes:

- Coastal PPAs protect breeding colonies or haulouts.
- Pelagic areas protect foraging areas and migration or movement corridors.
- Fixed pelagic areas may protect pinnipeds and prey associated with benthic or predictable hydrographic features.
- Ephemeral pelagic areas may protect pinnipeds associated with transitory and/or mobile oceanographic features.

Three factors are of particular importance in designing protected areas for pinnipeds:

Firstly, pinnipeds are associated with land or ice during the breeding season and while hauled out. This means that they are much more available to researchers, which can lead to a greater understanding of their physiology, reproductive biology, and ecology than can be achieved with comparable effort for other marine mammals. However, their association with the land means that they are directly exposed to terrestrial threats and that their management is more complex.

Secondly, the fact that many pinnipeds are centralplace foragers imposes special design constraints on pinniped protected areas.

Thirdly, pinnipeds generally have smaller ranges, more rapid growth rates and a closer link to local conditions than many cetaceans. This suggests that PPAs generally would be smaller than cetacean protected areas, for example, which could increase the probability of success.

As with any protected area, design is informed by goals, which are matched to threats. Typical pinniped protected areas are of the coastal type and have a core area that excludes all human activity with a seaward buffer area that restricts activities such as fishing and boating – the "core-buffer" design. When complete protection cannot be provided, consideration of the characteristics of the colony or haulout, the presence or absence natural barriers, the area's isolation, whether the colony is stable or declining, and the oceanographic conditions for breeders, are critical to optimizing protection. The size of a coastal PPA will be determined by the dispersion of the colony or haulout, and the types, intensity and spatial extent of any disturbance agents. In addition, tourism, education and research aspects will also play a part in the design of coastal PPAs.

For pelagic protected areas, as with cetacean protected areas, the aim is to protect critical habitat, meet the lifestage requirements for the species, protect biodiversity and the prey base, and to eliminate or reduce fisheries interactions. A cost-benefit analysis will determine, to a large extent, whether the protected area is feasible from ecological, economic and social perspectives, while a consideration of its size, location and level of protection will provide an expectation of the environmental and social benefits it can achieve. The determination of the most effective size will, for capital breeders, be determined largely by the protection provided to the ecosystem and forage base, and, for centralplace foragers, by the ability to provide predictable protection of animals on foraging grounds and in movement corridors.

Pelagic protected areas with fixed boundaries are associated with benthic habitats or relatively static oceanographic features, while "ephemeral" protected areas are associated with transitory oceanographic features. Ephemeral areas, because of the element of uncertainty, may need to be larger than fixed protected areas, which can create political, logistic and management challenges. While the core-buffer design could serve pelagic and benthic foragers in static areas as well as for the ephemeral areas, its elements would differ. The core of a coastal area would be designed to protect pinnipeds from terrestrial threats. On the other hand, the core of a static pelagic area would be designed to protect resources and control high-risk threats such as fishing, and the core of an ephemeral area would be designed to reduce competition and interaction rates in transitory hot spots. A coastal buffer area would exist to control distant disturbance agents such as noise or human activity. A static pelagic buffer would exist to control relatively low-risk threats such as sound or boat traffic, while a transitory buffer would be used to provide a hedge against the inherent uncertainty in predicting the spatio-temporal dynamics of transitory hot-spots.

Unlike a classic MPA, success of a pinniped protected area could lead to the need for more protected areas, especially for threatened or endangered species. An increasing population could lead eventually to overcrowding and the founding of new colonies or haulouts, as well as the occupation of new foraging areas and an increase in fisheries interactions. Because there is the potential of competition between pinnipeds and fisheries, expanding pinniped populations may require larger fisheries "set asides" for the pinnipeds.

Endangered pinnipeds, more than any other, require immediate and complete protection. These species should have strong area protections of every breeding colony and haul-out site. Perhaps even more importantly, many of these species require pelagic protection to eliminate or significantly reduce mortality and injury due to fisheries interactions, which is a primary threat to the viability of the majority of endangered and threatened pinnipeds. Other important factors that require attention are ecosystem-based management, community cooperation, monitoring and adaptive management, and integration of overlapping government authorities. Finally, as with any protected area, design creates potential, but realized success is dependent on the management system and compliance by ocean users.

Strengths and weaknesses of the MPA approach for endangered large whales

Greg Donovan (International Whaling Commission, UK)

Effective conservation, including establishment of MPAs, requires *inter alia* (1) good knowledge of the biology of the animals, especially their temporal and spatial distribution, population structure and abundance, (2) good knowledge of actual and potential threats to them, including their spatial and temporal distribution, (3) appropriate mitigation measures to address the threats.

Such information is never easy to obtain and the problems are even greater when the animals are migratory species, with large ranges including both national waters and the high seas. In such cases, obtaining the necessary temporal and spatial information is exacerbated by attendant legal and political difficulties in getting agreement on management measures. Moreover, if a species is endangered in the true sense of the word, i.e., with very low absolute abundance, determining appropriate management measures for what can be individually very low likelihood occurrences (e.g., bycatch in fishing gear on migration) can be fraught with difficulties and must involve some level of agreement on an ecological currency.

In the course of exploring these issues in the context of the use of MPAs as a management tool, some key points were made:

We cannot manage cetaceans; we can only manage human impacts on cetaceans. Deciding to do nothing is a management decision. The term 'MPA' is generally not well defined – this can be beneficial in that it can provide a flexible concept to deal with the great variety of problems facing species and environments. However, there should be minimum standards for MMPAs if they are to be effective and not merely 'paper parks'. Whether they are the best tool for endangered marine mammals depends on the specific problems they face and the most appropriate measures needed to address those. The concept of specific conservation management plans (e.g., that for the western gray whale) addressing threats throughout the range of a population is very important. Where appropriate, MPAs can form an important component of such plans.

A suggested way to move foward with MMPAs is as follows:

- Define objectives with respect to status of the population.
- Assess their status.
- Determine measures to ensure objectives are met (can be difficult when little is known about the population) – this involves identifying and prioritizing actual and potential threats, identifying and implementing mitigation measures.
- Monitor to make sure you have got things right.

Summary of Discussion

It was agreed that while there is a need to focus on critically endangered species, this should not be at the cost of ignoring other problems such that we produce more endangered species. An MPA is only one tool to accomplish this. MPAs have to be active and effective. Even when populations have recovered there is a value in keeping the protection afforded by MPAs recognizing other possible goals of an MPA including enhanced scientific research and ecotourism that raises public awareness of environmental problems. It is important not to lose sight of the big picture: we should strive ultimately to 'manage' the whole ocean wisely, not only a designated subset.

Even where problems are well known, MPAs and other conservation measures are difficult to effectively implement. For example, considerable effort has been made to try to reverse the decline of the vaguita; while the decline has been slowed it has not been reversed and time is running out. In many instances, especially in developing countries, the human socio-economic issues must be recognized and addressed on a realistic timescale to avoid catastrophe. Fishermen in the Gulf of California were offered a buyout to sell their license and boats, others decided to rent out their boats. There was a group that helped the fishermen decide what to do with the buyout money they received. There was also the option for the fishermen to use alternative fishing gear that is less harmful to the vaquita. Sometimes buyback programs are ineffective. To emphasize a point that John Reynolds made, if we look at human success for protecting oceans, we fail often. It is important to realize that accepting the state of play may not get us anywhere. It is a great time for thinking outside the box. We need to think creatively.

There are many areas that have multiple objectives that offer some protection for pinnipeds. Pinnipeds have special characteristics, which may require the implementation of particular protections beyond the classic MPA protections. Without that, the pinniped MPA may fail. We are still at the beginning stages of determining what pinniped MPAs should be.

We should never be complacent – establishment of MPAs (or other management measures) is merely the start. They must have carefully designed, well-funded management plans that include quantified objectives and integrated monitoring to assess effectiveness. This is particularly difficult but no less important for the more complicated cumulative effects – it is often difficult to get people to mobilize behind protection against those threats as opposed to easily identified single issues. It is hard to have all of the threats under control, especially for wide-ranging species that move within the territorial waters of several countries as well as the high seas.

Panel 2: Refining Our Understanding of Marine Mammal Critical Habitat and Hotspots, Wading Through Large, Heterogeneous Masses of Data, to Inform MMPA Designation (including on the High Seas)

Coordinators: Kristin Kaschner (Albert-Ludwigs-University of Freiburg, Germany) and Rob Williams (University of St. Andrews, UK)

Introduction and Panel Overview

Marine mammals and their habitats face multiple, urgent threats, and MPAs can help mitigate those threats. At its core, this process can be thought of as spatial conservation prioritization. Ultimately, the process of creating MMPAs involves a choice about which areas require more protection from human activities than others. This job is important and urgent, but requires that our decisions be based on sound science in order to be transparent, repeatable and robust to uncertainty.

In practice, one of the biggest problems to cope with when prioritizing marine mammal habitats to protect is the fact that our data on their distribution and abundance is inherently patchy. It is important to ensure that we do not inadvertently create "Data Protected Areas", where our picture of animal distribution is heavily biased by the distribution of research effort. After all, there has never been one global survey to provide a snapshot of marine mammal distribution, so the combination of existing survey data provide an opportunistic collection of disparate studies that vary spatially in data quality and quantity. There are a number of software tools to support decision making, but they all have a tendency to gravitate towards data-rich areas, and this tendency needs to be addressed to give unbiased results. Taken to extremes, this could create an issue of environmental justice, in which MMPAs are most likely to be placed in waters under jurisdiction of countries that spend the most money on marine mammal science.

This panel introduces the problem of decision-making in the face of data gaps, as well as proposing some tools and solutions. We used the six-stage process of systematic conservation planning (Margules & Pressey 2000) to structure the four panel talks. These steps include:

- Compiling data on the biodiversity of the planning region (discussed by Rob Williams and Kristin Kaschner).
- Identifying conservation goals for the planning region (discussed by Jessica Redfern).
- Reviewing existing conservation areas (discussed by Sandra Pompa).

- Selecting additional conservation areas (discussed by Sandra Pompa, with an emphasis on decision-support software tools).
- Implementing conservation actions (discussed throughout the conference).
- Maintaining the required values of conservation areas (discussed throughout the conference).

Cetacean data: gaps and challenges for systematic marine conservation planning

Rob Williams (Sea Mammal Research Unit, University of St. Andrews, UK)

The focus of my talk, compiling available data on biodiversity, is akin to a conservation assessment in the marine spatial planning literature. A conservation assessment is designed to identify data gaps. In the context of MMPAs, a key problem to overcome is the difficulty in combining data types. Spatial planning algorithms rank areas on simple decision rules, so data need to be in common currency like density, counts or probability of presence. This makes it difficult to incorporate all of the data we have on marine mammal distribution from line transect and mark-recapture surveys, acoustic data, opportunistic sightings, telemetry data and whaling records. There is an urgent need for statistical methodological development to provide robust estimates of cetacean distribution using data that were designed to estimate different things.

My talk outlines the problem using two real-world case studies from the Wider Caribbean Marine Region (WC) and the North East Pacific Marine Region (NEP). Kristin Kaschner recently led a study to digitize data from visual cetacean line transect surveys published worldwide. This global gap analysis identified that the vast majority of published estimates of cetacean density in WC come from waters under US jurisdiction. One pressing problem that this analysis highlighted is the need for new statistical methods to allow spatial planning inputs to make better use of information other than density estimates, such as from the gray whale breeding lagoons of México, or the longterm photo-identification studies of killer whales and humpback whales. Because the process of spatial conservation prioritization

inherently involves ranking some sites over others, methods are needed to integrate all the information arising from the various ways that we study cetaceans, to allow cross-study and betweensite comparisons from different data types. In the NEP, the largescale picture of cetacean density is strongly influenced by one platform-of-opportunity survey that was conducted in the 1980s for three species. Beyond this, there is an enormous disparity in data quantity within the region. More survey effort has been conducted by NOAA's Southwest Fisheries Science Center in the Eastern Tropical Pacific and the California Current than in the rest of the NEP combined.

Having introduced the problem of data gaps, let's consider analytical solutions. In summary, these solutions are clustered in a few main areas:

- Going out and filling gaps with real data, in at least a few randomly sampled sites (this presentation).
- Try prioritizing areas based on threats, rather than animals (this presentation).
- Setting precautionary targets, honest about real data vs. predictions and uncertainty (Jessica Redfern's presentation below).
- Setting targets for one priority species and hoping it serves an umbrella function (Jessica Redfern's presentation below).
- Using tools that are robust to gaps (Sandra Pompa's presentation below).
- Using statistical models to fill in gaps and quantify uncertainty (Kristin Kaschner's presentation below).
- Improving methods to synthesize telemetry data, photo-ID, whaling records and opportunistic sightings (e.g., Pirotta et al. 2011²).

One possible way to "level the playing field" and fill in data gaps would be to conduct two parallel spatial conservation prioritization exercises: one on existing, empirical density estimates, and another on a derived value such as the number of species predicted to be in a region (see Kristin Kaschner presentation below). If the results are similar, the data gaps may not be a problem. If they differ, more work is needed to pay attention to data gaps. The idea of using the predicted number of species present has the attractive quality of protecting multiple species simultaneously, i.e., meeting biodiversity targets, and analytically has the appealing property that predictions can be made for every point in the world ocean, regardless of whether a survey has ever taken place there. The downside is that protecting habitat used by multiple species may actually protect habitat that is peripherally used by many species, but may fail to protect core habitat for any one species. Worse, biodiversity patterns derived from mere presence/absence range maps fail to recognize that there are preferred habitats within ranges.

At first glance, it may be easy to dismiss this concern as the usual complaint of scientists wanting more data. The point of this panel discussion is that this is an issue relating to the quality and coverage of data, rather than the quantity of data. In fact, having "more data" may worsen the problem if it fails to address the systemic problem of coverage. Fortunately, marine mammal scientists have a strong tradition of partnering with statisticians to develop methods that are robust to non-systematic sampling. As a result of coping with logistical constraints of studying free-ranging marine mammals, the marine mammal science community has had to develop expertise with estimating abundance, density and distribution from sparse data and coping with uncertainty. Our research community has refined these skills over time as abundance estimates take on contentious meaning in the context of whaling or bycatch mortality limits. Our next challenge as a scientific community is to invest in building statistically robust estimates of marine mammal distribution that are peer reviewed and taken as seriously as we take abundance estimates.

One of the lessons to emerge from marine mammal science and management over the last few decades is that policies benefit from an implicit reward for science. An example of this is the potential biological removal equation under the US Marine Mammal Protection Act, in which more precise survey estimates generally allow higher fisheries-related mortality limits, which in turn would carry lower socio-economic costs. I see value in a similar "reward for science" in marine spatial planning. In my opinion, this could live comfortably within a systematic conservation planning framework at the stage of setting targets or objectives (discussed below by Jessica Redfern). Conceptually, the better the information available, the smaller the MPA could be while still meeting objectives and being precautionary. In other words, one could adjust MPA targets upward to compensate for biased or missing data or untested predictions.

Nevertheless, there will always be gaps in our information on marine mammal distribution. A philosophically different approach would be to guide MMPA placement by the distribution of human threats, rather than distribution of animals. After all, MPAs are tools to separate wildlife from some threatening process, and if it is difficult to get unbiased data on wildlife distribution, then good distribution data on threats could be a more tractable alternative. One proxy for human-caused threats is available in the form of global maps on shipping activity. Shipping intensity is related to ship strike risk, and also provides an important input for producing a global map of ocean noise. Ideally, this could inform the design of "quiet MPAs" in places that are important to cetaceans but not used much by shipping. I see important linkages to be made between the MMPA and ocean noise communities, because the data we need to map ocean noise globally will also help us to fill in gaps in marine mammal distribution. One suggestion could be for our community to join forces with the upcoming International Quiet Ocean Experiment, where our data gaps could be targeted for passive acoustic monitoring.

² Pirotta, E. et al. 2011. Modelling sperm whale habitat preference: a novel approach combining transect and follow data. *Marine Ecology Progress Series* 436: 257-272.

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Identifying critical habitat for baleen whales in the eastern tropical Pacific Ocean

Jessica V. Redfern (Southwest Fisheries Science Center, NOAA Fisheries, USA)

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Many species of baleen whales migrate long distances between breeding and feeding areas. These species are exposed to anthropogenic threats in their feeding and breeding areas and along their migration routes; threats include entanglement in fishing gear, ship strikes, ocean noise, contaminants, and climate change. Mitigating these threats requires a transboundary, systematic planning approach. We use three species of baleen whales in the Eastern Tropical Pacific (ETP) to explore several components of the planning process.

The ETP is a 20 million km², open-ocean system that is seasonally occupied by migratory blue and humpback whales from both northern and southern hemispheres; it also hosts important numbers of resident Bryde's whales. We use 10 years of largescale survey efforts in offshore waters to compare three methods for predicting species density: habitat models (using sea surface temperature, salinity, and chlorophyll, mixed-layer depth, and sea floor depth as predictor variables), static models (using latitude, longitude, and depth as predictor variables), and inverse distance weighted interpolation of daily density estimates. Generalized additive models were used to relate habitat and static predictor variables to an effort-corrected estimate of the number of whales. Each method was used to derive a synoptic grid of density for blue, humpback, and Bryde's whales. These grids were used to explore the trade-off between model complexity and accurately capturing hot spots of species density. For humpback whales, the grids were also compared to minimum convex polygons created from mother-calf sightings in coastal surveys of breeding areas off México, Costa Rica, Panama, and Ecuador. This comparison guided the selection of the best method to produce density grids for all species.

Different metrics have been suggested for delineating critical habitat (e.g., protecting a percentage of a population, protecting areas of known occurrence, or protecting known breeding or feeding areas). We compared the results of using multiple metrics to delineate critical habitat in the final density grids for each species. These comparisons provide the basis for further management actions relative to critical habitat. First, they identify areas where further data collection efforts are needed. Second, they allow stakeholders from multiple countries to understand how specific conservation metrics produce critical habitat areas.

Conservation planning tools available for MMPAs: Assumptions, strengths and weaknesses

Sandra Pompa (Instituto de Ecología, Universidad Nacional Autónoma de México, México)

Available tools for conservation planning include ResNet, Marxan, C-Plan, ConsNet, MarxEnt, Marzone and Zonation. The choice of software tool depends on the data, the objectives, and the expected results. Three of these key tools are compared below.

ResNet³ is based on variations and extensions of software originally proposed by Margules et al. (1988). If a region is divided into a set of places (on the basis of geographical coordinates, ecological boundaries, etc.) ResNet algorithms order those places by their biodiversity content. Richness, rarity and complementarity are incorporated into these algorithms.

Among the assumptions are that a definite target is set in the form of (1) adequate representation of each *surrogate*, that is, the number of selected places in which that surrogate must be present; (2) maximum allowed area; or (3) maximum allowed cost of a proposed set of conserved places. The goal of the algorithms is to achieve the set target efficiently by selecting as few places as possible that together reach the conservation goal. In terms of accessibility and use, ResNet is offered as a free download, takes up small disk space, and is fast-running; a 1/0 database is needed.

Marxan is intended to solve a particular class of reserve-design problems in which the goal is to achieve some minimum representation of biodiversity features for the smallest possible cost. Given reasonably comprehensive data on species, habitats, and/ or other relevant biodiversity features, Marxan aims to identify the reserve system (a combination of planning units) that will meet user-defined, cost-effective biodiversity targets. One feature found in Marxan is that it employs a "boundary length modifier", which increases the continuity of reserve systems. Some of the limitations and pitfalls of Marxan are its (1) inability to deal with issues of demographic inter-connectedness; and (2) in marine systems, the presence of a biological feature does not guarantee the persistence of that feature in the absence of the surrounding ecosystem – a concept generally known as "connectivity".

C-Plan maps the options and weighs the variables for achieving an explicit conservation goal in a region, calculating and displaying information that can be used to guide conservation planning decisions (e.g., the extent to which the conservation target for any particular feature has been reached by conservation decisions made up to that point). One of the key pieces of information that

³ Margules, C. R., Nicholls, A. O. and Pressey, R. L. 1988. Selecting networks of reserves to maximise biological diversity. *Biol. Conserv.* 43, 63-76.

C-Plan calculates and displays is the irreplaceability of each site in the planning region. The irreplaceability of a site can be used as a guide to the importance of that site for achieving a regional conservation goal. The irreplaceability predictor generates an "average" site assuming each feature is spread evenly across all available sites. However, a limitation of this measure is that it reveals nothing about how many features will fail to meet their target if the site is not selected.

It is important to acknowledge that data are sometimes scarce, and sampling effort tends to be very heterogeneous, resulting in large spatial and temporal data gaps. This brings the need to try to "statistically flatten" the available data. Always bear in mind that each algorithm is nothing but a tool that will keep developing through time. Based on the data you've chosen, pick the software that best fits your conservation needs. Remember your specific conservation objectives: species, environment, migratory corridors, endemism, restricted range, and so forth. Finally, make sure your results, including all caveats, are broadcasted to policy and decision makers, and then participate in the design of the MPA and the management plan with the local communities and corresponding national and international authorities to ensure that the scientific limitations and uncertainties are taken into account.

Where do we go from here: filling gaps and building models to predict densities in unsurveyed areas, and validating predictions with new data

Kristin Kaschner (Evolutionary Biology and Ecology Lab, Albert-Ludwigs-University of Freiburg, Germany)

As discussed in Rob Williams' presentation, the recently conducted analysis of global visual line-transect surveys shows the extreme heterogeneity of survey effort distribution and illustrates the prevailing large gaps in survey coverage. These gaps amount to almost three quarters of the world's oceans. Given the vastness of the marine environment and the high effort and expenditure required, comprehensive and frequent monitoring of marine mammal species' occurrence and densities will remain patchy for the foreseeable future, even under the best circumstances.

In addition to the solutions discussed by previous speakers, I therefore propose the development of a global data repository for geo-referenced marine mammal abundance estimates. This would complement the existing OBIS-SEAMAP portal which focuses on marine mammal point occurrence records. As high-lighted earlier, it could ideally be supplemented by developing methods to standardize outputs from different monitoring or analysis techniques from variable sources, thus allowing the direct comparison of all existing information and knowledge about marine mammal abundance and occurrence within a single comprehensive framework. This could then serve as a starting point for the development of a cost-effective global strategy for optimizing data collection efforts when planning future marine

mammal monitoring schemes, including survey designs that specifically focus on randomized subsets of unsurveyed areas.

As a parallel task, statistical models that predict species occurrence or density surfaces from line transect survey data and local environmental conditions could be expanded to make inferences about cetacean densities beyond surveyed areas. Combined with environmental niche models, these techniques could be used to predict global densities of marine mammals by extrapolating the statistical relationship between observed densities and corresponding predicted habitat suitability to unsurveyed areas. The preliminary results presented in this talk are intended to illustrate the general principle, but existing models will need to be developed much further in the future. I envision an iterative process eventually embedding both gap-filling approaches: model outputs of predicted densities that would be validated and improved with newly collected monitoring data as it becomes available, and which then in turn would inform management decisions about the focus of future monitoring efforts.



Keynote 2: Marine Mammals That Have Already **Been Lost – Lessons Learned?**

Randall Reeves

Chair, IUCN SSC Cetacean Specialist Group, and Okapi Wildlife Associates, Canada

From the Society for Marine Mammalogy's currently accepted list of marine mammals of the world, five species - 1 otariid, 1 phocid, 1 cetacean, 1 sirenian, 1 mustelid - are considered extinct; the baiji's extinction represents the loss of an entire cetacean family. Although that number seems relatively small (5 of 133, or < 4%), it does not begin to represent the true state of loss. It disguises the scale of loss in terms of animal abundance and distribution as well as ecosystem function. Also, it takes no account of the infra-species genetic and morphologic diversity and adaptive behavior that are lost when geographically separate populations disappear.

Little can be learned from the extinction of the sea mink, Steller's sea cow, or even the Caribbean monk seal and Japanese sea lion, except perhaps that unregulated hunting of vulnerable endemics is a recipe for extinction.

Some lessons might be learned though from the baiji's recent demise, e.g., the importance of rigorous diagnosis of causation, the need to act swiftly and aggressively to address risk factors, and the danger of allowing protected-area designations without real management teeth to give a false sense of security. The belief that areas along the Yangtze River that had been designated and reportedly managed as "natural reserves" gave the baiji some kind of added protection from fishery impacts proved to be mere wishful thinking. As such, it contributed to complacency and helped strengthen resistance to ex situ conservation alternatives, e.g., the capture of dolphins to stock a "semi-natural reserve".

Endemism to relatively small regions increases vulnerability (for example, with all five extinctions mentioned above) although, on the positive side, it might also, at least in principle, simplify protection efforts when the species occurs in only one country. Still, this did not help the baiji, nor does it seem to be helping the vaquita.

During the question and answer session following the presentation, it was noted that Mediterranean monk seals are probably gone from the Black Sea, the last sighting there having been in the late 1990s. Also, it was suggested that the world's currently dominant political and economic regimes are not designed to protect and preserve natural ecosystems or biodiversity.



Blue whale mother and calf in proposed Costa Rica Dome High Seas Transboundary MPA Lucy Molleson

Panel 3 and 4 (combined): Using Marine Spatial Planning and Ecosystem-based Management to Address Broad Threats to Marine Mammals

Coordinator and Chair: Tundi Agardy (Sound Seas, USA)

Introduction

This combined session explored the broad scale impacts to marine mammals and how these threat analyses can inform policy makers. The panel began with a broad overview of anthropogenic impacts on marine mammals and how understanding of all threats acting cumulatively over time and often simultaneously in the same locale can be addressed within an ecosystem-based management (EBM) framework, using marine spatial planning (MSP). Panelists then reflected on their experiences of bringing scientific information to bear on pressures or threats to derive strategies for marine mammal conservation, with presentations on scientific assessments made or in process in the Caribbean and Pacific French Overseas Territories, MSP performed in Bangladesh, and Marine Bioregional Planning undertaken in Australia. Panelists also addressed MSP for effective management of marine mammals based on diverse experiences around the world.

Broad-scale impacts and the use of MPAs and MSP to advance EBM in the service of conservation

Tundi Agardy (Sound Seas, USA)

Marine ecosystem and species conservation is a complicated affair: the easiest management tools are those that focus on the benthos and more fixed species. The conservation of marine mammals must go well beyond, especially in cases of migratory species that travel great distances. Recognizing the connections between biota within an ecosystem, and between ecosystems is a necessary first step – but what can be done to maintain those connections?

Spatial management can allow us to be more comprehensive and effective. The spatial management tools: marine protected areas (MPAs), MPA networks, marine spatial planning (MSP) and the ocean zoning that may result from it can all underpin ecosystem-based management (EBM). EBM recognizes the full array of interactions within an ecosystem, allowing us to manage impacts on the ecosystem. A quick review of the tools suggests that MPAs are good at protecting benthos and resident species, while MPA networks can capture more of the ecological requirements of migratory or highly mobile species. MSP is more powerful still, since it can consider multiple threats to ecosystems over wide areas, and find ways to accommodate different uses in a way that keeps resource use sustainable.

EBM, when done successfully, allows full consideration of all components of target ecosystems, and the health and productivity of ecosystems that are interlinked to them. Marine mammals fit into this hierarchy in two ways: marine mammals "need" EBM in the sense that effective conservation requires managing human impacts not only on the species themselves, but also on the systems that support them. However, the reverse is also true: EBM "needs" marine mammals, for at least three reasons:

- Iconic marine mammals act as flagships that can generate political will to do EBM.
- Marine mammal species can act as "umbrella" species whose conservation forces the consideration of wider ecosystem elements.
- Marine mammal science can inform planners on location of critically important areas to protect using spatial management tools.

The REMMOA surveys to establish baseline knowledge on pelagic megafauna for an ecosystem-based marine planning strategy

Vincent Ridoux (Centre de Recherche sur les Mammifères Marins, Observatoire Pelagis, Université de La Rochelle-CNRS, France)

Coauthors: Olivier Van Canneyt, Ghislain Dorémus and **Sophie Laran** (Centre de Recherche sur les Mammifères Marins, Observatoire Pelagis, Université de La Rochelle-CNRS, France) and **Pierre Watremez** (Agence des aires marines protégées, France)

The REMMOA⁴ project aims to map diversity and relative abundance of marine mammals and other pelagic megafauna across all tropical regions of the French EEZ, and to identify areas of higher anthropogenic pressure. Four broad regions were defined: NW Atlantic Ocean, SW Indian Ocean, SW Pacific Ocean and French Polynesia. The multi-target survey protocol followed a standard line-transect methodology for marine mammals, sea

⁴ *REcensement des Mammifères marins et autres Mégafaunes pélagiques par Observation Aérienne* (Census of marine mammals and other pelagic megafauna by aerial survey)

turtles, large fish and human activities, and a strip transect methodology for seabirds and macro-debris. To date, NW Atlantic (16,000 km of effort), SW Indian (90,000 km of effort) and French Polynesia (99,000 km of effort) have been surveyed. The SW Pacific (90,000 km of effort) surveys are planned for November 2012 to February 2013; analyses are in progress.

The strength of the project is its potential for comparison between and within regions, as well as between years. Encounter rates were selected as a simple indicator of density. Strong contrasts were found in cetacean encounter rates, with highest values in the Mozambique Channel, the Seychelles and off French Guiana; intermediate values in the Marquesas; and lowest densities in the Caribbean, the Mascareignes (Mascarene Islands) as well as in central and southern Polynesia. Variation in cetacean densities between oligotrophic and productive areas of the oceans varied in a ratio of *c*. 1-30 for small delphinids against only *c*. 1-5 in beaked whales, illustrating the lesser sensitivity of the latter to epipelagic biological production. Hotspots of seabird densities were in the Caribbean, the Mozambique Channel, the Seychelles, the Marquesas Islands and the Tuamotu. Sea turtles were most frequently encountered in the shelf waters of French Guiana, western Madagascar and the Seychelles, but turtle densities in Polynesia were particularly low. Habitat and spatial modeling will allow the production of taxon-specific models. Their combination into a single top predator habitat model under various weighting will be made depending on taxon-specific vulnerability as well as on spatial models of anthropogenic risk.

Further steps include the completion of the survey series in 2013 and of the analyses in 2015, the incorporation of the results into marine strategic regional analyses already conducted by the Agency for MPAs and the development of a monitoring strategy. Regional cooperation, capacity building and exchanges of information with island communities are an integral part of the surveys.

Spatial planning, ecosystem-based management (EBM) and adaptation to climate change: A case study on freshwater cetaceans in waterways of the Sundarbans mangrove forest, Bangladesh

Brian D. Smith (Wildlife Conservation Society/ WCS, USA)

Coauthors: Rubaiyat Mowgli Mansur, Elisabeth Fahrni Mansur, and **Zahangir Alom** (WCS, Bangladesh)

Waterways of the Sundarbans mangrove forest are characterized by high biodiversity, including endangered Ganges River and Irrawaddy dolphins, and other species of key conservation interest. Aquatic ecology in the forest is subject to extreme pressure from a large and growing human population whose survival largely depends on the exploitation of natural resources. Altered freshwater and sediment transport regimes caused by upstream water development and climate change, including sea-level rise, are causing major changes to the ecology of the Sundarbans. These considerations point towards spatial planning (SP) and ecosystem-based management (EBM) as critical for conserving freshwater cetaceans in this ecologically complex and humanimpacted environment.

Surveys of distribution and abundance were a vital first step. Concurrent counts in all navigable waterways resulted in abundance estimates of 225 (CV = 12.6%) Ganges River dolphins and 451 (CV = 9.6%) Irrawaddy dolphins. During low-water and highwater season surveys, we collected a suite of environmental data to investigate habitat preferences, predict seasonal locations of high density occurrence, and establish a baseline for long-term monitoring. Ganges River dolphins generally occupy the northeast low-salinity portion of the forest while Irrawaddy dolphins occupy the southwest high-salinity portion with a small zone of overlap. During the high-water season, with decreasing salinity, the distribution of Ganges River dolphins expands and the distribution of Irrawaddy dolphins shrinks towards the southwest. Habitat selection models indicate that both species depend on low-salinity and channel confluences which are determined by freshwater flow (including sediments) and sea-level forcing. This makes these dolphins particularly sensitive to habitat loss due to upstream water development and climate change.

To identify key areas of conservation importance we established a dolphin sighting network among captains of nature tourism vessels. Six 5-km channel segments were identified as cetacean hotspots during more than 26,000 km of search effort conducted by the captains. The hotspots segments accounted for 49% of more than 1,000 Ganges River dolphin sightings and 23% of almost 300 of Irrawaddy dolphin sightings. These hotspot segments were consolidated into three protected areas (PAs) with the boundaries slightly altered to take into account human use and existing management infrastructure. Although the PAs cover only a relatively small area, they include key habitat where both species are most threatened by human activities.

An adaptively managed protected area network for freshwater dolphins could function as a "living laboratory" for testing adaptive responses to climate-change and provide a critical safety net for ensuring the long-term persistence of these threatened, iconic species and the ecological system upon which they depend. Freshwater dolphins integrate climate related changes from the mountains to the sea. This means that their fine-scale distribution, movement patterns, and foraging behavior can be informative for adaptive resource management. As large, mobile predators, the manner by which these freshwater dolphins satisfy their life history needs may give them particular value for identifying ecologically significant attributes for site-based protection. Cetaceans can anchor ecosystem-based initiatives for establishing protected areas especially when the animals are viewed favorably by local people, which is the case among most cultures in Asia including Bangladesh.

EBM refers to a spectrum of approaches ranging from the consideration of multiple taxa to the optimization of management strategies for all elements of an ecosystem. Probably no PAs that include cetaceans fully achieve the latter but EBM should be seen as a work in progress. A participatory strategy has been extremely helpful for helping us to move farther along the spectrum of addressing all elements of the ecosystem.

Take home lessons from our experience are:

- SP and ecosystem-based approaches are particularly relevant for protecting cetaceans in biologically diverse and highly human-impacted ecosystems.
- Cetaceans can anchor the establishment of PAs and inform SP and EBM approaches through understanding their patterns of habitat use.
- Comprehensive EBM is a tall order, but we must start some place.
- Freshwater cetaceans may provide a biological short cut for investigating and monitoring other elements of the ecosystem.
- A participatory approach is essential, especially in a densely human-populated country such as Bangladesh, to build informed constituencies and management capacity for implementing SP and EBM practices.

Marine Bioregional Planning – an ecosystem-based management approach

Chris Schweizer (Department of Sustainability, Environment, Water, Population and Communities, Australia)

Ecosystem-based management recognizes that all elements of an ecosystem are interconnected and requires that the effects of actions on different elements of an ecosystem are taken into consideration in decision-making. This avoids the cumulative impact created by making a large number of small decisions without considering the bigger picture. Marine Bioregional Planning, Australia's approach to improving the way we manage our marine environment, is one way that ecosystem-based management is being progressed.

Marine Bioregional Planning is a process to develop marine bioregional plans for five large marine regions in the Commonwealth waters in Australia, and to identify regional networks of marine reserves that will become part of Australia's National Representative System of Marine Protected Areas.

The bioregional plans themselves describe the marine environment and conservation values of each marine region, set out broad objectives for biodiversity conservation, identify regional priorities, and outline strategies and actions to address them. This includes describing marine species, key ecological features, biologically important areas and regional priorities, pressure analysis and advice. These plans present a consolidated picture of the biophysical characteristics and diversity of marine life, assisting in taking an ecosystem-based management approach to decision making under national environmental law.

Marine Bioregional Plans are developed through a process of expert input and public consultation and are formally adopted by the Environment Minister who must then have regard to them when making relevant decisions.

Summary of Discussion

There was only a brief discussion period after each speaker finished. Agardy pointed out that it was important to recognize the connections among the various components of the marine environment. Marine protected area networks are better than single MPAs for protecting migratory species; it spreads management across a wider area. Marine spatial planning (MSP) allows accommodation of multiple users and can be used for a wider range of species. It is important to understand uses and impacts and then derive a management plan that addresses the key impacts. Ecosystem-based management (EBM) recognizes the full array of interactions within an ecosystem. We manage our impacts on the ecosystem. Marine mammal conservation requires EBM and EBM also requires marine mammal science and research. Agardy noted that UNEP has published a useful guide for steps to be taken toward EBM and that more discussion on these topics would take place in Workshop 4B and Workshop 9, both of which have a focus on MSP for marine mammal conservation.



Martinique school teachers were thanked for the artwork their students contributed to celebrate the conference and the marine mammals living in the Caribbean. Photo by Agence Kréöl

Panel 5: Managing Marine Mammal Protected Areas (MMPAs) for Localized Threats and Mitigation by Spatial Protection and Other Means

Coordinator: David Mattila (International Whaling Commission (IWC) and NOAA-ONMS, USA)

Special tribute to Alexandre de Lichtervelde

Before the panel began, a special tribute was paid to scientist Alexandre de Lichtervelde (1958-2011), the first Belgian commissioner to the International Whaling Commission, who died in September. A proactive, deeply conscientious champion for healthy oceans and the environment, Alexandre impressed all those who came into contact with him for his passion and commitment to conservation. In recent years, he worked tirelessly to raise awareness for researchers, government ministries, and conservation groups of the threat to whales from ship strikes. His work was global but he had a particular love for European cetaceans and the Antarctic.

Introduction

MMPAs are numerous and diverse yet share many of the same attributes and challenges. Oil spills, ship strikes, entanglements and bycatch are all common, acute threats facing marine mammals in many MMPAs. Given these similarities, MMPA managers, administrators, and researchers can assist each other in generating ideas and common solutions through improved communication and networking. Indeed, recognition of the need for networking was a catalyst for organizing the first ICMMPA in Hawaii in March 2009 and has continued as a recurring theme in panel and workshop discussions at ICMMPA 2. As part of Panel 5, four speakers and a follow-up panel discussion focused on acute and chronic threats.

Addressing the effectiveness of management alternatives for reducing collisions between large ships and large whales in marine mammal protected areas

Scott M. Gende (National Park Service, Alaska, USA)

Coauthors: A. Noble Hendrix (R2 Resource Consultants, USA) and **Karin R. Harris-Webb** (National Park Service, USA)

Ship strikes – in particular, collisions between large ships and large whales – are a global conservation issue. Generally, management has focused on re-routing ships around whale hot spots to reduce spatial overlap. However, in many cases, such as spatial bottlenecks or when arriving into port, ships cannot be re-routed and so the management alternative is to reduce ship speed. Yet, relatively few studies have attempted to quantify empirically the impact of reducing ship speed owing to the inherent rarity of collisions and logistic difficulties in collecting data. Indeed, simulations with varying detection probability and effect size – the true yet unknown effectiveness of reducing ship speed in reducing collision probability – demonstrate that existing data streams are insufficient to evaluate management effectiveness.

Our research offers a unique opportunity to evaluate the effectiveness of reducing ship speed to reduce the probability of collisions, and may be applicable to other MMPAs. Since 2006, we have placed observers aboard large cruise ships in and near Glacier Bay National Park (Alaska, USA), a large marine mammal protected area, to record real-time encounters with humpback whales. We used nearly 900 unique ship-whale encounters to parameterize a Bayesian change-point model which demonstrated that ships traveling faster than 11.8 knots (6.1 m/s) encountered whales, on average, 114 m closer than those traveling slower than 11.8 knots.

This adds to the evidence that requiring ships to travel slower may be an effective management tool when re-routing is not an option. However, we emphasize that well-designed monitoring plans for testing management effectiveness under different conditions should be put in place in MMPAs, and that it is important to make transparent, informed decisions.

Marine mammal bycatch: how big is the problem and how can MMPAs play a leading role in its solution?

David Mattila (IWC and NOAA-ONMS, USA)

The bycatch, or entanglement, of marine mammals in passive (stationery) fishing gear, whether derelict or actively fished, is increasingly recognized as a serious source of human-caused mortality for many populations. Indeed, the development and use of scar studies have begun to give estimates of scope and impact for many populations. For instance, an ocean-wide study of North Pacific humpback whales showed entanglement rates of approximately 20 to 60%, depending on the sub-population's range, and some annual mortalities could be as high as 3 to 4%. Recognizing this, the 89 member countries of the International Whaling Commission (IWC) recently agreed that any country with whale populations and passive fishing gear in their waters likely has a problem, whether they know it or not. Entanglements have been reported for all types of passive fishing gear, and bycatch numbers are generally agreed to be severely underestimated. The IWC countries, therefore, endorsed an initiative to build capacity in order to understand and manage this issue, recognizing that prevention should be the ultimate goal.

Some MMPAs already play a leading role in prevention, usually through time or area fishery closures, which may protect certain key marine mammal habitats. However this rarely reduces the overall amount of dangerous gear in the water, but instead simply moves it elsewhere. The other general approaches to prevention are modifying or switching fishing gear and alerting marine mammals to gear in the water (e.g., visually or acoustically).

It is suggested that MMPAs may play a greater role toward solving the overall problem by actively promoting and testing the use of new, less dangerous fishing gear within their boundaries. For example, acoustic pingers appear to work for some populations of small cetaceans and switching from gillnets to fish pots or long lines has been shown to be effective in some instances. In addition, the US government has mandated the use of sinking ground lines between pots and the use of "weak links" in the gear used in some areas. The use of gear without vertical lines as markers or pick up buoys is also being given serious consideration. However, we do not yet know the effectiveness or unintended consequences of these gear changes, and so MMPAs would need to establish comprehensive monitoring programs if alternate technologies are used.

It has also been suggested that MMPAs can help with immediate management of this problem through acting as a catalyst or focal point for establishing rescue networks until a preventative solution can be found. However, there are many public misconceptions about entanglements; rescues, even by trained individuals, can be dangerous. In response to this, a second IWC workshop held in Oct. 2011 drafted principles and guidelines for safe and effective response to entanglements.

Oil spills and marine mammals: findings from the recent spill in the Gulf of Mexico

Teri Rowles (NOAA Fisheries-OPR, Marine Mammal Health and Stranding Response Program, USA)

The Deepwater Horizon Oil Spill was the largest oil spill in US history requiring a sustained response and an intense investigation to understand the impacts of the oil spill on the ecosystem including marine mammals. The Gulf is home to many species of cetaceans as well as West Indian manatees.

During the oil spill, the Southeast Marine Mammal Stranding Network responded to over 100 cetacean strandings along the northern Gulf of Mexico, collecting samples to determine exposure to oil and cause of death. In addition, photo-identification and biopsy surveys of coastal bottlenose dolphins, aerial and boat surveys of both oceanic and coastal areas, biopsy and tagging of oceanic cetaceans, and health assessments of live captured bottlenose dolphins were undertaken to assess the injuries to marine mammals during and following the oil spill. Better understanding of the potential impacts of oil and of oil spill response activities will assist MPA Managers in preparedness and planning for such emergency events in their management areas.

Marine mammal protection in México

David Gutierrez Carbonell (Comisión Nacional de Áreas Naturales Protegidas, CONANP-SEMARNAT, México)

In México, environmental laws and specifically those related to biodiversity have only been in place for one to two decades; however protection of some marine mammal species was enforced in the early 20th century. Since then, different kinds of instruments have been developed, from the establishment of protected areas to technical regulations such as the standard for whale watching activities and more recently the establishment of refuge areas to protect aquatic species, as defined by the General Law on Wildlife. In 2007, the National Commission of Protected Areas started the implementation of the Species At Risk Conservation Program (PROCER, in Spanish) with 25 action plans in process, four of them related to marine mammals: humpback and blue whales, Caribbean manatee and vaquita.

This presentation made a synthesis of Mexican experiences in the use of some of these instruments, focusing on how protected areas, with a solid management plan that takes into consideration economic and social factors, could become a robust mechanism to make whale watching a sustainable and well organized activity with an important economic benefit for the inhabitants of El Vizcaíno Biosphere Reserve.

Summary of Discussion

Following the presentations, the panel answered questions focused on three general topics: communication of existing international efforts, database and enforcement deficiencies, and the overall applicability of result and methods. For example, the group highlighted that several international efforts have been initiated to address chronic threats for marine mammals including a resolution recently passed at the International Convention for Parties (UNEP) dealing with entanglement and marine debris. Another international effort is spearheaded at the IWC which has an ongoing international database to report ship strikes (see *www.iwcoffice.org/sci_com/shipstrikes.htm*). Countries without a formal network for reporting ship strikes were encouraged to report them through the IWC database. Finally the panel was encouraged to work to increase capacity for training geared toward stranding response including for live animals.

Another general topic during the discussion focused on deficiencies in terms of enforcement as well as availability of information. For example, an issue was raised that many MMPAs exist only on paper, including but not limited to México. David Gutierrez was thanked for acknowledging that México's 65 MPAs and two refuge areas are largely "paper MPAs" but said that the Mexican government is trying to make progress to ensure enforcement. Alongside the tool of protected areas, México participates in regional protection programs for humpback whales. Progress is also being made to determine the efficacy of buyouts of fishing licenses to reduce bycatch of vaquita; the interest by fishermen in buyout is diminishing and thus other options are being explored.

Another deficiency identified is the lack of data on the efficacy of having ships use warning devices when they navigate through whale habitat. David Mattila said that the use of "alarms" on large ships is not an active area of research for ships because of logistics and he highlighted that one of the first studies on alarms with right whales demonstrated that whales were more likely to come to the surface when alarms were used, which may have the opposite effect of reducing collisions.

The discussion next turned to the applicability of results from one time to the next and the applicability of methods from one study to another. For example, if cruise ships encounter whales at night, are the model results applicable if data were collected by observers aboard the ships during the day? This is a key issue because virtually all large ships undertake some voyages at night. For the cruise ship study, observations were indeed only made during daylight hours although this spanned up to 18 hours due to the long summer days in Alaska. Nevertheless, most cruising in Alaska and in other areas of the globe occurs in the late and early hours of the day so that ports of call can be visited during the day. This is also true in Alaska except when the port of call is an area of interest, such as a national park like Glacier Bay. Nevertheless, there is no reason to assume that ship-whale encounters would be any less infrequent at night. Whether the results derived from collecting data during the day are applicable at night thus depends on the mechanism. For example, if the mechanism behind the relationship between slower ships and greater separation distance is due to whales being better able to detect and react to the ships, then we could assume that the results are applicable to ship-whale encounters at night. If, however, the relationship between speed and encounter distance is due to a captain or pilot detecting whales and taking avoidance measures, then the relationship between speed and encounter distance is contingent upon the captain detecting the whale which will be significantly reduced or impossible at night. In the Glacier Bay study, the observer gave no indication to the captain when a whale was detected and the tracks of the ship when in the presence of a whale gave no indication that the course or speed was altered in response to having a whale in proximity. Thus, the assumption is that the relationship is due to changes in whale behavior as a result of reduced ship speed and thus is applicable at night.

Further discussion on management effectiveness in Glacier Bay addressed whether management of ships in one area may have an effect on ships in another area. For example, there are a number of whale hotspots in Alaska and if port schedules for the ships are tight, slowing the ships down in some areas may result in ships going faster in other areas to make up for lost time. Thus, it is important to think holistically about management effectiveness in an area and the impact that this will have on overall conservation goals.

The question of applicability also focused on whether the techniques employed for the cruise ship study could be used to better understand entanglement and right whales. David Mattila highlighted the difficulty in understanding entanglement rates without having tagged whales and knowledge of where fishing gear is located but he acknowledged that simulations similar to those highlighted in the talk on cruise ship strikes could be applied.

Finally, a discussion occurred relative to detection and quantification of carcasses following the Deepwater Horizon Oil Spill and whether there was an explicit attempt in the damage assessment to count how many carcasses were missed. Teri Rowles acknowledged that modeling efforts are attempting to address this; it is not limited to cetaceans but also includes other marine mammals, turtles and birds. This modeling effort is important because relatively few mortalities were detected offshore; only 400 mortalities have been documented from the beginning of the spill till the present including carcasses far from the well head and in areas with both high and low levels of oiling.⁵

⁵ Further discussion on oil disasters and marine mammals occurred in Workshop 7, p 67.



Tiare Turang Holm talked about developments in Palau during Panel 6: Regional Cooperation for MMPA Scientific and Technical Networking. Photo by Philippe Robert

Panel 6: Regional Cooperation for MMPA Scientific and Technical Networking

Coordinators: Martine Bigan (Ministère de l'Ecologie, Direction de l'Eau et Biodiversité, France) and **Denis Girou** (Guadeloupe National Park, Guadeloupe)

Chair: Denis Girou (Guadeloupe National Park, Guadeloupe)

Introduction

This panel examined the role of regional cooperation between scientists and MPA practitioners from various countries working together to establish and manage protected area networks that include marine mammals. The first three presentations focused in detail on the Mediterranean and Black seas and the last expansively on the Pacific Islands. The agreements forged in these areas are helping to improve collaboration and capacity for effective MMPA design and management.

Protection of areas for cetaceans in the Mediterranean Sea – key issues, tools, possible solutions

Ana Štrbenac (State Institute for Nature Protection, Croatia)

The Mediterranean region is a biodiversity hot spot, highly susceptible to threats. It is a mostly enclosed sea, surrounded by diverse countries with 43 million coastal residents which doubles because of tourism in the summer. Some 22 cetacean species and subspecies occur, but 60% of those regularly seen are threatened and 40% are data deficient.

At least 13 European and Mediterranean agreements are relevant for cetaceans. Two main regional instruments include a network of Specially Protected Areas of Mediterranean Importance under SPA/BD Protocol of the Barcelona Convention and 18 critical habitats identified for protection by the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) under the Bonn Convention. The European Union established the NATURA 2000 ecological network. International and national NGOs are active in cetacean research and conservation.

All marine protected and managed areas in the Mediterranean cover approximately 4% of the surface. There are 38 MPAs with cetacean habitat, including one on the high seas, and a number of smaller protected areas. The bottlenose dolphin is the most common conservation objective.

MPAs for cetaceans in the Mediterranean display many weaknesses: lack of representativeness of critical habitats, lack of stakeholders' involvement, inadequate management, and lack of data on status of species and habitats. Efforts to improve the situation should focus on two parallel tasks: strengthening the position for cetacean conservation and implementation of specific measures for improvement of the marine protected areas network.

Towards a network of protected areas for Black Sea cetaceans

Alexei Birkun, Jr. (Black Sea Council for Marine Mammals, BSCMM, Ukraine)

All three Black Sea cetacean subspecies are endemic and assessed in the IUCN Red List as endangered (EN) or vulnerable (VU). The Black Sea harbor porpoise and bottlenose dolphin are EN, and the Black Sea short-beaked common dolphin is VU.

These three subspecies experienced dramatic declines in the 20th century due to mass killing that finally stopped in 1983. Currently, adverse impacts from fisheries and habitat degradation continue to affect these populations throughout their range including in the Black Sea and adjoining Azov and Marmara seas and connecting straits.

The various Black Sea states have committed to protecting cetaceans as Parties to ACCOBAMS and the Bucharest Convention. The Workshop on Black Sea Protected Areas Eligible for the Conservation and Monitoring of Marine Mammals (Istanbul, 2006) produced a list of 19 MPAs which could constitute the backbone for a regional network. This list includes coastal biosphere and nature reserves and national parks established in Bulgaria (n = 2), Georgia (1), Romania (2), Russia (1), Turkey (4), and Ukraine (9). The development of the network is stipulated as a priority action in the Conservation Plan for Black Sea Cetaceans (2006) and the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (2009). The former document also envisages creating new MPAs specialized in cetacean conservation.

The development of a network of MPAs for the conservation of Black Sea cetaceans is still in its initial phase. Moreover, the total surface area of the 19 "eligible" MPAs is less than 1% of the Black Sea taken as a whole. It is clearly not enough even to conserve known semi-resident communities of bottlenose dolphins or to protect wintering areas where harbour porpoises and common dolphins assemble in annual dense aggregations.

The situation for Black Sea cetaceans might be effectively improved if the entire Black Sea along with the Azov Sea, Marmara Sea and the straits were declared by Black Sea countries as a basin-wide cetacean sanctuary or similar regional transboundary biosphere reserve, with special emphasis on conservation of cetaceans.

Using the MedPAN network to further marine mammal conservation ...and using marine mammals to improve MPA management

Chloë Webster (MedPAN, France)

MedPAN – the network of managers of marine protected areas in the Mediterranean – is a legally independent NGO created in response to MPA management demands. The network is comprised of more than 60 MPA managers and other partners from 20 countries working in nearly 200 MPAs, most of them small and largely coastal. MedPAN undertakes common initiatives to help MPA managers to reinforce the management of their areas. The framework of MedPAN's actions is based on CBD objectives, and it is also framed by the Barcelona Convention and other Agreements (ACCOBAMS) and various European policies and tools.

This presentation explores two perspectives as a means to open discussions for recommendations. The overall aim of the presentation is to provide participants with the chance to make recommendations to MPA managers via MedPAN thus broadening the scope of work relating to marine mammals.

Various ways of using MedPAN to further marine mammal conservation are underscored. While MedPAN has been constructing its database on MPAs and updating information on the status of MPAs in the Mediterranean, opportunities have arisen to identify those MPAs that could develop their role in furthering marine mammal conservation. As the Mediterranean network of MPA managers, MedPAN provides both a platform to exchange information and experience (technical or not), and tools to improve MPA management. Even though they are not MPA managers, marine mammal scientists and conservationists are encouraged to use MedPAN. It can also be useful for decision makers, including those who are Parties to ACCOBAMS. MPA and cetacean network strategies have many common objectives and highlighting these aims can help contribute to and enhance marine mammal conservation. Of course, to be effective with conservation initiatives, it also important to move outside the realms of scientists and MPA managers to the larger world where socio-economic and political factors play the major role.

Marine mammals can also be used to reinforce MPA management throughout the network. MedPAN's current work provides MPA managers with opportunities to reinforce management efficiency. The power marine mammals can have in attracting political and social attention is either underestimated at the MPA level or given a lesser priority in view of MPA conservation objectives. Managers may also be unfamiliar with cetology for example. However, using these emblematic animals to attract attention, in justifying an MPA extension for example, or else in public awareness messages, or again to develop responsible tourism, has proven clout. Using marine mammals in such ways will benefit the marine environment at large and in turn marine mammals. Strengthening collaboration and capacity for an effective regional marine mammals protected area (MMPA) network: The Pacific Islands experience

Tiare Turang Holm (Sustainable Decisions, Palau)

Across the vast Pacific Islands region, where more than 2000 languages are spoken, there are diverse cultural values regarding marine mammals. They are alternately revered as spiritual icons, or hunted for ceremonial purposes, though in most cases hunting is considered taboo. Six countries participate in the International Whaling Commission (IWC) meetings. There is a developing history of regional collaboration for marine mammal conservation and management.

The Secretariat for the Pacific Regional Environment Programme (SPREP) and the South Pacific Whale Research Consortium (SPWRC) together with NGO partners such as IFAW, Whales Alive, WWF and WDCS have established a critical platform for establishing marine mammal sanctuaries in Pacific islands countries and territories. Successes include more than ten years of researching marine mammals across 14 countries, conservation with species recovery and science action plans, working groups and Convention on Migratory Species (CMS) agreements, a comprehensive assessment of humpback whales in Oceania, national whale sanctuaries, and capacity building and linking information to key decision making. The humpback whale population has formed the basis for marine tourism and an economic lifeline for many in islands of the South Pacific, with network implications in their transboundary migrations.

SPREP plays an important leadership role in the region for marine mammal conservation. It assisted in successfully developing a memorandum of understanding (MoU) on Pacific Cetaceans and their Habitats under the Convention on Migratory Species (CMS) which opened for signing in 2006 (thus far signed by 12 SPREP members and 6 collaborating NGOs). SPREP's marine mammal efforts date back to the early 1990s and the current Pacific Islands Whale and Dolphin Action Plan (WDAP-2012) serves as a guide to the region to achieve marine mammal conservation goals.

The WDAP has nine themes, including national, regional and international collaboration, threat reduction, ecosystem and habitat protection (including MMPAs), capacity building, education, cultural significance and value, legislation and policy, research and monitoring, and whale- and dolphin-based tourism.

Supported by SPREP, SPWRC and a range of NGOs, Pacific states have established a network of 11 marine mammal EEZ sanctuaries covering more than 18 million km². The initial impetus for creation was the failure of the South Pacific Sanctuary proposal in the IWC. When countries, mostly outside the region, opposed this, Pacific Island countries decided to declare their EEZs as sanctuaries, beginning with the Cook Islands in 2001. Sanctuary management in the region is largely based on local
needs, capacity and varying situations. The involvement of communities and different stakeholders in the planning and management process is critical. Niue, Fiji and Samoa are starting to implement the sanctuaries with MPA management plans.

Despite these successes, cetacean conservation, including science and management, has seen little investment in the region relative to the scale and diversity of the needs. More must be done to research and understand cetacean species, and to address the huge data gaps. When I attended the last ICMMPA conference on Maui, I discovered that the gaps in data were not the result of lack of cetaceans but lack of research investment.

Palau is no exception to this observation but we are now working to enhance cetacean conservation in Palau. Palau declared all its waters as marine mammal sanctuaries in 2010. Supporting national legislation was then introduced, and funding for a targeted national research project was approved. The National Council of Matriarchs called on Palau's leaders to support effective implementation of the sanctuary in March 2011. The legislation is currently undergoing revision, and in 2012 the cetacean research project will begin.

Further research and monitoring protocols are required, along with the optimization of communication to communities and decision makers, development of a sustainable marine mammal watching industry, improving IWC activities, and building capacity. These are reflective of the region's challenges, which include access to financial and technical resources, conducting further research, filling data gaps, institutionalizing monitoring, conducting effective surveillance and enforcement, linking good information to communication strategies and decision making, building emotional and economic links between cetaceans and communities, and improving engagement and participation in the IWC.

A regional approach to management provides many benefits, though there are challenges in implementing them at the national level. The role of intergovernmental and non-government organizations is crucial in implementing national and regional action plans. The involvement of communities and primary stakeholders is crucial, and economic links must be clarified. Partnerships are critical.

Summary of Discussion

The brief discussion period focused on regional cooperation, initially with MedPan's experience in the Mediterranean and then with SPREP and the CMS Cetacean MoU in the Pacific, and regional financing.

Tiare Turang Holm from Palau reported that the CMS Pacific Cetacean MoU had been a useful tool, though they have not come close to optimizing its potential. More countries in the region need to be on board. Still, it can serve as a model for other regions; it commits nations to working together.

In Palau, legislation was passed which creates a sustainable finance mechanism for Palau's protected area network. It calls for all visitors to pay into a fund solely for the management of these protected areas, which can include support for cetacean conservation. Also on a regional level, the Micronesia Challenge – to protect at least 30% of marine and 20% of terrestrial resources by 2020 – has led to collaborative work on fundraising. The target for this is USD \$18 million, of which Palau has been able to raise USD \$8 million.

Palau is planning to bring its experiences with marine conservation to Rio+20, in June 2012, although it was noted that, so far, marine issues are not yet of significantly high enough profile on the agenda of host countries. Holm answered that this was a huge opportunity and that they would be working through their national delegation and through SPREP which has helped ensure such issues are properly dealt with.

Holm also reported on Palau's marine mammal and dugong sanctuary and announced that the first phase of Palau's cetacean research project would begin in January 2012 – the result of a partnership formed with Whales Alive through Palau's participation in the ICMMPA 1 in Hawaii in 2009.



A manatee floats just beneath the surface of a mangrove creek on the bayside in the Upper Keys. Florida Keys National Marine Sanctuary Photo by Andy Collins, Papahānaumokuākea Marine National Monument, NMS/NOS/NOAA

Panel 7: Development of Marine Mammal Protected Areas (MMPAs) in the Wider Caribbean Region

Coordinator and **Chair: Alessandra Vanzella-Khouri** (UNEP Caribbean Environment Programme, Jamaica)

Introduction, Objectives and Summary

The marine mammal fauna of the Wider Caribbean Region is diverse, with at least 32 species recorded, and offers significant ecological, aesthetic and economic value to the countries and territories of the region. However, data are scarce concerning most cetacean and manatee populations in the region. It is one of only two regions to have seen the extinction of a marine species in 250 years, the Caribbean monk seal. Hunting still occurs in some areas, and threats such as pollution and noise are largely uninvestigated. It is one of the busiest shipping areas in the world, along with being a biodiversity hotspot that depends heavily on tourism. Climate change impacts heavily on food webs, ecosystem productivity and oceanographic connectivity. The region is starting to recognise the need for conservation efforts including MMPAs.

A specific Marine Mammal Action Plan (MMAP) was adopted in 2008 under the framework of UNEP's Caribbean Environment Programme, after a long consultation process involving scientists, NGOs, and government representatives. Among the activities being pursued as part of the MMAP are training workshops on stranding response and networking, whale- and dolphin-watch training, and implementation of a regional manatee conservation plan.

Despite the large number of MPAs in the Wider Caribbean region (over 300), less than a handful have been established for the conservation of marine mammals. Nonetheless, the few that exist are of major ecological significance (e.g., the Marine Mammal Sanctuary of the Dominican Republic, the most important breeding and nursing grounds for the North Atlantic population of humpbacks) or are pioneers in the development of "sister sanctuary arrangements" between protected areas thousands of miles apart protecting endangered migratory marine mammal species on both ends of its range. Regional success in managing and conserving marine mammals depends ultimately on effective regional cooperation; the commitment of the countries of the region; and the implementation of conservation priorities, standards, and strategies for marine mammal conservation and education, some of which are discussed in this panel. From a regional treaty to an action plan to conservation efforts at the national level

Hélène Souan (SPAW – Regional Activity Centre, Guadeloupe)

The Protocol on Specially Protected Areas and Wildlife (SPAW) of the UNEP Cartagena Convention aims to protect and manage sustainably marine and coastal biodiversity in the Wider Caribbean. Among species of particular concern, marine mammals represent a major challenge, and the Contracting Parties to the SPAW Protocol have adopted in 2008 a dedicated Action Plan that foresees the development of appropriate actions for the conservation of marine mammals, from the strengthening of stranding networks to the control of pollutants.

One of the key goals is the implementation of appropriate spatial protection (e.g., sanctuaries) with important effort placed on cooperation among countries to ensure ecological coherence of the actions. Crucial progress has been made recently under this framework, with several national initiatives towards the establishment of marine mammal sanctuaries, or the reinforcement of management in existing sanctuaries. Bilateral partnerships have also been concluded, or are about to be, in order to promote common actions and exchanges between the sanctuaries' management teams.

The Marine Mammal Sanctuary for the Dominican Republic: 25 years of learning by doing

Oswaldo Vásquez (Advisor, Minister of Environment and Natural Resources of the Dominican Republic; Asesoría Ambiental y Tecnología Maritima – Atemar Eirl, Dominican Republic)

In 1986 Silver Bank became one of the first sanctuaries in the world to be created for conservation purposes. The Indian Ocean sanctuary was created for management purposes before Silver Bank, but Silver Bank was created for conservation. When it was created, the concepts of a sanctuary and an exclusive economic zone (EEZ) were new concepts, and the legislation was later modified to bring it into line with them. Silver Bank was first discovered in 1973, and is unique because it has a long chain of coral reefs which makes navigation difficult.

The sanctuary is home to representatives of all the marine species in the Dominican Republic, including humpback whales and two species of dolphins. Pilot whales and sperm whales are also sighted.

Part of the function of the sanctuary has been to conduct sophisticated research, including environmental and DNA studies and population studies. Twenty years ago, researchers in the North Atlantic did the largest study on humpback whales which had ever been conducted to that point, involving seven countries and 42 scientists. The study taught us a little about distribution, behavior in the winter, the relationship between the mother and calf, and mating behavior. We did a follow-up study ten years later to try to establish North Atlantic population numbers.

At present, we have issued 42 whale watching licenses. We have also created a national whale catalog based on photo ID and DNA studies.

The humpback whale population for the North Atlantic was initially established at 1517, but now it is close to 14,000. They are doing very well at the moment, with a growth rate of 2.3% per year, but they are still far from reaching the original population. This data is sometimes used to attempt to justify hunting.

We have been carrying out tagging operations on the whales to track their movements, and also to establish the level of noise in the area and how this affects the distribution of the population.

We have a number of issues to deal with, such as entanglement, ship strikes, and climate change. However, we are currently revising the legislation and will soon have a management plan. We are creating the Marine Mammal Commission of the Dominican Republic. The Dominican Republic is also a member of the IWC, where it will continue fighting for whale conservation. Before we joined the IWC, we established in law that we were not a whaling country.

The Agoa Sanctuary for the French Antilles

Nicolas Maslach (Agoa Sanctuary, St-Barthélemy)

Agoa⁶ is the first sanctuary for marine mammals in the French West Indies, i.e., the territorial waters and exclusive economic zone (EEZ) of Guadeloupe, Martinique, St-Martin and St-Barthélemy. It was created on 5 October 2010. With an area of 138,000 km², Agoa will make it possible to reinforce the protection of emblematic yet threatened species, such as sperm, humpback and other whales and dolphins, to sustainably manage their habitats and to ensure that they are considered in the development of human activities.

With the declaration of the sanctuary, France and the French West Indies communities have demonstrated their commitment by the following actions:

- A strong involvement of the local authorities and the French State in the governance of the Agoa Sanctuary. This structure is competent to propose protection and conservation measures for species and their habitats in the French Antilles EEZ, particularly with regard to the new legislation for marine mammal protection in Agoa created on July 1st, 2011. This legislation forbids destruction, removal, intentional capture and harassment of marine mammals, as well as habitat degradation. In 2012, regulations on safe distances for whale watching vessels will be developed.
- The establishment of human, technical and financial resources for the governance of the sanctuary, to improve scientific knowledge and organization of awareness among sea users and the general public.
- The provision of means to monitor the sanctuary as part of the "Action of the State at Sea".

Moreover, in view of the community issues in conservation and management of marine mammals in the Caribbean, France has undertaken to implement a cooperative strategy (as recommended in the Marine Mammal Action Plan adopted at the Conference of Parties to the SPAW Protocol in 2008) through the SPAW-RAC (Specially Protected Areas and Wildlife – Regional Activity Center) on behalf of the United Nations Environment Programme (UNEP) and the French MPA Agency (AAMP). This will facilitate the management of marine mammal migration corridors and protected areas for marine wildlife populations common to several countries. The ICMMPA 2 has provided a great opportunity to take further steps toward these important goals.

To this end, several countries have demonstrated their commitment to this process at ICMMPA 2, namely the Dominican Republic, the Netherlands for the Dutch Antilles, and the USA for Stellwagen Bank, which are establishing "twinning" partnerships with the Agoa Sanctuary. Another result of this cooperative approach will be the establishment in 2012 of a scientific protocol on observation and identification of marine mammals in the EEZ of the French Antilles, the Netherlands Antilles and Anguilla in the Lesser Antilles.

In conclusion, the studies conducted so far in the drafting process of the management plan of the Agoa Sanctuary indicate that the issues are:

- *Related to survival of the animals:* collisions, illnesses caused by stress or contaminants, entanglement and ingestion of macro-waste, noise pollution and other threats that have an effect on marine mammals;
- *Related to animal growth:* inadequate nutrition due to a dietary deficiency or excessive energy expenditure linked to repetitive disturbance (e.g., high levels of vessel traffic and whale watching), dependence on depredation (e.g., on fish in nets or on lines), or avoidance of feeding areas;
- Related to reproduction and fertility: potential for disease, disturbance, contamination by pollutants and chemical compounds that can affect day-to-day energy

requirements and ultimately impact age at maturity or reduce reproductive success; and

• *Related to habitat issues:* threats of coastal development and marine pollution.

Maintaining socio-economic interests is also an important issue for the economy of the French Antilles and the representatives of these communities. This component must be included in the choice of governance for the Agoa Sanctuary. With socioeconomic considerations incorporated into the framework of consultative and participatory governance, management measures on area and species conservation can be implemented and accepted by all.

Towards a sanctuary for the Dutch Caribbean: A partnership effort

Paul Hoetjes (Dutch Ministry of Economic Affairs, Agriculture and Innovation, Bonaire)

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The Dutch islands in the Caribbean agreed in 2009 that since fish stocks and other marine biodiversity are not bound by borders, the EEZ waters should be managed jointly by all islands, regardless of their separate political status within the Kingdom of the Netherlands. Triggered by the declaration of intent by France to establish its Agoa marine mammal sanctuary and following the adoption of the Marine Mammal Action Plan (MMAP) by the Parties to the SPAW Protocol, the Dutch islands also agreed that the management of the EEZ should include the designation of the area in its entirety as a marine mammal sanctuary, connecting with the French Agoa initiative.

After the dissolution of the Netherlands Antilles in 2010 and the accession of the smallest islands to The Netherlands, The Dutch Ministry of Economic Affairs, Agriculture and Innovation commissioned the Dutch Institute for Marine Resource and Ecosystem Studies (IMARES) to study how this marine mammal sanctuary designation could best be accomplished. IMARES reviewed the existing records of marine mammal species present in the Dutch waters, resulting in a couple of publications including a presentation at the IWC Scientific Committee meeting in 2011. Meanwhile a Committee for the Marine Biodiversity and Fisheries Management for the Dutch EEZ was formed and met for the first time in October. The Committee meeting reaffirmed the intent to establish a Dutch Caribbean marine mammal sanctuary.

A multi-partner program to survey the marine mammals in French, Dutch and UK waters was recently proposed to the EU for funding by a partnership of the SPAW-RAC; the French MPA Agency; the Dutch Ministry of Economic Affairs, Agriculture and Innovation; IMARES; Anguilla; and IFAW. Even if EU funding is not obtained, both France and the Netherlands have committed to proceed with joint marine mammal surveys. It is hoped that the designation of the Dutch Caribbean waters as a marine mammal sanctuary may be realized in 2012. In the lead up to the formal designation of the sanctuary, the Southern Caribbean Cetacean Network (SCCN) has been set up, and a Dutch Caribbean Stranding Workshop was held. All marine mammals are already legally protected. Fishing practices are limited and controlled. The sanctuary will provide focus to initiate distribution and abundance studies, and provide greater habitat protection.

Building capacity and networking of marine protected areas: A platform for the conservation of marine mammals in the Wider Caribbean

Alessandra Vanzella-Khouri (UNEP-Caribbean Environment Programme, Jamaica)

The Wider Caribbean Region encompasses 39 different political entities bordering the Caribbean Sea, Gulf of Mexico, and adjacent Atlantic Ocean. This includes 13 island nations, 12 continental nations, and 14 territories belonging to France, the UK, the United States, and the Netherlands. With so little international waters and so many shared boundary areas, the need is great for coordination between and among nations. Yet there are four official languages (Spanish, French, English, and Dutch), two legal systems (common and civil), wide economic disparities, and numerous socio-economic and environmental issues held in common. This is one of the busiest shipping areas in the world, with traffic from oil tankers, cruise ships, and cargo vessels in addition to smaller fishing, recreational, and transport vessels. It is also a biodiversity hotspot and thus there is the potential for numerous conflicts between human activities and the preservation of wild species and natural ecosystems.

There are more than 300 marine protected areas (MPAs) established in the Wider Caribbean but less than 10% are considered effectively managed. The main issues include inadequate design, planning, and enforcement; insufficient financial resources; insufficient capacity in the form of trained personnel; and lack of political will. In 1981, many governments in the region adopted an environmental agreement under the UNEP Regional Seas Programme and, in 1983, the Cartagena Convention provided an overall framework for further environmental agreements. Most notable in the present context is the Specially Protected Areas and Wildlife (SPAW) Protocol (adopted 1990, entered into force 2000) which calls on signatory governments to establish, manage, and strengthen MPAs and MPA networks and to protect listed species (Annex 2 includes 32 species of marine mammals). In recognition of the value of better communication and collaboration among MPAs and their staffs, the Caribbean Marine Protected Areas Management Network and Forum (CaMPAM) partnership was born in 1997. This network maintains a listserv (>300 members) and a regional MPA database, provides small grants to support MPA strengthening and initiatives, and facilitates comprehensive training and information-exchange efforts.

CaMPAM provides a useful platform for the implementation of marine mammal conservation activities through building capacity in MPAs, strengthening management effectiveness, and promoting policy formulation and good governance. Currently, in response to the commitment made by many countries around the world to establish national MPA systems and other management measures to ensure the protection of their coastal and marine areas, CaMPAM offers to the region its experience and financial resources to advance the implementation of these commitments.

Summary of Discussion

Following the panel presentations, the limited time left for discussion focused on the clarification of a number of points. The central role of the SPAW Protocol was stressed as it is the only regional legally-binding agreement on biodiversity in the Caribbean. In terms of marine mammals, the Regional Activity Center of the SPAW Protocol (SPAW-RAC) has convened three sub-regional stranding workshops. In Oct. 2011, it helped organize a workshop in Panama on best practices for whale watching activities; the resulting whale watching guidelines are being presented to the Parties.

Concern was expressed about México not having signed the SPAW Protocol and how collaborations could be conducted. It was noted that efforts are underway to promote the Mexican government to become a Contracting Party to the Protocol which will be very beneficial for the country's Caribbean marine resources management. There was also confusion about the participation of NGOs in the Protocol if a country were not a member. The SPAW Protocol does not prevent NGOs from participating in projects, regardless of the country. NGOs and experts also participate in the SPAW Scientific and Technical Advisory Committee (STAC); however, final decisions are only made by the Parties. For the marine mammal watching workshop there were participants from all around the Caribbean, including non-Parties.

Keynote 3: The Legal Regime Relating to Marine Protected Areas on the High Seas for Marine Mammal Protection

Christophe Lefèbvre

IUCN Global Ocean Councilor; French Marine Protected Areas Agency, France

The United Nations Convention on the Law of the Sea (UNCLOS) defines the legal framework in which all ocean and sea related activities must be carried out. Any activity affecting marine biological diversity beyond areas under national jurisdiction must be carried out in accordance with the principles of this international law. As a consequence, except for a general principle to protect and preserve the marine environment (article 192 and subsequent articles), the Convention only governs the high seas in a fragmented way: mineral resources in the seabed and below the seabed are designated the common heritage of mankind while elements of the marine biodiversity keep the status of *res nullius* and can therefore be freely appropriated.

The creation of marine protected areas to protect the biodiversity of the high seas requires an international legal framework to come under UNCLOS rather than the Convention on Biological Diversity (Article 22 of the CBD). However, these two conventions do not oppose each other but are complementary.

To identify marine areas worldwide that meet the criteria for ecologically or biologically significant areas (EBSAs), the IUCN instigated the Global Ocean Biodiversity Initiative (GOBI) in 2010, notably aimed at developing international scientific cooperation to promote a reliable, shared database for the EBSAs and to allow the CBD to draw up a world list of EBSAs as a necessary tool for marine spatial planning on the high seas. This identification meets the CBD objective of providing global protection for deep sea biodiversity. It can then be used to propose recognition of the marine protected areas to UNCLOS, as part of its institutional responsibilities.

Many countries consider that to protect the oceans, it is sufficient to act within the Regional Fisheries Organizations (RFOs), and improve the cooperation and coordination procedures between the various international organizations concerned (FAO, IMO, ISBA, UNESCO/IOC, UNEP). While the protection of the marine environment with respect to the exploitation of living marine resources in areas of the high seas comes under the responsibility of the RFOs, their scientific committees do not have a sufficient cross-sectoral vision to be recognized as *ad hoc* bodies for the MPAs. In the North Atlantic, the role of scientific validation prior to the international political validation to create an MPA on the high seas can be assigned to the International Council for the Exploration of the Sea (ICES), but other regions do not have such a tool.

The creation of high seas MPAs is based on key steps to be implemented within the international institutional system:

- Scientific assessment and its acknowledgement by the CBD, of the biodiversity, justifying their one-off creation.
- Commitment from the parties and users concerned, in a cross-sectoral approach.
- Setting up of decision-making processes and mechanisms by the United Nations within the UNCLOS framework.
- Implementation and management control of MPAs within an appropriate international system.

We must look for complementary aspects and synergies between these and other tools and strategies in order to gain acceptance for high seas MPAs in the international legal system.



Gray whale breaching in El Vizcaíno Biosphere Reserve in México. Photo by Steven Swartz, Office of Protected Resources, NMFS/NOAA

Keynote 4: Thinking Big–But Not Forgetting Small. The ICMMPA 2 "Take Home" Vision

Erich Hoyt

Research Fellow and Global MPA Programme Head Whale and Dolphin Conservation Society, UK⁷



Erich Hoyt provided a closing keynote presentation juxtaposing the great success of gray whale habitat conservation with the desperate efforts to save the currently most endangered marine mammal, the vaquita. Photo by Giuseppe Notarbartolo di Sciara This is the story of the gray whale and the vaquita – two marine mammals, one breeding, and the other living year-round off Baja California. The 35-tonne, high profile, wide-ranging gray whale has little in common with the small, low profile, geographically-restricted vaquita. The gray whale was the first whale to be studied and watched commercially in the wild, and the first ever marine mammal to have a marine protected area designated for it, the 1972 Ojo de Liebre Refuge which later became part of the network of lagoons designated as El Vizcaíno Biosphere Reserve. For the vaquita, the 1993 designation of a national biosphere reserve aimed to protect this cryptic, critically endangered porpoise ($n \ge 245$ in 2008, decreasing ~57% since 1997). Yet the species continues to decline because of gillnet fishing for shrimp and finfish within the reserve and even occasionally within the more restricted highly protected Vaquita Refuge. An estimated 700 artisanal gillnetters still operate throughout the vaquita's distribution range.

The gray whale embodies the themes of the first two ICMMPA conferences and is a success story. The gray whale became an endangered species in the late 19th Century after the discovery of its lagoon breeding habitat by whalers made it easy pickings. Saving the gray whale was a matter of stopping the whaling in the lagoons and along the migratory routes and keeping the lagoons as protected isolated ecosystems. The gray whale inspired networking of the Mexican MPA systems and later the US and California state sanctuaries. The gray whale is also a pioneering whale when it comes to climate change, with one bold gray whale having recently navigated the ice-free Northwest Passage en route to Israel, setting a distance record of at least 21,000 km. Marine mammal researchers and climate specialists wonder if this is a sign of things to come.

As scientists, managers, and conservationists, we need to think big and outside the box in terms of creating, linking and managing MPAs in the face of not only climate change, but also uncertainties regarding species data across the open ocean, emerging technologies both for and against conservation, and the state of the world economy. Despite the negatives, there are many positive signs in the collaborative work by the Global Ocean Biodiversity Initiative (GOBI) and High Seas Alliance (HSA), the latest developments facilitating offshore monitoring and enforcement, as well as the networks that have emerged in the Caribbean, northeast South America and among the river dolphin specialists from eight countries in South America plus Asia.

Nevertheless, we are faced with difficult problems to solve, such as the battle for effective habitat protection for the vaquita. Since the baiji went extinct in 2007, the vaquita is the marine mammal species voted "most likely not to succeed". The vaquita story touches on the challenges and concerns of ICMMPA 2 in Martinique – an endangered species in this case living in a protected productive ecosystem in the Upper Gulf but endangered by outside forces beyond the control of marine mammal scientists and managers. In terms of a campaign to try to save it, the vaquita was rejected as not glamorous enough by the *Grupo de los Cien* that was part of the national and international movement that stopped Mitsubishi's salt works expansion in the protected gray whale habitat of San Ignacio Lagoon in 2000. Every species needs its champion but it may take an inspired *grupo de los millónes* to rescue the vaquita.

A transcript of this talk is available. Contact: erich.hoyt@me.com



Monk seals. Hawaii, Papahānaumokuākea Marine National Monument. Photo by Paulo Maurin, NOAA Coral Reef Conservation Program

Workshop 1: Monk Seal Conservation Issues

Convener and **Chair: Giuseppe Notarbartolo di Sciara** (Tethys Research Institute, Italy)

Rapporteur: Charles Littnan (NOAA Fisheries, USA)

Participants: Pablo Fernández de Larrinoa, Lenie 't Hart, Cem Orkun Kıraç, Charles Littnan, Hamady Ould Mohamed, Giuseppe Notarbartolo di Sciara, Vangelis Paravas, Rosa Pires, Eleni Tryfon

Introduction and Objectives

The purpose of this workshop was to seize the opportunity for an update on the status of both monk seal species within their respective ranges, but in particular to explore ways in which marine protected areas (MPAs) can be used to protect these critically endangered species. The conditions under which monk seals survive vary greatly not only between Hawaii and the Mediterranean/North Atlantic, but also in the different localities where the animals remain within each species' range. Accordingly, the tools to address the different pressures affecting monk seal status include, but are not limited to, the establishment of protected areas and the application of these tools varies greatly between the many programs.

Presentations

Supporting the peaceful coexistence between human communities and monk seals in Greece

Giuseppe Notarbartolo di Sciara

(Tethys Research Institute, Italy)

Coexistence between humans and monk seals in Greece is nowhere peaceful. In these communities – the economies of which are in part based on small-scale artisanal fisheries – seals that occasionally damage catch and fishing gear are perceived as vermin. Although damages are economically small, together with more serious sources of hardship they may be perceived as intolerable.

A study will take place in 2011-2012 in Greece (the country hosting half of the remaining Mediterranean monk seals), supported by the Prince Albert II of Monaco Foundation, in a location where human communities coexist with breeding nuclei of monk seals. The study will assess the feasibility of the implementation of a multi-year model project having the goal of demonstrating in practice that the peaceful coexistence between local human communities and Mediterranean monk seals is not only possible, but, under proper conditions, even advantageous. This would create a precedent that would help to make the perspective of coexistence with monk seals attractive and persuasive to other Mediterranean communities having similar relationships with these endangered pinnipeds.

Monk seal protection on the Saharan coast

Pablo Fernández de Larrinoa (Mediterranean Monk Seal Conservation Program in Cap Blanc, Mauritania/Morocco and CBD-Habitat Foundation, Spain) and Hamady Ould Mohamed (CBD-Habitat Foundation, Spain)

One of the main challenges to protecting Mediterranean monk seals may be how to determine which are the appropriate areas to be protected. This action implies the protection of diverse monk seal critical habitats, such as breeding places, foraging areas, and mating areas. These critical habitats are very often completely or partially unknown and may prevent an effective design or execution of protection measures. On the Saharan coast, several non-invasive methodologies have been developed to identify these critical habitats in order to evaluate established protection measures and to develop new ones. Among these tools, satellite tracking and phototrap cameras have an important role.

According to the experience developed on the Saharan coast of Cap Blanc peninsula, regulations needed for effective protection of monk seals should include strict elimination of human disturbance in breeding places and the vicinity. On the other hand, protection measures need to be accompanied by social compensation measures to prevent negative attitudes from fishermen that can result in direct persecution of monk seals.

Marine protected areas as a tool for Hawaiian monk seal recovery

Charles Littnan (Hawaiian Monk Seal Research Program, NOAA Fisheries, Pacific Island Fisheries Science Center, Hawaii, USA)

With a declining population of approximately 1100 seals, Hawaiian monk seals are on the brink of extinction. The population can be divided regionally with most monk seals residing in the remote Northwestern Hawaiian Islands (NWHI) where the decline is approximately 4%/yr, whereas relatively fewer seals currently occupy the main Hawaiian Islands (MHI). The MHI population is increasing at an estimated 6.5% per year.

These trends underscore the National Marine Fisheries Service's (NMFS) urgency to mitigate the NWHI decline while devoting conservation efforts to foster population growth in the MHI, where documented threats including fishery interactions, direct killing, and disease could undo the current fragile positive trend. NMFS has proposed a large-scale plan to improve chronic poor

juvenile survival in the NWHI, manage the current growth in the MHI and preserve the population's reproductive potential overall.

Marine protected areas may play a key role in the success or failure of recovery efforts for the monk seal. The Papahānaumokuākea Marine National Monument (PMNM) protects the natural and cultural resources in the NWHI, including monk seals; however, some of the actions that have been proposed to assist in monk seal recovery might be viewed as either supporting or inconsistent with the PMNM's ecosystem management goals, depending on the interpretation or prioritization of those goals. In the MHI, habitat protection including critical habitat designation and MPAs could play important roles in protecting and aiding the recovery of monk seals in the future.

MPAs have a role in the recovery of Hawaiian monk seals but there are difficult ecological, cultural, and other factors to consider in their application.

Mediterranean monk seal (Monachus monachus) and marine protected areas in Greece

Eleni Tryfon (Nature Management Section, Ministry for the Environment, Energy and Climate Change, Greece)

Monachus monachus is widely distributed in Greece which hosts at least one third of the world population of the species.

For the conservation of the species, the National Marine Park of Alonissos – Northern Sporades was established in 1992, covering 2265 km². It is estimated that the park hosts approximately 30% of the known Greek population of the monk seal. The designation of two new marine parks, inhabited by an additional 40% of the known population of the species, is at the final stages of procedure. However, the process of MPA designation has been slow.

The National Marine Park of Alonissos – Northern Sporades has been managed since 2003 by a management body, supported by an advisory board on which central and local competent authorities, local stakeholders and NGOs are represented. The management body has to face a number of challenges. Most prominent among them are: enactment and application of a local management plan for the species, conflict with local interests, and financing and creation of a network of MPAs in Greece.

Mediterranean monk seals: Are marine protected areas the panacea for the conservation of the species in Greek seas?

Vangelis Paravas (MOm/Hellenic Society for the Study and Protection of the Monk Seal, Greece)

Greek seas currently host the largest Mediterranean monk seal population throughout the species' range. Despite their critically

endangered status, monk seals are still widely distributed across the insular and mainland coastline of the country. However the species is facing substantial anthropogenic pressures and threats, such as habitat destruction and human-related mortality.

Conservation and research initiatives carried out during the past three decades have been critical for ensuring the viability of the species in the eastern Mediterranean Sea. These efforts, predominantly by NGOs, have been focusing on ecological research on the species, promoting relevant legislation to mitigate the alarming decline of its populations, demanding the strict measures necessary to face direct and indirect threats, and implementing essential *in situ* conservation actions.

The current status of Mediterranean monk seal conservation in Greece is stemming from a double-axis approach, based on the establishment and operation of MPAs, as well as on the implementation of "horizontal" – on a national scale – conservation measures. Both approaches have their successes and strengths, but also their defects and weaknesses. In principle their results act reciprocally to each other; nevertheless their successful implementation is hindered by numerous ecological, but also socio-economic factors. This presentation described the Greek experience, as well as the strategy and the rationale behind the efforts aiming at the preservation of the most endangered marine mammal in the European Union.

Rehabilitation of Mediterranean monk seals (Monachus monachus) as part of an integrated approach to its survival

Lenie 't Hart (Seal Rehabilitation and Research Centre, The Netherlands)

The habitat of monk seals covers a diverse range of countries which poses different challenges in order to be able to make the rehabilitation effort a success. The rehabilitation process for monk seals is not an easy one, but external factors complicate matters even further. Threats exist such as drowning through entanglement, disturbances and even intentional killing. The establishment of protected areas is one of the necessary requirements in addition to the rehabilitation process. After the seal is released from the rehabilitation facility it needs an area where it can survive with as few threats as possible. Next to protected areas, support from the local community needs to be enhanced with regard to the survival needs of the species. Especially in developing countries this can be accomplished through education and integration with programs that improve the quality of life for the local people.

The case of Mauritania, where rehabilitation, protection and the construction of a hospital for the fishing community was integrated, proved to be essential for the success of the rehabilitation program and the seals' survival after release. At the same time it fulfilled a moral obligation towards the people living close to the seals.

In this way the individual monk seal undergoing rehabilitation acts as an ambassador to generate support for the protection of the species in general.

The case study of the Desertas Islands Nature Reserve – A home for the Mediterranean monk seal, Monachus monachus

Rosa Pires (Parque Natural da Madeira Service, Madeira)

In 1988, the Mediterranean monk seal was near extinction in Portugal. The last colony of 6-8 individuals, resident on the Desertas Islands (Madeira Archipelago), was facing unsustainable fishing pressure (using gillnets and explosives intensively) and fishermen's hostility. It was urgent to protect the monk seal and its habitat. But there was a big problem to create an MPA on the Desertas Islands – the socio-economic situation of the fishermen.

To deal with this situation, an awareness campaign was implemented directed to the fishermen, and the MPA, created in 1990, designated an integrated area where controlled fishing was allowed. As fishing nets were forbidden, alternative fishing instruments were offered to the fishermen. Since then, the main strategy to achieve effective protection of the MPA has included enforcement and environmental education. As a result, the monk seal population recovered (today there are 30-40 individuals), as did other fauna and flora species. Moreover there is huge support from Madeira's citizens.

This presentation focused on the strategy followed in the establishment of the reserve which integrated social and economic concerns. Such an approach was the key to the success of the project.

Conservation of the Mediterranean monk seal Monachus monachus in Turkey and the role of coastal and marine protected areas

Cem Orkun Kıraç (SAD-AFAG, Underwater Research Society – Mediterranean Seal Research Group, Turkey)

The historical distribution range of the Mediterranean monk seal, *Monachus monachus* (Hermann, 1779), covered the whole of the Turkish coasts of approximately 8500 km with the only uncertainty being along the eastern Turkish Black Sea coast. Today, the patchy distribution of the species in the country mainly extends along the Turkish Aegean and Mediterranean coasts with a total population of around 100 individuals. The species exists very sparsely in the Sea of Marmara and is believed extinct along the Black Sea coasts of Turkey with the last reliable sighting record in 1997. Currently, the most important threat against the species is habitat degradation due to coastal development projects including new road construction and housing. Other important threats include pup and juvenile deaths due to entanglement in set-nets resulting in drowning and the disturbance of seals in caves by intruding divers and excursion boats locally in tourism zones. The deliberate killings of seals by artisanal fishermen have been rarely observed in the last two decades. Therefore, the habitat loss of the wild coasts, as the only irreversible process among all the threats, is regarded as the major threat in the country.

Establishment of MPAs is the pre-requisite for the conservation of the Mediterranean seal. However, without complete management plans, MPA practices will not effectively function for the conservation of the species and its habitat. Integrated Coastal and Marine Management (ICMM) planning plays, therefore, a crucial role for effective habitat protection. There are ten special environmental protection areas (SEPAs), eight national parks (NPs), nine nature reserves and five Ramsar sites along Turkish coasts, which constitutes 4% of the marine area and around 18% of whole coastline. Only Göksu SEPA is known to have an approved management plan. Selection criteria for new MPAs should be set up to expand MPAs, and ICMM planning should be completed for all the coastal protected areas. There are successful implementation examples of coastal and marine management practices in the country, and the national background, the know-how and scientific data are available for setting up selection criteria and ICMM design, based on the experiences gained.

Summary of Discussion

Each program shared its collective experience on the development and implementation of MPAs for monk seal conservation. All programs agreed on the importance of MPAs but each group had different visions of their application. Greek representatives believed that MPAs were important but greater "horizontal" measures were essential to make recovery efforts more effective. Programs working on the Atlantic populations had extremely positive results with the implementation and enforcement of regulations of marine and coastal protected areas. These programs highlighted the successful inclusion of local communities and increases in local monk seal populations. In Turkey the experience has been that MPAs will not function effectively without integrated coastal and marine management planning. In general, management and protection of these diversified PAs are insufficient, although there are successful examples of PA management practices in the country. Finally, the bulk of the Hawaiian monk seal population and its habitat in the Northwest Hawaiian Islands has been protected by the establishment of the Papahānaumokuākea Marine National Monument, but there are concerns that the bureaucracy created to manage this area may obstruct critical enhancement activities in the future. The recently established population of seals in the main Hawaiian Islands benefit from MPAs that have been established for other reasons; however, there is some concern about potential negative consequences of establishing any protected areas specifically for the species.

Despite great differences in population trends, threats, and conservation strategies across the genus, participants identified three shared issues of concern regarding their efforts to recover monk seal species. First is that actively engaging local communities is critical for each project's success and is necessary to achieve long-term recovery goals. Only by understanding the needs of communities, finding shared goals, and identifying creative solutions, can we create the culture of co-existence necessary to ensure the persistence of these species.

The final two issues are closely linked and, at times, difficult to separate. Increased and sustained funding and greater action and support by government agencies are essential to complete the numerous ongoing and planned initiatives to protect habitats, increase seal survival, and build partnerships with key stakeholders. A number of ideas were shared on how potentially to influence government action and funding. While the group did not reach consensus on a particular strategy, it was acknowledged that it would require efforts on both international and local scales and would vary based on the needs of the individual programs.

Recommendations from Workshop 1

Workshop 1 **recommends** that the ICMMPA Steering Committee works to facilitate the following three actions for monk seal recovery:

Monk seals are threatened by some activities of particular marine and coastal users such as fishermen and coastal developers. The Conference **recommends** that a group of monk seal scientists, managers and advocates be established to achieve two goals. First, to work with these users to find common values and solutions to the problems faced by these users and monk seals. This can be achieved by adapting relevant successful cooperative agreements that have been developed between these users and conservationists around the world to solve the shared problems. And, second, to raise awareness, understanding and motivation by the public to apply these solutions to saving monk seals, by encouraging governments to fulfill their commitments and obligations to act on behalf of monk seals, these users and healthier environments.

This Conference acknowledges the numerous ongoing efforts to engage local communities, in particular fishing communities, in monk seal conservation. We **commend** and **encourage** the continuation and expansion of these activities and **recommend** that the appropriate attention is given to social and economic components of conservation solutions.

The Conference acknowledges the extensive research and recovery initiatives being undertaken at current funding levels and realizes that financial support for projects will likely diminish during these economic times. However, this Conference **strongly urges** that appropriate and sustained funding be provided to accomplish the recovery needs for these critically endangered species.

Workshop 2: River Dolphin, Estuary, and Coastal Dolphin Conservation

Coordinators: Fernando Trujillo (Fundación Omacha, Colombia), **Erich Hoyt** (Whale and Dolphin Conservation Society, United Kingdom), **Miguel Iñíguez** (Fundación Cethus and Whale and Dolphin Conservation Society, Argentina)

Chair: Fernando Trujillo (Fundación Omacha, Colombia)

Rapporteur: Catalina Gomez-Salazar (Dalhousie University, Canada and Fundación Omacha, Colombia)

Participants: Heather Anderson, Patricia Aramayo Mariscal, Mike Bossley, Nancy Daves, Mauricio Failla, Catalina Gómez-Salazar, Erich Hoyt, Chantal Landburg, Miriam Marmontel, Benjamín Morales, Olivia Patterson, Marcela Portocarrero-Aya, Randall Reeves, Chris Schweizer, Ravindra K. Sinha, Brian D. Smith, Fernando Trujillo, Rob Williams, others

Introduction and Objectives

This workshop explored the special habitat protection needs of river dolphins. A broad view of river dolphins was taken, including the taxonomic classes of the various river dolphins.

In South America, there are three genera: *Inia*, *Sotalia* and *Pontoporia*. Recent studies have suggested that the baiji, or pink river dolphin, *Inia* has two species: *Inia geoffrensis* in the Amazon and Orinoco basins (Brazil, Colombia, Ecuador, Peru, French Guiana and Venezuela) and *Inia boliviensis* in the Amazon and Madeira upper basins (Bolivia). The tucuxi (*Sotalia fluviatilis*) inhabits the Amazon basin, while the Guiana dolphin (*Sotalia guianensis*) inhabits the Caribbean and Atlantic coasts of South America, including some estuarine and riverine areas. To date, it is unknown what species of *Sotalia* inhabits the Orinoco basin. Franciscana, *Pontoporia blainvillei*, is found in coastal Atlantic waters of southeastern South America.

In Asia there are two genera: *Platanista* and *Orcaella*. The Ganges River dolphin *Platanista gangetica gangetica* is found in the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of Bangladesh and India. The Indus River dolphin *P. g. minor* is primarily restricted to less than 700 km of river, in the mainstream between the Sukkur and Guddu barrages in Sind Province. The Irrawaddy dolphin, *Orcaella brevirostris*, occurs near coastal areas and in estuaries of the Bay of Bengal and Southeast Asia, including Kalimantan and the central Indonesian archipelago, extending to the Philippines.

River dolphins in Asia and South America have many threats in common, some of which are localized such as bycatch and intentional hunting for bait or other uses and some large-scale such as dam construction and upstream pollution effects. In general there are few protected areas dedicated to the dolphins. Some dolphins are in fact found in protected areas in South America and some include portions of the rivers. Yet without special attention to the dolphins or special dolphin habitat zones, any real protection is in question. Complicating the issue is the political geography with various river dolphin populations spread over nine countries of northern South America and at least four countries in South Asia for the Ganges River dolphin and twelve countries for the Irrawaddy dolphin.

The objective was to bring diverse river dolphin experts together to consider how habitat protection could benefit river dolphin conservation. The speakers and participants were weighted toward South American river dolphin researchers and managers, mainly because of the proximity of Martinique to northern South America. Two key initiatives in South America, the Action Plan for South American River Dolphins and the South American River Dolphin Protected Area Network were on the table for discussion to see how these might be advanced in the coming years.

Presentations

River dolphins as indicators of ecosystem degradation in large tropical rivers

Catalina Gomez-Salazar (Dalhousie University, Canada and Fundación Omacha, Colombia)

Human stressors are currently impacting both the Amazon and Orinoco river basins and these are likely to increase. However, there is a lack of standardized monitoring programs to track these human stressors in most of the countries that overlap these basins, and no clear ecological indicators have been identified to track this degradation.

In this study we investigated the statistical relationships between estimates of ecosystem degradation and potential ecological indicators. The presence of human stressors and their distance from the areas surveyed were used to provide an estimate of ecosystem degradation. Moreover, we tested three ecological indicators of freshwater ecosystem degradation using river dolphins as flagship species:

- Density of river dolphins.
- Mean dolphin group size of dolphins.
- Dolphin sighting rates.

River dolphin density estimates in selected locations of the Amazon and Orinoco can be good indicators of freshwater ecosystem degradation: a highly significant negative relationship was established between degradation and dolphin densities and sighting rates. Moreover, sighting rates and densities were highly correlated.

This study highlights that river dolphins are good candidates as ecological indicators, flagship and sentinel species for monitoring the conservation status of large tropical rivers in South America. We suggest that effort should be directed toward collecting reliable data on human stressors, creating collaborative networks for compiling existing data, and to documenting and monitoring current trends in freshwater ecosystem degradation and indicator species in the Amazon and Orinoco basins.

The South American River Dolphin Protected Area Network SARDPAN

Marcela Portocarrero-Aya (University of Hull, UK and Fundación Omacha, Colombia)

River dolphins are currently exposed to pressures that range from habitat loss and degradation, direct killing, conflicts with fisheries, to mining and infrastructure development. Freshwater cetaceans have been identified as surrogates of conservation characterizing ecological processes that support local biodiversity and ensuring provision of ecosystem services and societal benefits to the region. Potentially, the current method of protecting the space where a species exists improves its chances of conservation by ensuring the protection of ecosystem services and the improvement of the livelihoods of local communities.

Protected areas also enable threats to be controlled and are a key tool for providing a sound basis for management of ecosystems, their ecosystem services and of endangered species. This helps to maintain ecological processes, conservation of genetic variability, and the productive capacities of these ecosystems.

The creation of the South American River Dolphin Protected Area Network (SARDPAN) constitutes a regional cooperation initiative stretching across South America to evaluate and improve the habitat conservation of river dolphins by bringing together researchers, managers, policy makers and local communities.

The Action Plan for South American River Dolphins and major human stressors that impact river dolphins directly: Interactions with fisheries and killing of dolphins to be used as bait

Fernando Trujillo (Fundación Omacha, Colombia)

During the last five years, negative interactions with fisheries and deliberate killing have become the main threats for river dolphins in the Amazon and Orinoco basins. The mota fishery stimulates the hunting of at least 900 dolphins per year in Brazil alone for use as bait, and the market is being expanded in Colombia, Brazil and Peru. Despite several efforts from NGOs and governments to stop the killing of dolphins, solutions are not in process due to the economic situation in the region. Additionally, at least two cases of deliberate poisoning of dolphins have been documented in Peru to reduce interactions with local fisheries.

As a response to these stressors, a South American Action Plan for river dolphins has been produced, identifying specific actions to improve knowledge, implement conservation work and reduce and mitigate human impacts. This regional action plan has motivated the creation of national plans for river dolphins in Bolivia, Peru, Ecuador and Colombia.

Conservation of freshwater dolphins in protected areas: Mamiraua as a case study

Miriam Marmontel (Instituto de Desenvolvimento Sustentavel Mamiraua, Brazil)

The Mamiraua Sustainable Development Institute co-manages

two large state government-owned sustainable development reserves in the western Brazilian Amazon: Mamiraua and Amana. Together, they comprise over 3 million hectares, containing both floodplains and terra firma, murky and blackwater environments.

Two species of South American freshwater dolphins (*Inia geof-frensis* and *Sotalia fluviatilis*) occur throughout these protected areas. Both species are part of the daily life and folklore of the region. Local people's ancestral relationship with the waterworld inhabitants influences local conservation. Until recently one could still find birth certificates where the father's name was "The Boto", and women still avoid riding their dugout canoes during their period, or carry garlic strings to protect themselves against the evil creature, or from being taken to the "encantados" (literally the "enchanted ones", referring to the boto dolphins thought to be able to turn into humans).

Both dolphin species are prone to becoming entangled in fishing nets, but while tucuxi is usually released, boto is often maimed or killed. More recently this killing has been used to get bait for piracatinga fishing. Boto may be intentionally killed for this fishing practice as well, a problem that has been escalating in the past 10 years. Dealing with these different sources of mortality and motives are the challenges of conserving freshwater dolphins in the Brazilian Amazon.

Establishing protected areas for freshwater cetaceans: Case studies from the Ayeyarwady River, Myanmar, and waterways of the eastern Sundarbans mangrove forest, Bangladesh

Brian D. Smith (Wildlife Conservation Society (WCS), USA)

Coauthors: Ishtiaq Ahmad (Forest Department, Bangladesh), Benazir Ahmed (University of Chittagong, Bangladesh), Zahangir Alom (WCS, Bangladesh), Aung Myo Chit (WCS, Myanmar), Tapan Kumar Dey (Forest Department, Bangladesh), Elisabeth Fahrni Mansur (WCS, Bangladesh), Rubaiyat Mowgli Mansur (WCS, Bangladesh), Mya Than Tun (Department of Fisheries, Myanmar)

Protected areas have been used extensively as a management tool for conserving marine cetaceans. Less emphasis has been given to establishing protected areas for freshwater cetaceans, and the locations and boundaries of the few that have been established have generally been determined opportunistically without rigorous consideration of habitat use, ecosystem-based management, or local human needs.

Two case studies are presented on establishing protected areas for freshwater cetaceans: one for Irrawaddy dolphins in the Ayeyarwady River, Myanmar, and the other in the waterways of the eastern Sundarbans mangrove forest, Bangladesh. In both cases, the first step was to conduct broad-scale systematic surveys to assess the distribution and abundance of the populations, followed by more in-depth studies on habitat selection, fisheries ecology, and human interactions. In the Ayeyarwady River, an emphasis was placed on understanding the fishery dynamics and enlisting the support of cast-net fishermen who cooperate with the dolphins to catch more fish. In the Sundarbans, a strong emphasis was placed on identifying "hotspots" of dolphin abundance and comparing the ecological and human-use characteristics of these channels with "non-hotspot" channels.

River dolphin conservation in India

Ravindra K. Sinha (Central University of Bihar, India)

The Ganges dolphin, is an exclusively freshwater dolphin, found in the Ganges Brahmaputra-Meghna river basin of India, Nepal and Bangladesh. The current estimated population is about 2,500-3,000 animals. Their eyes lack a crystalline lens so they are blind. They have many primitive characters, namely presence of caecum, a much more dorsal testis position, and subcutaneous muscle situated between two layers of blubber, none of which are found in other cetaceans.

The threats these dolphins are facing include exploitation as well as habitat degradation due to declined flows, pollution, water development projects, and flood control measures. It has been categorized as endangered on the IUCN Redlist, listed in CITES Appendix 1, CMS Appendix II, and as a "Schedule – 1" animal under the Indian Wildlife (Protection) Act 1972.

The Government of India's initiatives to save the ecological integrity and function of the Ganges River system will help improve dolphin habitat. This species was declared a National Aquatic Animal in 2010.

A Conservation Action Plan prepared for this dolphin includes habitat restoration, community participation, capacity building, monitoring, setting up protected areas, education and awareness, minimizing incidental catches, rescue and rehabilitation, and research and development programs.

Franciscana dolphin conservation in Patagonia: Promoting a new protected area in the Río Negro Estuary

Mauricio Failla (Fundación Cethus, Argentina)

Coauthors: Verónica Seijas (Proyecto Patagonia Noreste, Argentina) and **Miguel A. Iñíguez** (Fundación Cethus and Whale and Dolphin Conservation Society, Argentina)

The franciscana dolphin (*Pontoporia blainvillei*) is the most endangered dolphin of South America: thousands die each year in gillnets. It is endemic to the South American coast bordering the southwestern Atlantic Ocean where four management areas have been identified, with a suggested genetically isolated population in Argentina.

Since 2002, we have studied franciscana bioecology in the Río Negro Estuary (RNE), Patagonia, to design strategies for its conservation. Group size varied from one to five dolphins. Travelling, feeding, socialization and resting behavior were recorded. Calves were observed in spring and summer.

The main threat in the RNE is gillnetting. From a total of ten strandings, three had signs of being incidentally caught and another four cases were reported by local fishermen. In order to mitigate the impact caused by bycatch, an educational program focusing on franciscana and other cetaceans is carried out in the RNE.

Franciscana is reported year-round in the study area and this area is considered the southernmost reported feeding and breeding area. Therefore, we are working with other institutions including the Río Negro provincial government to create and implement a protected area in the RNE to protect the franciscana and its habitat.

Summary of Discussion

Following the presentations, the workshop participants discussed various threats to river dolphins including water development projects, climate change and dolphins for use as bait in South America. Participants then tried to agree on various possible recommendations related to habitat protection for river dolphins. It was decided that one recommendation would be more general, one would focus on South America and one on Asia.

Water development projects: The drainage areas of several rivers in Asia have faced extreme changes due to the construction of dams and waterways. The Xingu River Basin in Amazonia will face similar changes in the next few years with the construction of the Belo Monte dam. Dams are built for flood control, irrigation and hydroelectric power; however, several assessments have shown that the final outcome often does not meet the expected economic benefits and instead generates major environmental, social and health impacts. In terms of biodiversity and ecological processes, the construction of dams can fragment populations, reduce river flow, affect river pulses, change the water quality, and ultimately contribute to the extinction of many species, including perhaps river dolphins. However, there are no baseline assessments of river dolphin populations before and after the construction of dams. These types of assessments are of high priority to provide quantitative data that should be considered in relation to the further dams that are planned. In addition, it was noted that it is often difficult for river dolphin researchers and protected area managers to keep track of dams that are being planned often far upstream and sometimes located in different countries.

Climate change: The cascading effects of climate change will likely impact river dolphins, biodiversity and human populations in Asia. Initially, increased melting of the Himalayas will increase water availability. Subsequently, there will be severe water shortages when glaciers completely disappear or approach new equilibria.⁸ There was no discussion about the potential implications of climate change for South American dolphins.

Dolphins for use as bait in South America: The capture of *Inia* dolphins for use as bait in the mota (*Calophysus macropterus*) fishery is one of the most serious human stressors that might increase in the near future. However, there is limited information regarding the number of dolphins that are being killed per year and most of the information comes from data on fisheries. The discussion focused on (1) providing potential mitigations actions to stop this activity, and (2) planning efforts to conduct abundance estimates of river dolphin populations in areas where this activity occurs (e.g., Mamiraua Reserve, Brazil).

Recommendations from Workshop 2

Workshop 2 prepared three recommendations: one for river dolphins in South America and Asia, one for South American river dolphins, and one for Asian river dolphins.

Workshop 2 **recognizes** that the large number of dams currently being constructed, or in the advanced stages of planning, in the Amazon, Orinoco, Yangtze, Ayeyarwady, Mekong, Ganges and Brahmaputra river systems will dramatically affect the environments inhabited by freshwater dolphins and other aquatic mammals and have strong implications for the establishment of protected areas aiming to conserve these species.

(1) The workshop **recommends** that upstream-downstream connectivity and ecologically viable flow be taken into account in the design and management of protected areas. In addition, a comprehensive inventory should be conducted of planned and recent dams constructed in river systems inhabited by freshwater dolphins, and the conservation requirements of these animals be given strong consideration in the decision-making process of whether or not to construct new dams and in the operating procedures of dams that have already been built in river systems inhabited by these species.

Workshop 2 **recognizes** that the South American River Dolphin Protected Area Network (SARDPAN) is a collaborative, low-cost, and relatively simple tool to communicate and link researchers, organizations and protected areas. This network was announced during the First International Conference on Marine Mammal Protected Areas (2009), and since then, significant efforts have taken place towards accomplishing some of the major recommendations given in Maui. These accomplishments include beginning to provide river dolphin population estimates for some areas, identifying hotpots and critical areas, quantifying human stressors, compiling information on existing protected areas where dolphins occur, and connecting researchers across different countries.

(2) Recognizing the momentum of this regional network, the workshop **recommends** that SARDPAN be strengthened to continue to fill gaps in information, to develop proposals for regional conservation initiatives with emphasis on protected areas, and to convey science-based information to stakeholders including different local communities and managers.

Workshop 2 further **acknowledges** that the most critical shortterm threat facing Asian freshwater cetaceans is bycatch in fisheries, particularly entanglement in gillnets and long-lines with multiple hooks, and in some areas electrocution from illegal electro-fishing. The workshop also **recognizes** that protected areas for Asian freshwater cetaceans must balance the conservation needs of these animals with those of large and growing human populations.

(3) The workshop therefore **recommends** that existing and planned protected areas include zoning such that some portions are designated as no-fishing zones while others allow regulated and monitored fishing activities using "dolphin-safe" techniques. These latter portions should also be used as "living laboratories" where environmentally sustainable fishing practices could be tested for potential application outside of protected areas.

⁸ See Jianchu Xu, 2009. The Melting Himalayas: Cascading Effects of Climate Change on Water, Biodiversity, and Livelihoods. *Conservation Biology* 23, 3:520-530.

Workshop 3: Bycatch and Marine Mammal Protected Areas

Coordinator and **Chair: Greg Donovan** (Head of Science, International Whaling Commission, UK)⁹

Rapporteur: Jaclyn Taylor (NOAA Fisheries, OPR, USA)

Participants: Yong-Rock An, Alexei Birkun, Greg Donovan, Mauricio Failla, Scott Gende, Alexandra Gigou, Marie-Christine Grillo-Compulsione, Tiare T. Holm, Erich Hoyt, Artie Jacobson, Cecile Lefeuvre, David Mattila, Sarah Mesnick, Jennifer Murphy, François Poisson, Sandra Pompa, Oscar Ramírez, Randall Reeves, Lionel Reynal, Caroline Rinaldi, Lorenzo Rojas Bracho, Teri Rowles, Hassani Sami, Brian D. Smith, Hawsun Sohn, Aurelie Tasciotti, Jaclyn Taylor, Steven Tucker, Olivier Van Canneyt, Gaëlle Vandersarren, Nina Young

Introduction and Objectives

Workshop discussions were facilitated by five presentations that covered various aspects of the bycatch issue ranging from a global overview, initiatives to try to address the problem worldwide and local case studies on the testing of gear and on prevention attempts for a critically endangered species, the vaquita.

It has been known for many years that the bycatch of marine mammals in many types of fishing gear is a worldwide problem (e.g., IWC, 1994). In addition to animal welfare concerns, it is probably the major population level threat facing most small cetacean populations around the world as well as small populations of some large whales. It has contributed to declines in populations of pinnipeds and sirenians. In addition, bycatch (and depredation) causes problems for fishermen at a variety of levels including loss and damage of gear as well as bad publicity that may lead to reduced or closed fisheries. Addressing this problem is thus important both from the perspective of marine mammals and fishermen alike; solutions are most likely to come from cooperation not confrontation.

Many previous workshops and papers have dealt with the difficulties of obtaining reliable estimates of marine mammal bycatch and determining sustainable levels (in many cases, especially for small cetaceans, the information on bycatch levels, population structure and abundance is even insufficient to estimate what sustainable levels might be). Those topics were considered beyond the scope of this short workshop, although the need to obtain abundance estimates for populations (not merely for abundance within jurisdictional boundaries) to assess threats was emphasized. The primary objective of the present workshop was to examine the contribution that marine protected areas could make to local and global efforts to reduce levels of marine mammal bycatch.

Summaries of Presentations

Global review of marine mammal bycatch in gillnet and other entangling-net fisheries, 1990-2011

Randall Reeves (Chair, IUCN SSC Cetacean Specialist Group, and Okapi Wildlife Associates, Canada)

Coauthors: Kate McClellan and Tim Werner

Since the 1970s, the role of bycatch as a factor limiting or reducing marine mammal populations has been increasingly recognized. The proceedings of a 1990 IWC Symposium and Workshop on the Mortality of Cetaceans in Passive Fishing Nets and Traps in La Jolla, California, included a summary of fishery and bycatch data by region, by fishery, and by species, as well as an experts' evaluation of the significance of the "impacts" of bycatch in passive gear on all cetacean species and on numerous geographically defined populations. That report highlighted six species or populations as needing urgent action to reduce unsustainable bycatch: the baiji, the vaquita, coastal humpback dolphins and bottlenose dolphins in Natal (South Africa), striped dolphins in the Mediterranean Sea, and harbor porpoises in the western North Atlantic.

Much has changed in the ensuing 20-plus years in terms of both what is known about bycatch and which species and populations are perceived as being at greatest risk. For example, the baiji is now considered extinct, the vaquita has continued to decline as a direct result of unsustainable bycatch, and coastal dolphins in Natal continue to be killed in anti-shark nets with the sustainability of this mortality still unclear. On the other hand, striped dolphins in the Mediterranean and harbor porpoises in the western North Atlantic have proven to be less seriously threatened than was assumed in 1990, although both populations continue to experience considerable bycatch mortality.

In terms of broader changes, large-scale driftnet fishing on the high seas is now legally prohibited by the United Nations and regional bans on driftnetting are in place in some areas, although these are not always completely effective (e.g., in the Mediterranean). It remains true that even as other significant threats to marine mammal populations have become better documented and understood – underwater noise, ship strikes, reductions in prey populations, toxic algal blooms, epizootic disease, and various environmental changes related to global warming – bycatch remains a critical issue demanding urgent attention if there is to be any hope of preventing further losses of marine mammal diversity and abundance and protecting, or restoring, ecological health.

⁹ In the absence of Arne Bjørge who was unfortunately unable to attend due to illness, Greg Donovan chaired the Workshop. The report was drafted by Jaclyn Taylor and Greg Donovan.

The objectives of this ongoing study of marine mammal bycatch are to:

- Update some of the information summarized in the 1990 IWC report.
- Reassess the impact of gillnet mortality on cetacean species and populations, weighing its significance in relation to other threats.
- Assess bycatch data on marine mammals other than cetaceans (i.e., pinnipeds, sirenians, and two otter species).
- Determine where important temporal, spatial, or taxonomic data gaps exist.
- Identify species and populations known or likely to be at greatest risk from bycatch in gillnets.

Efforts to control marine mammal bycatch using the international provisions of the Marine Mammal Protection Act

Nina M. Young (NOAA Fisheries, Office of International Affairs, USA)

Bycatch is recognized as the major threat facing marine mammals. Most marine mammal protected area managers find bycatch assessment and mitigation a particular challenge.

In the United States, the Marine Mammal Protection Act (the Act) provides the tools to protect marine mammals from U.S. activities on the high seas and to negotiate with nations to protect and conserve marine mammals in international and foreign waters. In implementing the Act, the National Marine Fisheries Service is also required to demonstrate that domestic efforts to protect marine mammals ultimately do not place U.S. industries at a competitive disadvantage to foreign industries that are not constrained by similar conservation measures.

Additionally, in the United States, consumers typically do not want to purchase seafood that contributes to the killing of marine mammals. Therefore, the Act requires that the United States ban imports of fish and fish products from nations whose fisheries exceed U.S. marine mammal bycatch reduction standards. The United States has never fully implemented this portion of the Act, but is currently considering draft regulations in response to a petition to ban swordfish imports. Implementation of this provision of the Act opens up new avenues for scientific collaboration and capacity building to estimate marine mammal populations and bycatch as well as to develop a suite of bycatch mitigation measures. It also provides a process for the United States to engage with its trading partners and an incentive for these partners to realize significant bycatch reduction and improved efforts to conserve marine mammals.

A new capacity building and bycatch mitigation initiative from the International Whaling Commission (IWC)

David Mattila (IWC and NOAA-ONMS, USA)

The International Whaling Commission has recently been working to advance the understanding of, response to and prevention of large whale bycatch. This included more detailed discussions of the results and recommendations of a 2010 workshop on this topic in Maui, USA. The workshop realized that fisheries observer programs are not well suited to understanding the scope and impact of this issue for large whales, as the whales frequently drag the fishing gear away from its set location, and the entanglement is therefore not found or counted.

Currently, the primary tools for gathering this information for large whales are:

- Better response to stranded carcasses.
- The establishment of a reporting and response network for entangled live animals.
- Entanglement scarring studies.

A brief overview of each was given, including a discussion of the strengths and weaknesses of each approach. In order to advance the recommendations of the Maui workshop, the IWC sponsored a second workshop in Provincetown, USA (2011). Although the report of the workshop was not yet public, examples of the key items on the agenda were discussed, including some currently used components of capacity building, and some universally adhered to principles and guidelines for safe, professional entanglement response. These principles, and some of the basics of entanglement response, were summarized in a short "outreach" video produced by NOAA, USA.

Bycatch initiatives in a newly created MPA in Brittany (Iroise Sea)

Hassani Sami (Oceanopolis, France)

Coauthors: Yvon Morizur, Philippe Le Niliot and Eric Stephan

A pinger experiment was carried out on the French trammel net fishery in the marine protected area off the west coast of Brittany in order to compare acoustic mitigation measures for harbour porpoises. Three types of pinger devices (*Aquamark* 100, Marexi V2.2, DDD02) were used for porpoise mitigation in the area where no bycatch estimation had previously been made. The pingers DDD02 were attached at each end of the net near the anchor. The pingers Aquamark 100 and Marexi V2.2 were attached to the headline of the nets and were spaced apart 400m and 200m respectively. The EC regulation 812/2004 requires such a pilot study. During the study, observers at sea were deployed on board ten fishing vessels from Le Conquet and Audierne harbors.

During one year, 462 km of control nets (non-equipped nets) and 150 km of equipped nets shared between the three systems were observed in order to compare bycatch, as well as physical reliability and practicability of pingers.

Three harbour porpoises, *Phocoena phocoena*, were caught in the control nets whereas two porpoises and two grey seals, *Halichoerus grypus*, were recorded in the nets equipped with *Aquamark 100*. The bycatch rate was 0.006 porpoise per kilometer on the control nets and twice more on the pingered nets and six times more for those equipped with the *Aquamark 100*. No statistical test can be performed due to the small numbers of bycatches observed. The practicability, reliability and costs were also analyzed for each pinger type. The results were discussed in relation to mitigation measures and regulations.

Coping with bycatch of a critically endangered species: The vaquita conservation action plan

Oscar Ramírez-Flores (CONANP, México)

The vaquita, discovered just 53 years ago, is now one of the most critically endangered marine mammals. In order to protect the species, along with the totoaba (an endangered fish species), the Biosphere Reserve of the Upper Gulf of California and Colorado River Delta was established in 1993. In the late 1990s, scientists estimated a population of about 567 individuals. The International Committee for the Recovery of Vaquita (CIRVA), identified bycatch as the main risk to the species.

In September 2005, a Refuge Area was established and a protection program of general guidelines, was issued in December. Unfortunately, this highlighted a conflict with artisanal fishing, which is the main economic activity in San Felipe, Baja California and Golfo de Santa Clara, Sonora. Trawling is also important, and although it does not represent a great danger to the vaquita, it does represent an important impact to the sea floor.

As of 2007, the legal artisanal fishing effort was estimated to be 1700 boats (pangas) with at least two fishing permits (finfish and shrimp) using trammel and gillnets, plus 162 trawlers – all conducting fishing activities in the buffer zone of the Biosphere Reserve and within the distribution range of the vaquita. The Gulf of California is considered a highly productive ecosystem, and as such, in the Upper Gulf, there are important areas where high quality blue shrimp are harvested, with income to both the artisanal and industrial fleets.

In this context, with the intent to protect the vaquita, environmental authorities formulated and began the implementation of the Vaquita Conservation Action Plan in 2007, with the goal of eliminating bycatch by reducing fishing effort through voluntary buy-out and substitution of gill and trammel nets by more selective fishing methods. Technological development of alternative fishing gear and biological diversity conservation actions in the Refuge Area were also promoted. To date, the Secretariat of Environment and Natural Resources has spent more than 400 million pesos (more than \$30 million USD) but there is still a long way to go and time is short for the survival of the vaquita. The protected area's management body has the will but not the authority to regulate fisheries, which complicates the chance to succeed and to be able to contribute to species conservation.

Experiences in the implementation of the Action Plan have taught us various lessons, which now can be turned into recommendations for scientists, politicians, decision-makers and civil society organizations concerned about species conservation:

- Threats to vaquita have been reduced significantly but not sufficiently.
- Fishing effort has been reduced and a fisheries management process is being implemented.
- Fishermen have initiated successful alternative economic activities which provide them a proper livelihood.
- The mechanisms of continuous dialogue and coordination of efforts between fishermen and government have helped us reach institutional agreements.
- The basis for sustainable fishing in the Upper Gulf has been established.
- There is an urgent need for better fishery regulations enforcement and the development of specific regulations and enforcement for the upper Gulf of California.

Summary of Discussion

A key component of the development of mitigation and ultimately prevention is an understanding of the entanglement process for different species and different gear; collecting relevant data and information from entanglements, as well as disentanglements, is essential.

Ongoing and extensive work on this problem has revealed that there is no universal panacea – local solutions to local problems will need to be found in cooperation with stakeholders. This is particularly true when examining the different scales and resources available for such categories as large-scale commercial versus artisanal fisheries, operations in developed versus developing countries and/or operations in national waters of one or more countries versus high seas.

It is important to recognize that while individual bycatches represent an important animal welfare consideration, bycatches often represent a threat to populations or, in the case of the vaquita, a species. In that context, the effectiveness or otherwise of mitigation measures within boundaries of the MMPA will be determined by the relationship of the extent of the MMPA to the total range of the population and the bycatch threat. Thus, protecting marine mammals from bycatches within MMPAs alone will often be insufficient. Reduction of bycatch should be seen as a shared problem of many including scientists, environmental authorities, fishermen, fishing authorities, managers and NGOs. Without cooperation and trust amongst all these groups leading to actions in a timely manner, there may be serious consequences for marine mammal populations as witnessed by the sad case of the vaquita. It is especially important that environmental and fishery management authorities work together, something that unfortunately is uncommon.

Recommendations from Workshop 3

Workshop 3 **recommends** that the Steering Committee works to facilitate the following actions within MMPAs (singly, in regional groups and/or in groups representative of particular circumstances related to fishing types, species and resources) to assist with addressing the bycatch problem, namely that:

MMPAs **act** as an example by bringing together the various stakeholders to work collaboratively on this issue as an important component of MMPA management plans and where appropriate, legislation.

Where appropriate (recognizing the need for power analyses and properly designed studies for testing that take into account likely sample sizes), MMPAs actively **encourage** initiatives for the development and testing of marine mammal safe fishing gear (note: this may require zoning).

MMPAs **contribute** to the necessary knowledge to assess bycatch at the population level by at least examining stock structure, density and fishing type and effort within their boundaries, recognizing that this information alone is not usually sufficient.

MMPAs **serve** as focal points for essential capacity building initiatives related to disentanglement and prevention.

MMPAs **increase** public awareness of this issue including the provision of information on entanglement response networks.

Workshop 4A: Bilateral and Multilateral Agreements to Facilitate Partnerships between and among MMPAs: Making Them Work and Lessons Learned

Chairs: Brad Barr (NOAA-ONMS, USA) and **Scott Gende** (National Park Service, Alaska, USA)

Rapporteur: Christina Geijer (University College London, UK/ Sweden)

Participants: Leslie Abramson, Brad Barr, Julián Botero, Carole Carlson, Fernando Félix, Lionel Gardes, Christina Geijer, Scott Gende, Paul Hoetjes, Artie Jacobson, Jorge Jimenez, Pascal Mayol, Craig McDonald, Anne Nelson, Sandra Pompa, Caroline Rinaldi, Mark J. Spalding, Oswaldo Vásquez, Nathalie Ward

Introduction and objectives

When the focus of the management of a marine mammal protected area (MMPA) is on a highly migratory marine mammal species or group of species, networking with other MMPAs that provide important habitats for sustaining those species is both necessary and appropriate. While not always required, a bilateral (or in the case of more than two MMPAs, multilateral) agreement can be used to establish a formal "sister MMPA" relationship. This can foster support for the partnership with the management agencies responsible for the MMPAs which helps in setting clear objectives, clarifying responsibilities, and managing expectations. While potentially useful, such agreements require specific legal authorities to empower them, can be challenging to craft, often require long and sometimes complex agency reviews, and many times are found ultimately to be ineffective in achieving the aspirations of the MMPAs involved.

There are a number of successful models for such agreements. The lessons learned can be helpful in addressing the many challenges involved in networking MMPAs. The workshop was focused on presenting two of these potential model partnerships, one in effect for a number of years and another in its first year of implementation. Workshop participants from ten countries and representing several existing partnerships discussed the development of the agreements, the goals and aspirations of those involved in the development of the partnerships, and the lessons learned, both positive and negative, in their development and implementation. What has been learned can guide and inform future efforts at MMPA partnerships and networking.

Presentations

Beyond borders – sister sanctuaries: An innovative management approach for transboundary marine mammal species in the Wider Caribbean Region

Nathalie Ward (NOAA, USA)

The sister sanctuary relationship, established in 2006, between Stellwagen Bank National Marine Sanctuary (SBNMS) and Santuario de Mamíferos Marinos de la República Dominicana (SMMRD) marked a new chapter for the *joint* management of the endangered humpback whale (*Megaptera novaeangliae*) in the North Atlantic. The sister sanctuary was the first international accord to protect an endangered marine mammal migratory species on both ends of its range – in its northern feeding and nursery grounds in SBNMS and its southern mating and calving grounds in SMMRD.

In 2011, SBNMS signed a sister sanctuary agreement with the French Antilles Agoa Marine Mammal Sanctuary, expanding the sister sanctuary programme, which:

- Facilitates an ecosystem-based approach to cooperative sanctuary management of humpback whales through capacity building, research, monitoring and education;
- Serves as a template to elevate national and international awareness of the importance of the ecological connection between these marine mammal protected areas; and
- Emphasizes the critical need to take a broader management view toward transboundary conservation of marine mammal species.

The sister sanctuary concept is part of a larger international and global vision of MMPAs, such as UNEP's Specially Protected Areas and Wildlife (SPAW) Protocol for the Wider Caribbean Region, that prioritizes management regimes that maintain ecological connections between marine protected areas in order to satisfy species' requirements. The sister sanctuary model promotes a strategy that defines emerging problems (beyond EEZs), kindles commitment to critical habitats, and manifests the true spirit of regional cooperation, which is a key element to ensure effective management for biodiversity protection and the conservation of migratory, marine mammal species.

A bilateral agreement between similar MMPAs: Francisco Coloane Coastal and Marine Protected Area (Chile) and Glacier Bay National Park (USA)

Scott Gende (National Park Service, Alaska, USA) and **Sergio Cornejo** (Francisco Coloane Marine and Coastal Protected Area – FCCMPA, Chile)

Bilateral agreements are an integral tool for connecting personnel and developing management strategies between protected areas connected by migratory marine mammal species. However, a recent bilateral agreement establishing a sister park relationship between the US National Park Service at Glacier Bay National Park and the Chilean Ministry of Environment at Francisco Coloane Marine and Coastal Protected Area was signed based not on shared resources but on striking similarities in resource and management issues, including marine mammals. Both parks are large glacial fjords and represent one of the largest marine protected areas in their respective countries. Both parks represent hotspots for humpback whale feeding aggregations, and support a large number of sea lions.

In Glacier Bay National Park, concerns over the impacts of large cruise ships via acoustic disturbance, risks of oil spills and collisions with whales, are a focus of management, monitoring, and research. In Francisco Coloane Marine and Coastal Protected Area, concerns over the impacts of commercial shipping to humpback whales and potential expansion of shipping due to recent mining and exploration are of primary concern. The disturbance to whales from whale watching vessels is an issue in both parks.

Personnel exchange between the two areas has been supported by the U.S. Department of State and will continue with longer-term scientific exchange November 2011–May 2012 focusing on joint development of marine mammal monitoring plans, application of research techniques developed in Glacier Bay, and development of science-based management plans. The history and mechanisms by which this agreement was established will be discussed and highlight how other agreements may be developed.

Summary of Discussion

The workshop participants engaged in a general discussion of partnerships and the agreements that empower them. Points raised include:

- It is important to retain a degree of flexibility with regards to cultural and political differences, avoiding rigidity in terms.
- A continuum exists from getting people together and sharing information to the actual signing of bilateral agreements. This comes down to identifying potential partners and usually starts with cooperation between researchers. A good way could be to have workshops related to particular species or populations, bringing people together and discussing the next steps.

- It is important to develop a common database for information sharing to facilitate connections to be able to identify the right people.
- The need to train people and to have researchers to establish the research framework is fundamental. We must develop methodologies to make data collection more unified and useful.
- It is relatively easy to do constituency building in general and with the public so people understand and begin to think out of the box.
- Science, policy and the community working together can provide substantial value.
- We should use universities as a source of research into furthering bilateral agreements. We could make lists of topics to be researched on websites and send out to universities that have conservation science and marine mammal Master's and PhD programs. We could also take advantage of local people, so that they can best use the data and keep on working in the area.

Based on the discussions, the workshop participants agreed that the following points form the basis for, and further expand and articulate, the recommendations at the end of this section which were put forward to the conference and formally adopted:

- Promote information exchange, interpersonal relationships, and education between MMPAs.
- Promote workshops (e.g., at bigger conferences) either threat or species/stock-specific to bring the relevant people together to address joint MMPA issues.
- Standardize data collection methodology and a common database for information sharing between MMPAs.
- Conceptually endorse the idea of "sister sanctuary" programs and develop case studies to share "lessons learned" and best practices/ strategies for implementation of bi/multilateral agreements.
- Promote bilateral agreements into multilateral agreements with MMPAs.
- Seek out legal frameworks and international vehicles such as SPAW to create bilateral and multilateral agreements between MMPAs.
- Bring together scientists, managers and policy makers to share information and be more inclusive and transparent.

Recommendations from Workshop 4A

Workshop 4A **recommends** that the ICMMPA:

Endorse and **support** the use of multilateral and bilateral agreements for the purpose of creating MMPA networks and partnerships.

Endorse and **support** sister sanctuary MMPA partnerships established through such agreements.

Coordinate the development of a document providing guidance for the MMPA community that offers essential underlying principles for effective development of bilateral and multilateral agreements, outlines appropriate legal mechanisms, "best practices" for development and implementation of agreements, and illustrative case studies.



Humpback whales in the Commander Islands Biosphere Reserve, Russia Photo by Alexander Burdin, Russian Cetacean Habitat Project, Whale and Dolphin Conservation Society



Northern fur seals on Bering Island in the Commander Islands Biosphere Reserve, Russia Photo by Erich Hoyt, Russian Cetacean Habitat Project, Whale and Dolphin Conservation Society

Workshop 4B: Broad-scale Marine Spatial Planning of Mammal Corridors and Protected Areas in the Wider Caribbean and Southeast and Northeast Pacific, Including Identifying Ecologically or Biologically Significant Areas (EBSAs)¹⁰

Coordinators: Alessandra Vanzella-Khouri (UNEP-CEP – Caribbean Environment Programme, Jamaica) and **Ole Vestergaard** (UNEP Division of Environmental Policy Implementation, Freshwater and Marine Ecosystems Branch, Kenya)

Chairs: Alessandra Vanzella-Khouri (UNEP-CEP – Caribbean Environment Programme, Jamaica) and **Patricio Bernal** (IUCN High Seas Initiative, Switzerland)

Rapporteur: Monika Thiele (UNEP-CMS, Regional Office for North America, USA)

Participants: Patricio Bernal, Julián Botero, Fernando Félix, Kristin Kaschner, Patricia Lancho, François Poisson, Jessica Redfern, Lionel Reynal, Hélène Souan, Monika Thiele, Alessandra Vanzella-Khouri, Oswaldo Vásquez, Nathalie Ward

Introduction and Objectives

Networks of well-planned and effectively managed marine protected areas – ranging from multiple-use zones to no-take reserves – may be a useful approach to protect critical habitats for migrating large marine mammals. Protected areas that regulate certain types of human activity can be economically costly in the short term, but may provide substantial immediate and long-term economic benefits, ranging from fishery enhancement to recreational and educational opportunities for the public, while at the same time sustaining marine mammal populations.

A key step to effective MPA network design is comprehensive marine spatial planning and zoning of human activities addressing cumulative environmental pressures. This involves environmental assessment and mapping of key migration routes and stop-over points connecting habitats at regional scales, socioeconomic assessment and evaluation of management trade-offs in forming spatial planning and zoning. A further prerequisite for effective management, good governance and compliance is extensive national and regional stakeholder consultation.

An ongoing regional project, "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific" is assisting countries in building capacity for marine spatial planning of MMPAs through support from the Spain-UNEP Partnership for the LifeWeb Initiative running August 2010-November 2012. The overall objective is to build technical capacities for design of transboundary management and governance arrangements to protect large marine mammal corridors and critical habitats across the two regions. This includes regional data collation, analysis and mapping of ecological and socio-economic data, training in spatial planning, strategic communication, network and policy support, plus two planning demonstration projects. [Project website: www.spain-unepforpas.org/-marine-mammalcorridors-a-critical-habitats-.html]

The workshop objective was to present and discuss emerging concepts and preliminary project findings and to further develop ecological and socio-economic maps of large marine mammal distribution, critical habitats and human activities in the Southeast and Northeast Pacific and Wider Caribbean as a basis for transboundary marine spatial planning scenarios and management arrangements.

Summaries of Presentations

Broad-scale marine spatial planning for transboundary management of marine mammal corridors and critical habitats

Alessandra Vanzella-Khouri (UNEP-CEP – Caribbean Environment Programme, Jamaica) and Ole Vestergaard (UNEP Division of Environmental Policy Implementation, Freshwater and Marine Ecosystems Branch, Kenya)

UNEP's Division of Environmental Policy Implementation in collaboration with UNEP's Caribbean Environment Programme (UNEP-CEP), the Regional Activity Centre for the SPAW Protocol (SPAW-RAC), the Permanent Commission for the South Pacific (CPPS) and UNEP's Regional Offices for Latin America-Caribbean and North America, have partnered to implement the inter-regional LifeWeb project "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific". The project,

¹⁰ Note: Workshop 4B and Workshop 9 each incorporated separate parts of Workshop 6 originally planned as a separate workshop tentatively called "GOBI-UNEP/LifeWeb Technical Session: Identifying EBSAs and Critical Habitats in the Wider Caribbean and East Pacific to Inform Marine Mammal Management Planning"

funded by the Government of Spain over 2.5 years, recognizes the strategic importance of multiple-use protected areas as a tool for resource management and biodiversity conservation within broader cross-sectoral marine spatial planning and management. These areas are of particular importance for transboundary species such as marine mammals that may spend time in critical habitat areas that cross jurisdictional boundaries.

Through the use of statistical modeling and mapping, this broadscale spatial planning project has begun to identify marine mammal distribution, critical habitat areas, and threats to their protection (e.g., fisheries impacts, shipping lanes, pollution, coastal and offshore development, and tourism-related activities) throughout both the Wider Caribbean and the southeast and northeast Pacific regions. In addition to this work, demonstration projects are currently underway in the Dominican Republic that will develop a management plan for the Marine Mammal Sanctuary of the Dominican Republic, an important mating and calving ground for the humpback whale (Megaptera novaeangliae), as well as in east Pacific outlining transboundary management scenarios for the Eastern Tropical Pacific Marine Corridor region. In conjunction with this, two large workshops are being planned for spring 2012. One will invite regulators and officials from Eastern Caribbean countries to visit the sanctuary during the calving season to understand the potential that whale watching and marine mammal protection areas could have on their countries. The other will consist of a training course for government planners and experts on marine spatial planning, management and governance options to support marine mammal management for both regions.

In order to highlight the importance of the project issues and to "make the case" for integrated and transboundary management of marine mammal migration routes and critical habitats, strategic communication products will be developed and distributed to government officials, academic institutions, the media and the wider public in an effort to bring attention to the management of these species and the threats facing them.

All of these activities support the implementation of the Action Plans for the Conservation of Marine Mammals in the Wider Caribbean and Southeast Pacific regions and will help to improve the information currently available on marine mammal distribution and threats as well as the capacity, governance and sustainability of marine protected areas to help conserve marine mammal populations in these regions. GOBI, the Global Ocean Biodiversity Initiative, and the Convention on Biological Diversity (CBD) process to establish MPA networks on the High Seas: Bridging international policy and Science

Patricio A. Bernal (IUCN High Seas Initiative, Switzerland)

The sector-by-sector management of human activities in the ocean has proven to be insufficient. Land degradation is an accepted technical term in management, and many actions are taken and resources spent annually to mitigate its effects, yet ocean degradation, until now, has been invisible. The most recent study on human activities in the ocean considering 17 global uses over 20 different types of ecosystems shows that 41% of the ocean experiences medium to high anthropogenic impact.

The spatial measures of MPAs and other management tools are being effectively applied under national and other jurisdictions such as the Antarctic Treaty. Since MPAs are also being proposed on the high seas beyond areas of national jurisdiction, the United Nations General Assembly and the UN Food and Agriculture Organization have sponsored or mandated actions to identify areas in the ocean in need of protection, to correct destructive fishing practices on the high seas and over seamounts, and in general to promote an ecosystem approach to management. The Conference of the Parties of the Convention on Biological Diversity (CBD) defined in 2008 a set of seven scientific criteria for the identification of ecologically or biologically significant areas (EBSAs) in need of protection, initiating a process for the identification of these areas and the creation of a repository with this information.

From a scientific point of view, and thanks to new techniques and tools available to observe the ocean, this could translate into a program revealing the true complexity of marine life in the ocean. This would go beyond the current understanding of marine life distribution, by attempting to measure the ecological and genetic interconnection among marine ecosystems and between the pelagic and benthic domains in different geomorphological environments.

To accompany the policy processes, in 2009 IUCN with support from the German government created GOBI, the Global Ocean Biodiversity Initiative, with the specific aim of bridging these policy processes with science. During the last two years, GOBI, now a partnership of 21 science organizations, has generated guidance to use the CBD criteria for the identification of EBSAs, having identified 15 examples in which these criteria were used. Now that the CBD has initiated a series of Regional Workshops with the specific aim to identify EBSAs, GOBI at the invitation of the Conference of the Parties of CBD will contribute to this process by compiling the data and information necessary and supporting the development of capabilities by the State parties of the convention.

Challenges in implementing marine mammal spatial planning and management in the Eastern Pacific

Fernando Félix (Marine Mammal and Marine Spatial Planning Project, UNEP/Spain/CPPS, Ecuador)

The broad–scale marine spatial planning for marine mammal corridors in the Eastern Pacific (Spain/UNEP) project has been in the process of being implemented since early 2011, under the coordination of the Permanent Commission for the South Pacific (CPPS). The project aims to provide an overview of essential habitats and regional-scale migration routes for marine mammals in this vast region which covers about 20 million km² of territorial waters, exclusive economic zones, and island territories of 13 countries, as well as extensive areas beyond national jurisdictions. Approximately 40 species of cetaceans inhabit the eastern Pacific, including 9 species of large whales.

Defining conservation priorities for these species over such a large and diverse area presents enormous challenges, particularly related to spatial and temporal scales, information availability, weak or nonexistent legal frameworks, weak control and enforcement, and lack of political will, among others. In this context, the Spain/UNEP/CPPS project is an opportunity to introduce crosssectoral spatial planning approaches and to facilitate regional dialogues and consultations with relevant stakeholders in design management options for migrating marine mammals.

Geo-referenced and socio-economic data are currently used for modeling the habitat of five large cetacean species in the Eastern Pacific from both hemispheres: blue, humpback, Bryde's, sperm and southern right whales. Some of these species have welldefined migration patterns such as humpback, southern right and to a lesser extent blue whales, while the population structure of Bryde's and sperm whales remains poorly known. Some overlap exists in breeding areas along the central Pacific between north and south populations (humpback and blue whales) creating favorable conditions for genetic exchange between populations of both hemispheres.

Several of the most important fisheries in the world occur in Eastern Tropical Pacific (ETP) waters and these constitute a major threat to cetaceans in this region. Other human activities include shipping and pollution from both sea- and land-based origins.

For migratory cetaceans, the ETP must be considered as an ecological management unit that includes the central as well as the northeast and southeast Pacific whale feeding destinations. Because no regional legal framework on environmental issues involving all the countries of ETP exists, a Memorandum of Cooperation or similar non-legally binding instrument would be helpful in defining regional policies and promoting conservation and management of marine mammals in the region. This could be advanced through an Action Plan, similar to the Memorandum of Understanding for the Conservation of Cetaceans in the Pacific Islands under the framework of the Convention on Migratory Species (CMS). The United Nations Convention on the Law of

the Sea (UNCLOS) in Articles 64 and 65 provides a broad framework regarding the management of highly migratory species and marine mammals in areas beyond national jurisdictions.

Habitat modeling of large whales in the Eastern Tropical Pacific

Jessica V. Redfern (Southwest Fisheries Science Center, NOAA Fisheries, USA)

An overview of processes for identifying critical habitat for baleen whales in the eastern tropical Pacific Ocean, commonly referred to as the Eastern Tropical Pacific (ETP), was presented in Panel 2. This presentation provided a more detailed and critical examination of the methodologies and resulting distribution maps for three species of baleen whales in the ETP.

The ETP is a 20 million km², open-ocean system that is seasonally occupied by migratory blue and humpback whales from both northern and southern hemispheres; it also hosts important numbers of resident Bryde's whales.

Three methodological issues for identifying critical habitat were explored:

- Data types.
- Methods for creating density surfaces.
- Conservation targets.

Differences in resulting maps of critical habitat were examined for each species; the need for caution when using such maps to make management decisions was highlighted.

The Eastern Tropical Pacific Marine Corridor (CMAR) Initiative

Julián Botero (Eastern Tropical Pacific Marine Corridor – CMAR, Colombia)

The Eastern Tropical Pacific Marine Corridor (CMAR) is a regional initiative for the conservation and sustainable use of biodiversity and marine and coastal resources in the MPAs considered as a "core areas" of the islands of Cocos (Costa Rica), Coiba (Panama), Gorgona and Malpelo (Colombia), and Galápagos (Ecuador). The initiative looks for the suitable management of such resources through an ecosystem-based approach, establishing joint government strategies supported by civil society, governmental agencies of international cooperation, and nongovernmental organizations (NGOs).

The CMAR initiative has its roots in the Joint Presidential Declaration of December 2001 between the governments of Costa Rica and Ecuador to study the proposal of creating a corridor of marine conservation between Cocos and the Galapagos islands. In 2002, Malpelo and Gorgona islands (Colombia) and Coiba island (Panama) asked to join the initiative, and in April 2004, the signing of the «Declaration of San José» by the representatives of the Governments of Costa Rica, Panama, Colombia and Ecuador, gave birth to the CMAR initiative.

The overall objective is to define and establish between governments a joint management system for the conservation and sustainable use of biodiversity and coastal and marine resources in the MPAs of the CMAR, the islands of Cocos, Coiba, Malpelo, Gorgona, and Galapagos, and their areas of influence.

Specific objectives include:

- Promoting the sustainable management and conservation of biodiversity and coastal resources of the region.
- Establishing a regional framework that facilitates the development and management of the CMAR.
- Promoting the participation of governments and stakeholders in the integral management of the CMAR: tourism, fishing and conservation, among other things.
- Improving and consolidating the protection and management of the marine protected areas comprising the core areas of the CMAR.
- Identifying and promoting financing mechanisms to support the management of the CMAR.
- Directing technical and financial cooperation for the CMAR at the national or international level based on the priorities set by countries.
- Boosting responsible tourism which contributes to the sustainable development of the communities involved in the CMAR.
- Providing a set of environmental goods and services to local, regional and global levels.
- Promoting propagation and dissemination of information on the scope, objectives, actions and progress made in the implementation of the CMAR.

Two of the key ongoing projects are the Eastern Tropical Pacific Seascape (ETPS), by Conservation International (CI), which began in 2003, and the regional management system for the sustainable use of the fishery resources of the CMAR, by IDB-Fundación Malpelo, beginning in 2009.

Future plans (2011-2014) include:

- Giving support for the implementation of the Programme of Work of the CBD on protected areas in the region, through the consolidation of cross-border areas.
- Enlargement of the CMAR corridor by integrating new MPAs.
- Improving coordination with other international instruments for the conservation of the marine environment (CBD, CPPS, CBI,) amongst others.
- Development of future projects with major collaborative partners (e.g., World Bank GEF).

Towards the identification of important marine mammal habitat and possible EBSAs in the greater Caribbean & tropical central Atlantic

Kristin Kaschner (Albert-Ludwigs-University of Freiburg, Germany)

Coauthors: Rob Williams (University of St Andrews, UK) and **Erin Ashe** (University of St Andrews, UK)

The identification of ecologically or biologically significant areas (EBSAs) is one of the key first steps towards reaching the CBD 2012 Marine Targets for Setting up Marine Protected Areas in the High Seas. Criteria used to define EBSAs include biological diversity and special importance to life history stages such as breeding areas and migration corridors. These criteria largely overlap with the main goals of the ongoing UNEP-Spain LifeWeb project "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific".

Here we present results from an analysis summarizing the extent of available marine mammal (cetacean) data and information in the Wider Caribbean Region, initiated and funded by the LifeWeb project and the Whale and Dolphin Conservation Society (WDCS). As of November 2011, there were more than 18,000 occurrence records of cetaceans in the Wider Caribbean available through OBIS-SEAMAP, yet the vast majority of these records are spatially concentrated in the northern Gulf of Mexico, while occurrence records from the main Caribbean Sea are very sparse. In addition, there is large variability in terms of the data available for different species, with common bottlenose dolphin (*Tursiops truncatus*) sightings making up more than 70% of all records.

The analysis also highlighted the importance of effort considerations, which would otherwise largely impact the perception of occurrence and distribution of cetaceans in the area. Outputs from line transect surveys on the other hand are corrected for effort and currently provide the only means to produce the geo-referenced density information, which ideally should be the basis of any quantitative spatial planning exercise. Our analysis showed, however, that survey coverage is very patchy, concentrated in the northern Gulf of Mexico. In the Caribbean Sea itself, there were only two surveys, the French REMMOA¹¹ surveys, producing absolute abundance estimates for French overseas territorial waters surrounding the French Antilles and French Guiana. The visualization of a species environmental niche envelope, using mapping approaches such as the Relative Environmental (RES) model or AquaMaps (www.aquamaps. org) may represent a useful alternative to assess potential large-

WORKSHOPS

¹¹ Ridoux V, Certain G, Dorémus G, Laran S, Van Canneyt O, Watremez P (2010) Mapping diversity and relative density of cetaceans and other pelagic megafauna across the tropics: general design and progress of the REMMOA aerial surveys conducted in the French EEZ and adjacent waters. Report SC/62/E14 submitted to the Scientific Committee of the International Whaling Commission (unpublished), Agadir, Morocco, 13 pp.

scale occurrence of cetaceans in the Wider Caribbean Region. Although the directly available global distributions matched known regional occurrence quite well for some species, a comparison of global RES predictions with regional species occurrence highlighted the importance of incorporating regional expert knowledge and seasonal aspects to adequately capture known species occurrence on smaller scales.

In conclusion, the cetacean data currently available through online data repositories highlight the large gaps and unrepresentative survey coverage of this region. Available data thus need to be used with caution, keeping known effort biases in mind. Ultimately, this situation can best be remedied through some concentrated, large-scale survey effort in this area. Modeling approaches that infer cetacean densities in unsurveyed areas based on empirical data and predicted distribution, described in Kristin Kaschner's presentation in Panel 2, may also be helpful in this respect. In the meantime and until better data or outputs from these types of models become available, mapping of known and probable occurrence of species, using approaches such as AquaMaps that allow for incorporation of regional expert knowledge, can be helpful to determine priority areas for future research and conservation efforts. This is currently being undertaken as part of the UNEP-LifeWeb project (to be completed February 2012). Outputs in the form of mapped known and probable distributions of cetaceans in the Caribbean may also represent a useful contribution to the regional CBD workshop focusing on the identification of EBSAs in the Tropical Central Atlantic (February 2012, Recife, Brazil).

Mapping ecological and socioeconomic factors for marine mammal management in the Caribbean

Hélène Souan (SPAW – Regional Activity Centre, Guadeloupe)

The production of maps displaying marine mammal distribution, threats, and conservation measures is the key expected output of component 1 of the Spain-funded UNEP LifeWeb project "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific". Component 1 aims to progress data integration, mapping and GIS analysis of marine mammal migration routes, critical habitats and human threats at the regional scale for both the Caribbean and the Eastern Pacific.

For the Caribbean region, the data for documenting socio-economic factors such as direct fishing and bycatch, pollution, intensity of marine traffic and other aspects have been compiled and the corresponding maps have been produced. The same goes for the maps and factsheets on policies for marine mammal conservation (describing suitable MPAs for marine mammals and outlining legal protection measures). The maps and comprehensive factsheets are not all finalized yet, but some examples of possible outputs were displayed during the presentation. Describing and accurately mapping marine mammal distributions and migration routes, however, remains a challenge, as available datasets are scarce. Although many publications have been produced over the years, few species are well documented, and not all the sectors of the Wider Caribbean have been investigated with the same intensity and with consistent protocols. In order to overcome, to the extent possible, the lack of homogeneous surveys in the recorded efforts, other tools and approaches have had to be explored. These first results obtained so far will hopefully be able to be complemented by varied information on distribution, species richness and/or movements for the whole Wider Caribbean Region.

A Management Plan for the Dominican Republic Marine Mammal Sanctuary, a key to consolidate the Sanctuary, one of most important marine protected areas in the Caribbean and Western North Atlantic

Patricia Lancho (Fundación Dominicana de Estudios Marinos – FUNDEMAR, Dominican Republic)

The Marine Mammal Sanctuary of the Dominican Republic is the largest protected area in the country and recently passed 25 years without a management plan. This year, FUNDEMAR, the Dominican Republic Ministry of Environment and Natural Resources, and UNEP-CEP made an agreement to develop the management plan for the sanctuary. Some of the main difficulties that we have found are: the large size of the sanctuary, the lack of permanent personnel throughout the year and the different levels of knowledge about and uses of the area.

To develop the plan we are using methodology from the Ministry of Environment, enriched with experiences from the sister sanctuary relationship with the Stellwagen Bank National Marine Sanctuary, in order to plan in advance for the next five years. The process has invited high numbers of stakeholders, individual and institutional, Dominican and foreigners. The main information sources are from the Ministry of Environment, FUNDEMAR, Atemar, CIBIMA and CEBSE, and in NOAA's publications about research in the sanctuary, and the main lack of information is regarding future fishery use.¹²

¹² MMPA acronyms commonly used in the Dominican Republic include FUNDEMAR, Fundación Dominicana de Estudios Marinos (Dominican Foundation for Marine Research); CIBIMA, Centro de Investigaciones de Biología Marina de la Universidad Autónoma de Santo Domingo (Center for Marine Biology Research from the Autonomous University of Santo Domingo); CEBSE, Centro para el Ecodesarrollo de la Bahía de Samaná y su entorno (Center for Eco-development of the Samaná Bay Region). Atemar, Asesoría Ambiental y Tecnología Maritima, is a consulting company focusing on the environment and marine technology.

Summary of Discussion

The main topics on the agenda for discussion centered on:

- Effective spatial information and data for broad-scale marine spatial planning (MSP) and mapping.
- Emerging planning approaches for large marine mammal management.
- Transboundary marine mammal management strategies and arrangements.
- Synergies that might be possible with other processes and efforts.

The workshop participants recognized that marine mammals have significant ecological, aesthetic and economic value to the countries and territories of the East Pacific and Wider Caribbean regions, that the waters of these regions serve as primary habitats for critical stages of their life cycles, while also serving as key satellite sites directly connected to habitats in distant waters via long-ranging north-south migration routes in both Atlantic and Pacific oceans. The workshop expressed concern that marine mammals in these regions face a range of severe impacts from human activities, as well as those from climate change impacting on food webs, ecosystem productivity, oceanographic processes and connectivity. There is ever greater need to address these different stressors via comprehensive and integrated ecosystembased management that includes, inter alia, marine protected area networks and special marine management areas as tools. Marine spatial planning is a very useful tool for marine mammal management interventions that requires quantitative and qualitative data and mapping of essential habitats and migration routes, including ecological and socio-economic information (e.g., species distribution and abundance, fisheries, shipping, pollution, tourism development, among other things). However, there are data limitations including large data gaps for regions such as the Wider Caribbean and the Southeast Pacific due to the varying level of effort and the financial and time implications for comprehensive quantitative data gathering and analysis.

Workshop participants acknowledged that the Lifeweb Project "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific" supported by the Government of Spain and coordinated through UNEP, constitutes an outstanding opportunity to bring together a variety of stakeholders such as scientists, managers, and governmental and non-governmental organizations to join efforts for marine mammal spatial planning and networking. There are also efforts as part of the framework of the Convention on Biological Diversity (CBD) to identify largescale ecologically or biologically significant areas (EBSAs); the upcoming regional EBSA Workshops (e.g., for the Caribbean and Tropical Atlantic Region, Bahia, Brazil, 28 February-2 March 2012) will provide opportunities for broad-scale marine spatial planning for marine mammal conservation.

Recommendations from Workshop 4B

In light of the workshop discussions and considering the Action Plans for the Conservation of Marine Mammals that have been adopted in the Wider Caribbean and Southeast Pacific regions under the Cartagena and Lima Conventions of the UNEP Regional Seas Programmes, the Workshop 4B participants **encourage** countries, managers and scientific teams of the Wider Caribbean and Eastern Pacific regions to apply the following recommendations:

Immediately **develop** a feasible and realistic plan for synthesizing existing data, including expert opinion, in maps that can be used as communication tools. This plan should also outline the ways and means to make reasonable comparisons between the qualitative and quantitative summaries, which should include the relevant socio-economic information.

Compile and **standardize** the use of historical data (e.g., archaeological data), as well **establish** minimum protocols for future data collection efforts (e.g., preparing standardized questionnaires for whale watching operators; encouraging researchers who study cetaceans through photo-ID to routinely collect geo-referenced trackline effort, bearing, and distance data to allow density to be modeled from effort and sightings data). Those protocols should be made widely available to stakeholders to facilitate data comparison for marine spatial planning purposes.

Use existing data inventory to **identify** and **prioritize** filling the data gaps, and consider, for example, conducting a large-scale survey (on the scale of the SCANS II, TNASS or CODA surveys conducted in other areas of the North Atlantic), as well as other standardized surveys which are cost-effective and opportunistic, to **gather** relevant oceanographic, ecological and socio-economic data.

Workshop 5: North East of South America, Regional Cooperation for a Marine Mammals Conservation Strategy Workshop – MAMA COCO SEA Project

Coordinators: Marion Brichet (Agence des aires marines protégées, France)

Co-Chairs: François Gauthiez (Agence des aires marines protégées, France) and **Hélène Souan** (SPAW – Regional Activity Centre, Guadeloupe)

Participants: Marion Brichet, Virginie Dosreis, Marc-Henri Duffaud, François Gauthiez, Catalina Gomez-Salazar, Thierry Houard, Gaël Hubert, Sophie Laran, Miriam Marmontel, Carole Martinez, Nicolas Maslach, Denis Ody, Lenin Enrique Oviedo Correa, Monique Pool, Marcela Portocarrero-Aya, Romain Renoux, John Reynolds, Vincent Ridoux, Marie-Catherine Santoni, Hélène Souan, Lesley Sutty, Fernando Trujillo, Olivier Van Canneyt, Gaëlle Vandersarren, Pierre Watremez

Introduction

In French Guiana, an inventory of marine mammal populations drawn up by the University of La Rochelle Marine Mammals Research Centre (Centre de recherche sur les mammifères marins – CRMM), for the French Marine Protected Areas Agency (Agence des aires marines protégées), revealed a significant, previously unsuspected, abundance. The density of cetaceans observed in French Guiana is substantially higher than in the French West Indies. These studies, and the regional strategic analysis of the marine environment performed by the French MPA Agency in French Guiana (2009), highlight the potential importance of a regional scientific cooperation project on marine mammals to respond to the challenges identified.

A regional approach vital for conservation

French Guiana shares many marine mammal species with neighboring countries. The diversity of the species, their cross-border distribution range and their status, for some of them endangered, underline the need for increased, coordinated action between the various countries. The inclusion of some or all of the species in various international conventions and treaties makes cooperation between countries in northeastern Latin America, from northern Brazil to Venezuela, including Trinidad and Tobago and the "ABC islands" of the Dutch Caribbean (Aruba, Bonaire, Curaçao), all the more pertinent. A cooperation project covering the entire area from Brazil to Venezuela would thus appear to be a useful avenue to explore in response to the challenges in French Guiana and the region.

Presentations

REMMOA survey results for French Guiana and the French Caribbean

Vincent Ridoux (Centre de Recherche sur les Mammifères Marins, Observatoire Pelagis, Université de La Rochelle-CNRS, France)

The context for the REMMOA¹³ survey was the French policy to designate MPAs in 10% of the French worldwide exclusive economic zone (EEZ) by 2012 and 20% by 2020. 97% of the 11 million km² marine EEZ under French jurisdiction is located around overseas territories, where offshore biodiversity is poorly known. There is an urgent need to develop baseline knowledge of pelagic megafauna as an index of off-shore biodiversity in these vast areas. The methodology must be standardized to allow regional and year-to-year comparisons. Habitat modeling will provide the scientific basis for identifying priority areas for future MPAs.

The objectives were to inform management policy with objective data on pelagic systems in the entire French overseas EEZ. In 2008, two pilot studies were conducted in the Atlantic. We looked for basic metrics for nature conservation and management (species, numbers, locations). The sampling protocol consisted of multispecific aerial surveys constrained for marine mammals, similar to the SCANS II Protocol that was developed for small cetacean surveys in Europe.

The results included a sightings summary, revealing marine mammal species composition, to be followed by spatial habitat models, using a covariate selection process to reveal key habitats in the Caribbean and in French Guiana. Sufficient sightings were recorded to estimate minimal abundance for *Tursiops truncatus* and *Sotalia guianensis*.

In conclusion, aerial surveys provide – quickly and at comparatively low cost – standardized information for the identification of priority habitats within the whole EEZ. The main habitats have been identified for both areas (French Caribbean and Guiana) and these can serve as an objective basis to design MPAs especially if confirmed by additional surveys. Further improvements are needed to enhance the sample size in the Caribbean-French Guiana, to obtain seasonal and year-to-year variability, interspecific interactions, and to perform a sensitivity analysis.

¹³ REcensement des Mammifères marins et autres Mégafaunes pélagiques par Observation Aérienne (Census of marine mammals and other pelagic megafauna by aerial survey)

New consideration for marine issues in French Guiana

Marc-Henri Duffaud (Environmental Regional Direction, French Guiana)

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Following the successful collaboration between the Environmental Regional Direction in French Guiana and the French MPA Agency, strategic planning for marine biodiversity conservation was established. At the same time, the Marine Mammals Research Centre began to make a general inventory of the exclusive economic zone of French Guiana. The result of this survey was notable for the diversity and quantity of marine mammals found. This new knowledge has led to a review of local assessments on the issue of marine mammals.

The Environmental Regional Direction in French Guiana is therefore working now with Brazil to implement a regional cooperation project for the conservation of marine mammals. The first steps of this action will focus on data exchange and monitoring coordination. Moreover, based on strategic analysis, studies were conducted on sea grass beds, submarine rocky areas, and inventories of pelagic birds. All of these will contribute to the implementation of marine ZNIEFF (zone naturelle d'intérêt écologique, faunistique et floristique, or Natural Areas of Ecological, Faunal and Floral Interest), already begun with the adoption of reference lists and the preparation of critical species lists.

Dolphin monitoring and research programme in suriname

Monique Pool (Suriname Environmental Advisory Services, Suriname)

The Green Heritage Fund Suriname has set itself the goal, within the framework of its Dolphin Monitoring and Research Programme, to engage public authorities and the general public in a process to consider the establishment of MPAs.

For that purpose, a workshop was held in March 2010 – The Dolphin Programme Coastal Zone Management and Marine Protected Areas Workshop – to provide an introductory overview of MPAs. During this workshop, the process, as well as a clarification of the role of the Green Heritage Fund in the designation and implementation of MPAs in the territorial sea (from shore to 3 miles), were provided.

This first step in the process in which the Green Heritage Fund as an advocacy group wished to inform public authorities and public opinion of the benefits of Coastal Zone Management and MPAs was expanded on at a conference 1½ years after the initial workshop. Opinions of policy-makers were presented, reporting on the current status of this initiative.

Cetacean critical habitat assessment in the central-northeast coast of venezuela

Lenin Enrique Oviedo Correa (The Swire Institute of Marine Science, The University of Hong Kong, China)

The coastal area of Venezuela has the largest and most concentrated population in the Caribbean (61% of the country's population), along with equally considerable shipping traffic and one of the largest fishing catches in the region. This is partly related to an important pelagic fish population, which sustains this high level of coastal development. Venezuela's coast also supports some of the richest marine biodiversity in the region. Current strategic policies, prioritized by the Venezuelan government, aim to promote and increase national food production to achieve self-sustainability, and, integrated within these policies, is the important local sector of artisanal fishing.

Coastal and neritic critical habitats of dolphins are associated with key ecologically dynamic processes, such as coastal upwelling, and locally identified bays and coves with specific values in term of species ecology and survival (e.g., foraging areas). Granting MPA status to identified critical habitats would promote healthy population growth and wider ecosystem benefits. Thus, the scope of protection might include the basic complex of trophic relationships with upwellings and small pelagic fish aggregations.

Manatees in French Guiana

Virginie Dosreis (Kwata NGO, French Guiana)

Our manatee study in French Guiana has used various methods. Two surveys based on interviews were conducted in 2000 and 2001 and revealed the wide distribution of manatees along the coast of French Guiana.

Recently, more interviews were undertaken to update the initial work. Moreover, a survey method has been tested for quantitative estimation of population size, using lateral sonar tracked in turbid waters with visual confirmation.

This project could be expanded in collaboration with Brazilian teams and by comparison with other monitoring methods (e.g., ARGOS tags). Public awareness is needed.

Conservation of freshwater dolphins in South America: A regional cooperation initiative among countries, stakeholders and policy makers

Marcela Portocarrero-Aya (University of Hull, UK, and Fundación Omacha, Colombia)

The initiative "Abundance Estimation of River Dolphins in South America" constitutes the first regional scheme for the conservation of freshwater dolphins (*Inia* spp. and *Sotalia* spp.) in

the Amazon and Orinoco river basins. So far the initiative has involved 31 researchers from six countries and has been supported by WWF, WCS, WDCS, IUCN, Whitley Fund, National Geographic, Fundación Omacha and Asociación Faunagua.

The formulation of the Action Plan for the Conservation of South American River dolphins (2010-2020) managed to gather in the same venue for the first time government representatives, policy makers, experts on river dolphins, freshwater ecosystems and fisheries, and donors from Colombia, Venezuela, Peru, Ecuador, Bolivia, Brazil, Argentina, UK, and Switzerland.

The establishment of the South American River Dolphin Protected Area Network (SARDPAN) has become the third regional river dolphin conservation initiative in recent years to bring together stakeholders involved in river dolphin and freshwater biodiversity conservation and protected areas management.

Aquatic mammals as ecological indicators to integrate monitoring programs and assessments with management practices

Catalina Gomez-Salazar (Dalhousie University, Canada, and Fundación Omacha, Colombia)

The impacts of human activities on aquatic ecosystems are dramatically increasing and are often unsustainable in the long term. Measuring habitat degradation in aquatic ecosystems is extremely challenging because the majority of consequences of human stressors occur underwater and thus are harder to track and measure since they are not usually detectable by the technology used in terrestrial systems.

Therefore, including information on indicator species such as aquatic mammals to assess, monitor and mitigate human stressors is worth investigating. Aquatic mammals could potentially be used as ecological indicators with the aim of integrating the monitoring and assessment of ecosystem degradation with management practices.

Summary of Discussion

Following the aerial survey conducted in French Guiana, there has been great interest in marine mammal populations from other countries in the region. Details of the methods were explained including species identification, especially of *Sotalia* species. Some recommendations to organize networks were suggested. Venezuela's representative welcomed this cooperation project and the network idea. First, it is necessary to define conservation areas and study them; second, the different methods of protection for land and marine need to be considered; third, every stakeholder has to be involved. The project should take into account all threats including the issues of oil spills and shipping accidents as well as chronic land (run-off), marine-based pollution and fisheries interactions. Several studies on *Sotalia* species are progressing and Suriname has begun to work with Brazilian and Costa Rican teams. In Venezuela's northeastern coast, an important work is ongoing on a coastal population of *Sotalia* sp., where evidence suggests that they have a very small localized home range. In French Guiana, as well, local teams are working with Brazilian teams especially on manatees. These studies are testing acoustic methods because the turbid waters prevent visual observations. Another problem comes from human capacity because there are not enough researchers.

French Guiana research into marine issues provides an indication of the overall situation. However, more monitoring and surveys are needed with different priorities to learn about bycatch, fine-scale species distribution, and other matters. It would be valuable to exchange data between countries to understand the current situation and data gaps.

A debate has been engaged on research priorities. Some propositions were considered as well as standardization of data collection or similar approaches for different areas (for example, aerial surveys). A common problem in several countries in this project is a lack of marine biologists. Concerning species, *Sotalia* is the priority species in the area. Various marine protected areas exist but, as reported by each country, none have been created for marine mammal conservation. For example, in Venezuela only recently have cetaceans had critical habitats identified with the purpose of exploring conservation strategies, specifically for the common dolphin and other delphinids in the central coast of the country.

All participants agreed it was essential to work with local stakeholders such as fishermen. Marine mammals have been suggested as ecological indicators and can be useful to transmit scientific information to stakeholders. For example, dolphin density can be combined with a human stress/anthropogenic threats index.

To build this regional project, various suggestions have been made by participants, who were conscious of the various complex political and environmental aspects. Much information is needed. Countries have marine protected areas (though principally not created based on marine wildlife densities) but there are gaps in management and funding. It could be valuable to develop an action plan but a trigger is needed.

Recommendations from Workshop 5

To initiate cooperation on marine mammals in the northeastern Latin American region, Workshop 5 participants will concentrate first on obtaining and disseminating knowledge. All species in the region should be considered, but special attention should be afforded to *Sotalia* species.

In the short term, Workshop 5 participants intend to:

- Update and complete the ICMMPA 2 Workshop 5 background paper;
- (2) Organize a new workshop to be held in September or October 2012, in Paramaribo, Suriname, to:

- a. establish the state of the art on knowledge of marine mammals (species and critical habitats), threats and current legal management framework, country by country. In some cases, assistance for data analysis will be needed, and
- b. set up an action plan (including *inter alia* capacity building through training courses, regional surveys, a stranding network).
- In the longer term, Workshop 5 participants **recommend** that they:
- (3) Take the opportunity from existing regional projects to foresee the way to develop synergies (example: Ríos de America project);
- (4) Consider joining the Amazon cooperation treaty organization and Guiana shield facility;
- (5) Help each other develop a strategy for fundraising; and
- (6) Involve SPAW-RAC and the following countries Brazil, French Guiana, Suriname, Guyana, Venezuela, Trinidad & Tobago and ABC Dutch Caribbean islands – in their organization.
Workshop 6: GOBI-UNEP/LifeWeb Technical Session: Identifying EBSAs and Critical Habitats in the Wider Caribbean and East Pacific to Inform Marine Mammal Management Planning

(cancelled as a separate workshop and included as part of Workshop 4B and Workshop 9)



Blainville's beaked whale in the Canary Islands Photo by David Sellwood (courtesy Erich Hoyt, WDCS)



Some populations of killer whales, or orcas, in the US, Canada and the Mediterranean are considered endangered by national or regional bodies. Photo by Harriet Huber, National Marine Mammal Laboratory, NOAA Fisheries



Killer whales off Kamchatka, Russia, where marine traffic, even in this remote corner of the North Pacific, is steadily increasing Photo by Tatiana Ivkovich, Far East Russia Orca Project, Whale and Dolphin Conservation Society

Workshop 7: Immediate and Lingering Impacts of Oil Disasters on Marine Mammals: Review of Experiences and Policy Implications

Coordinators: Teri Rowles (NOAA Fisheries-OPR, Marine Mammal Health and Stranding Response Program, USA) and **David Mattila** (IWC and NOAA-ONMS, USA)

Rapporteur: Jaclyn Taylor (NOAA, USA)

Participants: Philippe Baillot, Patricio Bernal, Nancy Daves, Greg Donovan, Cécile Lefeuvre, David Mattila, Naomi McIntosh, Véronique Moriniere, José Truda Palazzo, Jr, Teri Rowles, Ric Sagarminaga van Buiten, Aurelie Tasciotti, Jaclyn Taylor, Steven Tucker, Chloë Webster, Rob Williams, Mike Ziccardi, others

Introduction

Every oil spill, both large and small, offers an opportunity for learning experiences. In the wake of the large-scale Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010, the largest oil spill in US history, there have been more questions about the impacts of oil disasters on marine mammals and what might be done to mitigate the effects both short- and long-term and to prepare better for future spills. This workshop, with experts in both marine mammals and oil spill response, examined the effects on marine mammals and considered various scenarios and strategies for oil spill preparedness and response. Recommendations focused on how the situation can be improved.

Presentations

Oil spill contingency planning response strategies and tools

Véronique Moriniere (RAC/REMPEITC – Caribe, Curaçao, Caribbean Netherlands)

The REMPEITC is the Regional Marine Pollution Emergency Information and Training Center in the Wider Caribbean Region. It is a joint IMO and UNEP center, and is one of the three Regional Activity Centers (RAC) of the Caribbean Environment Program (CEP) of UNEP, related to the Oil Spill Protocol of the Cartagena Convention. One of its main missions is to promote international cooperation and preparedness on oil spill response. It works with the governments of the Wider Caribbean region organizing activities, such as training, seminars and exercises, at both national and regional levels.

The key for an efficient oil spill response is pre-planning. The mechanisms for the establishment of the response and management tools must be pre-defined in Oil Spill Contingency Plans. These plans must define three levels of response capabilities: local, national and international (tier 1 to 3). Contingency Planning includes the definition of areas at risk to be protected in order of priority, and the wildlife protection community has an important role to play in this pre-definition.

Worldwide, there exists a number of international and regional organizations involved in oil spill preparedness and response, including governmental organizations, industries, and NGOs. One challenge for the oil spill response community is to communicate, work together and share the resources, especially in less developed areas where the resources are scarce. An example of a cooperation agreement is the Global Initiative, led by the IMO and IPIECA (International Petroleum Industry Environmental Conservation Association), which implement programs in several regions of the world to promote cooperation between governments and industry.

Promoting cooperation also includes making sure that all response parties know each other and are well connected. REMPEITC's representation at this 2nd ICMMPA was an opportunity to discuss this important topic: marine mammals experts, available to work on oil spill response and rescue issues, have to be familiar with oil spill response strategies and management, and oil spill responders have to be familiar with marine mammals and other wildlife specific issues and problems.

An example of cooperation between these two worlds is the current project of the REMPEITC to develop a GIS-based database on the maritime routes in the Wider Caribbean Region (to be available online at the end of the year). This project will constitute an important tool for oil spill risk assessment in the region, but it can also be of great interest for MMPA topics. The two regional activity centers (RACs) of the Caribbean Environment Plan, the SPAW-RAC and the REMPEITC-RAC, have been communicating to share data.

The Effects of Oil on Marine Mammals

Teri Rowles (NOAA Fisheries-OPR, Marine Mammal Health and Stranding Response Program, USA)

Marine mammal protected area (MMPA) managers and marine mammal scientists may have many roles during an oil spill including roles in wildlife response, impact assessment, mitigation, and long-term assessments. Of critical importance to MMPA managers is the scientific information on oil spill impacts from direct or indirect exposure to oil and from response activities such as dispersant applications and in-situ burn operations.

Oil is a complex mixture of products and changes over time as the oil is weathered. The toxic or physical effects of oil are dependent on the type of oil, the status of the oil (weathering), exposure (in both dose and route), the species affected, and the overall physiological/biological status of the individual affected. Some species, such as otters and fur seals, have significant impacts due to the physical effects of the oil and may be obvious during a spill; others may be sensitive to the toxicological effects that may not be obvious in either the short- or long term. In the planning and response stage, the availability of environmental sensitivity maps is critical to protecting areas or species yet most national or international plans often include only shoreline or coastal sensitivity maps and not oceanic sensitivity maps. There are published data on impacts on pinnipeds and otters which include both external and internal oiling effects; for example, impacts on reproduction, survival, and organ pathology (neural, respiratory, blood, immune, liver, and kidney). There are, however, sparse data on acute effects on cetaceans and some published reports documenting loss of individuals (e.g., in the case of the orcas after missing from their pod after the Exxon Valdez oil spill).

As part of a manager's responsibilities, documentation of exposure and effects during the spill and medium to long-term assessments after the spill are important. During Deepwater Horizon, assessment of cetaceans both inshore and offshore did occur utilizing stranding information, photo-ID, biopsy, tagging, passive acoustic monitoring, and surveys (boat-based and aerial). MMPA managers should be familiar with the potential impacts of both oil and response activities and should use appropriate tools and techniques to document acute, medium- and long-term impacts on populations and their ecosystems.

Overview of oil spill response for marine mammals in the US

Mike Ziccardi (Oiled Wildlife Care Network, USA)

In the United States, there is a requirement for Area Contingency Plans to provide for a specific fish and wildlife response plan to minimize disruption to them and their habitat. Funding to respond to oiled wildlife is the responsibility of the spiller or, if the spiller is not identified, federal funding managed by the US Coast Guard is available. To assist with this (as well as to organize response if and when needed), NOAA has developed, and conducts training in, Marine Mammal Oil Spill Response Guidelines (MMOSRG) – a living document that changes after every major event, including the Deepwater Horizon spill.

This presentation detailed the key aspects of these guidelines as related to marine mammal collection, care, and readiness activities as an example of how an integrated program can be implemented to protect marine mammals during such incidents. If warranted, this model could be effectively used for marine protected areas on an international level in order to:

- Combine mammal-specific information into contingency plans.
- Develop resources needed to rapidly and effectively respond during incidents.
- Integrate local resources for immediate and intermediate monitoring programs.

Summary of Discussion

Participants discussed the international coordination for oil spills. For the Wider Caribbean, the RAC/REMPEITC does the planning. Internationally, there is a database for all of the existing national contingency plans. There is some international coordination from the IMO, but each country coordinates its own response. IMO's role is to exchange information with other countries, but the information is fragmented. There is no single location for all of the information.

What about post-response monitoring? If post-response monitoring is in the contingency plan, then it may be included as part of the response. Each country has its own policy on when to start each phase of an oil spill response from initial response to injury assessment and long-term monitoring. Even in the US Oil Pollution Act of 1990 (OPA 90), it is still difficult to obtain funding for anything beyond the actual response phase and there are regional differences between what is covered in wildlife response. When the initial response ends, the Coast Guard and responsible party may disappear in some countries or some situations. Then it is not clear who pays for the injury assessment and the postresponse and long-term monitoring. Internationally, there is no a requirement for damage assessment or for long-term monitoring.

Every case is different. Is there a place where people can go to learn from other oil spill response experiences? The IMO has meetings with experts all over the world, but the main focus is on the operational portion of the response and cleanup. It includes response and the effects on nature but the wildlife impacts, particularly marine mammals, may not be included as a strong component of the post-response review and reporting.

For tanker spills, the ITOF also provides summary planning documents. For the US, the most complete source of information is the Coast Guard's incident-specific preparedness reviews, available online.

It was mentioned that dispersants do help with biodegradation of the oil but PAHs (crude oil called polycyclic aromatic hydrocarbons) are very persistent in the environment and may remain longer than is evident in the actual visible oil. The use of dispersants doesn't mean the oil is gone; it will not degrade that quickly. The oil is just displaced into smaller droplets and into the water column, but it is still there.

Was there an overload or dysfunction of the Incident Command System (ICS) by having handled both response and damage assessment in a spill of the size of Deepwater Horizon? Under OPA 90, damage assessment is outside of the unified command. When response and natural resource damage assessment (NRDA) overlap with a limited or the same staff, it is taxing to staff. At

height of the response, there were over 47,000 people actively working on the response including private groups working on their own. We now know new complexities of working on a spill of national significance.

Regarding public pressure put on response decisions (e.g., to save tourist beaches vs. saving the whales), throughout a spill response there are competing needs and environmental trade off decisions that have to be made. Human and environmental impacts have to be considered. Within the ICS during an actual response, one hopes there is enough knowledge to know what the critical resources are that have to be dealt with. At times it is difficult to emphasize the importance of the marsh and sea grass. The public wants the birds and whales saved over the sea grass. People often don't understand the interconnection of these. Pre-planning is critical in order to have those discussions of sensitivity before a spill rather than having those discussions during a spill.

During Deepwater Horizon, the US Coast Guard got a good lesson in handling public affairs and was initially behind on the communications to the public. The Coast Guard began holding public meetings to communicate the reasons behind the response decisions. The hope is that you have the resource to save the animals and the habitat and a mechanism for input from the public. Before the spill response starts, the environmental trade-offs should be discussed between the response community and the wildlife or environmental community and possibly the public. It is best to evaluate the options and develop communication strategies in a calm situation, not during the height of the response.

We are also missing out on huge opportunities to learn from smaller oil spills. The lessons are that we should strongly encourage debriefings and lessons learned from smaller spills which occur more often. Of course, it is also important to have adequate science to support decisions.

Discussion Toward Recommendations

Marine mammals are long-lived animals, and it is dangerous for short-term studies to make pronouncements. We need to be looking at long-term monitoring studies. In the context of MPAs, we need to know much better what we mean by baselines. We need a better idea of what the variability is and what types of wildlife populations we have in MPAs. The likely effects from a spill can be difficult or meaningless to detect in the short term. It is also difficult to maintain funding for long-term studies. During a spill, there need to be investigations on animals that have been impacted as well as on "unimpacted" animals for comparisons. There need to be short-term and intermediate term assessments. There needs to be post-release monitoring of released animals (both beach release and rehabilitation release) as well those that were assessed during the spill.

In terms of table top exercises that could be developed from the Deepwater Horizon experiences and shared with managers, the partnership between the Oiled Wildlife Care Network (OWCN), NOAA and the US Coast Guard will incorporate wildlife in the table top exercises that already exist. The response and wildlife communities need to understand each other. The most recent drill in California had a large contingent from the Channel Islands National Marine Sanctuary. Things are changing. If there are drills and exercises that are planned, it is important to join early to be included in the exercise. The REMPEITC exercises, however, do not include marine mammals and only briefly mention wildlife recovery.

Marine mammals are not included in broader disaster responses – hurricanes, typhoons, etc. Marine mammals need to be included in drills for broader natural disasters.

Finding qualified personnel can be difficult. New Zealand has a good national plan. In their plan, they identify international groups ahead of time and at a tier 3 response they will call in international experts to help. The best thing to do is to get involved with some of the international programs – some 10 organizations. OWCN is funded to respond to and prepare for events in California. They are always interested in promoting training and outreach.

In the Russian Federation, typical of other places, the oil company is in charge of the response and has the plan. Oil companies have contingency plans and are often in charge through professional group organizations. If OSR is responding to a spill and there is no wildlife plan in place, they can do some of the response through existing agreements.

In the US Arctic, the US Clean Seas would be the lead for clean up – including for the Alyeska pipelines.

There is no professional body that is geared to reviewing companies' response plans. Best thing is to identify someone you trust to review would be a good thing.

Human error and equipment failure are the leading causes of oil spills. Oil company practices and safety can vary by county. Not all countries have contingency funding if the polluter doesn't pay for the cleanup. That seems to only happen in the US. Spillers insurance is what pays for the response in many instances and that usually has a ceiling which limits the funds available. There is a big difference if a spill takes place in a country's EEZ or if it occurs offshore outside of national jurisdiction.

Some of the possible needs, recommendations and other desired outcomes that were identified and put on the table, and led up to the final recommendations, include:

- Contingency funds are needed internationally with advance planning. Ways should be found to gain the funds though MPAs.
- A strong part of the law of the sea is free transit for ships. We have used the term MPA to show that an area is not a no-take zone. It might be necessary to narrow the term MPA to mean no-take zones for areas where we want a high level of marine mammal protection. The challenge for protection is mostly with the high seas where some feel there are no agreements to establish large MPAs. The idea of protecting areas in the high seas resonates with people, but the idea of enforcement and surveillance would be difficult.

- We need to move towards a more consistent process for the responsible party when an spill event happens – something that can easily fit into their business plan.
- International organizations such as IMO ITOPF/ Industries, IPIECA, ARPEL, API should be encouraged to work in cooperation with marine mammal specialists for oil spill response contingency planning.
- Marine mammal specialists should be encouraged to present impacts of oils spills on animals at key industry meetings.
- All marine mammal protected area managers should be urged to work with the government or national authorities to be included in the regional oil spill response contingency planning and training.
- The ICMMPA should present and distribute these proceedings at International Oil Industry Conferences.

Recommendations from Workshop 7

Recognizing that many international oil spill contingency plans do not include marine mammals or marine mammal protected areas, Workshop 7 **recommends** that the ICMMPA steering committee and MMPA managers should:

- Work together to **encourage** international organizations such as the IMO, ITOPF, IPIECA, ARPEL, and API¹⁴ to work in cooperation with marine mammal specialists for oil spill response contingency planning, drills, and preparedness to ensure a more consistent process and expectation for oil spill (or other hazard/disaster) responses, and
- Work with the appropriate government(s), national authorities, or international/regional bodies (such as the Regional Activity Centers) to **ensure** that MMPAs and marine mammals are included in national/regional oil spill response contingency plans, training activities, and responses.

There remains too little information on individual and population effects of oil on marine mammals, particularly cetaceans and sirenians. Recognizing the difficulty in understanding the impacts especially in long-lived animals, the Workshop:

Strongly **encourages** debriefings, lessons learned, and publication of such evaluations from all spills, including both large and small spills, and incidents that result in the oiling of marine mammals without a declared spill;

Recommends that MMPA managers and the marine mammal scientific community develop baseline information on the variability and types of populations in MMPAs (including temporal, spatial, and other biological aspects) and that short- and long-term studies be undertaken using appropriate assessment tools such as strandings, photo-ID, biopsy, and surveys, using solid science to support decisions; and

Recommends having joint international stranding networks and oil spill working groups.

 ¹⁴ Acronyms used are as follows: IMO – International Maritime Organization;
ITOPF – International Tanker Owners Pollution Federation; IPIECA – Global
Oil and Gas Industry Association for Environmental and Social Issues; ARPEL
– Regional Association of Oil, Gas and Biofuels Sector Companies in Latin
America and the Caribbean; API – American Petroleum Institute.

Workshop 8: Conservation of Sirenians

Chair: John Reynolds (Mote Marine Laboratory, USA)

Rapporteurs: Anaïs Gainette (National Park of Guadeloupe, Guadeloupe) and **Gaël Hubert** (SPAW – Regional Activity Centre, Guadeloupe)

Participants: Anaïs Gainette, Gaël Hubert, Boris Lerebours, Hervé Magnin, Benjamin Morales Vela, Oscar Ramírez, John Reynolds, Vincent Ridoux, Lorenzo Rojas Bracho, Hélène Souan, Fernando Trujillo, Alessandra Vanzella-Khouri

Introduction and Goals

The session was developed around several presentations, summarized below. Following the presentations, a lively discussion focused primarily around the re-introduction of manatees in nearby Guadeloupe. Nonetheless, a set of over-arching recommendations was made. Many thanks go to Anaïs Gainette and Gaël Hubert for volunteering to serve as rapporteurs and for doing a terrific job.

For two reasons, the presentations focused to a large extent on ongoing manatee spatial management in the Wider Caribbean. The main reason was that, given constraints on travel and competition with other conferences, attendance by Caribbean-based professionals was more assured than was attendance by people from other locations. In addition, though, exciting ongoing efforts in the wider Caribbean provide a model for some creative, effective and instructive models that could be transferred and applied to sirenians in other parts of the world.

Thus, the goals of the workshop were to:

- Discuss conservation of sirenians and the role MPAs could and should play in conservation of this order.
- Examine specific causes of success and failure of existing programs.
- Provide a vision of manatee conservation in the Wider Caribbean and explore the role that national and international (e.g., LifeWeb) programs could play.
- Describe creative and novel options (e.g., reintroductions) of manatees into existing and effective MPAs, as a powerful tool for regional conservation.
- Solicit recommendations regarding optimization of MPAs for sirenian conservation.

Presentations¹⁵

Conservation of sirenians

John Reynolds (Mote Marine Laboratory, Florida, USA)

Reynolds began by defining the term "conservation" in a manner that addressed both current and future threats, highlighting considerations of both species and their environments, and that clearly included humans and their needs and activities. Reynolds indicated that keys to success in the developing countries are not related to science so much as to alleviation of poverty and food insecurities and creation of alternative livelihoods. He illustrated this with an example from Mozambique's Bazaruto Archipelago National Park. Indeed, in such countries, the value of a dead animal is more important than that of a living animal. Until that situation changes, conservation of sirenians is going to be extremely difficult, if not impossible.

Conservation can occur without science if the political will exists to conserve; conversely, even with great scientific information, conservation may fail without appropriate political will. Reynolds indicated that conservationists need to establish clear goals; confront the fact that conservation is values-based, more than it is based on science, and establish a central role in conservation of values; adopt a geocentric conservation ethic; clarify issues of temporal and geographic scale; and establish fundamental principles for the 21st century. Optimally, conservation efforts should include: long-term funding; a proactive, not reactive approach; appropriate but not excessive infrastructure; a coherent ideology; leadership; creativity (i.e., not be wedded to traditional, often unsuccessful approaches); interdisciplinary teams (ecologists, economists, sociologists, among other disciplines); and transparency in communication.

Tools for conservation include regulatory tools that often fail to work well (e.g., legal protection, enforcement, and aquatic protected areas) as well as enabling tools. The latter, which are well described in the recently published *Ecology and Conservation of Sirenia: Dugongs and Manatees*,¹⁶ include but are not limited to: education/awareness; community partnerships (as sirenians often live near humans); spatial management of risks; and economic incentives and other economics tools such as economic mortgages, cash payment incentives, and conditional cash transfers for poor countries.

¹⁵ There was to have been one additional presentation by Ellen Hines entitled "Evolving MPA monitoring into marine spatial planning: Aligning science and policy to conserve dugongs and their habitat." The speaker was unable to attend due to an unforeseen, last-minute conflict.

¹⁶ Marsh, H., T.J. O'Shea, and J.E. Reynolds, III. 2011. *Ecology and Conservation of Sirenia: Dugongs and Manatees*. Cambridge University Press.

Reynolds concluded that conservation efforts must recognize the multiple values of ecosystems, place a high value on conservation, and be transparent and proactive. Individuals engaged in such efforts must have courage; be creative, imaginative, and opportunistic; and focus on winning wars, not every battle. MPAs need to be a component of conservation strategies, but they must become more than "paper parks".

Conservation of manatees in the wider Caribbean: Vision, initiatives, momentum, and transferability

Alessandra Vanzella-Khouri (UNEP Caribbean Environment Programme, Jamaica)

Coauthors: Hélène Souan (SPAW – Regional Activity Centre, Guadeloupe) and **John Reynolds** (Mote Marine Laboratory, Florida, USA)

Vanzella-Khouri began by describing the geographic, political, environmental and economic attributes of the Wider Caribbean Region. She noted that there is mostly insufficient, anecdotal information on the status of the manatees here. The Antillean sub-species is endangered, with perhaps 4,000-5,000 widely scattered individuals (compared to nearly 5,000 Florida manatees in Florida). Major regional issues for sustainability of wildlife and ecosystems include climate change, invasive species, and expansion of coastal development.

In the Cartagena Convention and its Protocol for Specially Protected Areas and Wildlife (SPAW), the manatee was, from the outset, a priority species for action by the governments. The first regional management plan for the manatee was adopted by the Parties to the Cartagena Convention in 1995. A revised Manatee Regional Management Plan¹⁷ for the West Indian manatee was published in 2010 around the same time that a regional Marine Mammal Action Plan (MMAP) was developed and approved by the Parties to SPAW.

Vanzella-Khouri reviewed the provisions of the regional MMAP. She noted the lack of information on the status and abundance of marine mammals in the Wider Caribbean; the continued exploitation of the resource; habitat deterioration; limited protection measures; insufficient national capacity for research, enforcement or conservation; and fragmented or non-existing policy. The five-year priorities of the MMAP include: improving knowledge; enhancing capacity to address and manage threats; developing an expert group to guide implementation of the plan; and improving research and conservation capacity. Manatee research and conservation are an important component of the regional MMAP, in addition to the manatee-specific management plan. The latter provides both an overall regional review (covering taxonomy, ecological importance, general status in the region) and national status account (focusing on countryby-country analysis, status and distribution, major threats and conservation, legislation and conservation, socio-economic significance to local communities).

The Caribbean Environment Programme (CEP) and the SPAW Regional Activity Center (SPAW-RAC) work together to implement relevant provisions of both the Cartagena Convention and the SPAW Protocol. Their joint efforts involve focused conservation actions for manatees, as well as action to protect habitat and to build local and regional capacity to identify and mitigate threats.

Some of the lessons learned have been that (a) transboundary cooperation (regional, multilateral, bilateral) and integrated approaches are more useful than more focused efforts; (b) regional initiatives take time and commitment to achieve; (c) a regional, integrated, legal framework for cooperation is essential to pursue common goals and priorities; (d) meaningful actions require and are best delivered with partners, with common vision and objectives; and (e) ultimately, political will is critical to the achievement of objectives.

The LifeWeb program as a potential tool for sirenian conservation in Mesoamerica

Hélène Souan (SPAW – Regional Activity Centre, Guadeloupe)

Coauthor: Alessandra Vanzella-Khouri (UNEP Caribbean Environment Programme, Jamaica)

Manatees are threatened throughout Mesoamerica. There is a dramatic need to develop (a) protected areas for manatees, (b) transboundary cooperation, and (c) spatial management efforts involving all the contiguous countries of this sub-region.

The UNEP LifeWeb project "Broad-scale marine spatial planning of mammal corridors and protected areas in the Wider Caribbean and Southeast and Northeast Pacific" was instituted by the government of Spain to promote broad-scale marine spatial planning to protect marine mammal habitats. The goal of the project is to improve protection of marine mammals through the development and enforcement of appropriate tools including MPAs and travel corridors. It seeks to introduce integrated planning approaches, technical guidance, regional training and learning exchange. The success of the project depends to a great extent on political will in each country.

The LifeWeb project on marine mammals has multiple, interlinked components. For example, component 1 requires regional integration, mapping and GIS analysis of marine mammal migration routes, corridors and habitats. The relevant datasets considered for integration include not only biological/ecological data on species, but also data on effects that human activities can have on marine mammals (e.g., direct and indirect effects of fisheries). The main tasks associated with achieving the goals of component 1 include an inventory and collation of existing ecological

¹⁷ UNEP 2010. Regional Management Plan for the West Indian Manatee (*Trichechus manatus*) compiled by Ester Quintana-Rizzo and John Reynolds III. CEP Technical Report No. 48. UNEP Caribbean Environment Programme, Kingston, Jamaica.

and socio-economic data in a coherent format, followed by GIS analysis and mapping of ecological and socio-economic information to regionally visualize critical habitats and key areas for marine mammals – locations where marine mammal conservation is affected by specific human activities and where active mitigation or conservation are urgently needed.

Component 2 involves regional training and learning exchanges to develop shared best practices and governance principles for successful management activities.

The above two components do not directly target manatees, but manatee conservation can benefit from their implementation. Data on manatees and suitable MPAs are already being incorporated in the analyses carried out under component 1, as described above; component 2 can provide important opportunities to strengthen capacity for and awareness of the need for improved spatial protection for manatees.

Multi-national efforts to create transboundary MPAs that safeguard habitat essential for feeding, breeding, and migration can be an especially useful ingredient in manatee conservation efforts in the Caribbean and elsewhere. An expert working group on manatees has been established under the SPAW protocol to guide implementation of the recommended actions in the regional manatee management plan.

The establishment and challenges of the Chetumal Bay Manatee Protected Area

Benjamin Morales Vela (ECOSUR, Chetumal, México)

Along the Yucatan Peninsula of México, manatees are most abundant in Chetumal Bay which México designated as a protected area for manatees in October 1996. As Chetumal Bay lies within the territorial waters of both México and Belize, Belize subsequently created a protected area there, too. Since 1992, there has generally been strong bilateral cooperation to protect manatees. New information with GPS tags shows that manatees move frequently between México and Belize. The GPS data also show a regional connection for female manatees that use Chetumal Bay and a lagoon system located some distance south in Belize. Thus, cooperation between the two countries is indispensable for manatee conservation.

In recent years, there has been only modest environmental interest in the Chetumal Bay Manatee Protected Area from the Mexican state (i.e., Quintana Roo), and limited management authority exercised by the director of the Mexican reserve. Whereas infrastructure, federal and state funding, stakeholder participation and community support for the Chetumal Bay Manatee Protected Area were once very strong, those parameters have weakened over time.

Two key threats to manatees and their habitat in Chetumal Bay and surrounding waters are: high levels of PCBs that exceed the current threshold for toxicity in dolphins (thresholds for sirenians are unknown), and the use of nylon fishing lines by fishermen. Morales strongly recommended the following steps to strengthen the Mexican manatee reserve:

- Establish a new protected area under federal jurisdiction.
- Continue to advocate regional strategies (e.g., the Mesoamerican barrier reef system project, a LifeWeb program for manatees).
- Encourage México to sign up and become a Party to the SPAW Protocol.

The reintroduction of manatees to the waters of Guadeloupe

Boris Lerebours (National Park of Guadeloupe, Guadeloupe)

Coauthors: Hervé Magnin (National Park of Guadeloupe, Guadeloupe) and **John Reynolds** (Mote Marine Laboratory, Florida, USA)

Lerebours described the known history of manatees in the nearby waters of Guadeloupe and cited reasons why the French government and the National Park of Guadeloupe wish to consider reintroducing the species. The reasons include:

- The current enhanced knowledge of Antillean manatees has afforded the opportunity to explore the reintroduction option;
- The historical threats in the area where the population would be established are relatively minor and generally well controlled; and
- This project could help the restoration of the natural/ historical biodiversity of Guadeloupe. The project has also received support from Parties to the SPAW Protocol as a means by which to promote regional conservation of manatees in the Wider Caribbean.

The proposed site of the reintroduction is the Grand Cul-de-Sac Marin, a marine protected area that already contains no-entry zones and excellent infrastructure for management, enforcement, and research. A review by scientists at Mote Marine Laboratory indicated that the reintroduction could have important regional implications for manatee sustainability and conservation, but that certain questions must be addressed (e.g., pollution levels) and certain obstacles overcome (e.g., threats of fishing gear and boats; endorsement of the project by local stakeholders).

Lerebours described the proposed timelines for different phases of the project. The preparation phase is intended to take approximately four years (between 2009 and 2013), followed by a five-year implementation and monitoring phase. The accomplishments to date include developing improved communications with local fishing groups, assessment of organic contaminants (which are at low levels), and establishing an international expert working group to advise on the process. The challenges that remain include developing relationships with foreign governments to provide animals for the reintroduction.

Summary of Discussion

Discussion of the various presentations and their implications, coordinated by Reynolds, centered on the Guadeloupe reintroduction project in part because it is a regional project, but also because it is a novel, experimental approach to management of sirenians and possibly other marine mammals.

The critical issues of concern regarding the Guadeloupe project extend across a range of economic, sociological, biological and ecological parameters. Lerebours, Magnin, and Reynolds dealt with the majority of the questions. At the end of the discussion, it was apparent that workshop participants felt more comfortable about the reintroduction program as a potential, responsible tool for manatee conservation in the Wider Caribbean. The issues were more a matter of incomplete communication of information than of fundamental disagreements. As noted below, the workshop participants ultimately endorsed, with caution, the concept of reintroduction of manatees into appropriate protected areas (such as the National Park of Guadeloupe) as a very useful conservation measure. At the conclusion of the discussion, Dr. Morales stated: "Don't give up even if it is a long road to success. Even if the legislation for the condor didn't authorize their reintroduction, today we have condors! It's a beautiful project."

Reynolds then asked workshop participants to consider bigger picture issues regarding sirenian conservation and the role that MPAs could play. Workshop participants were asked to develop a list of three key recommendations, recognizing that the list could and should be considerably longer to truly promote the optimal use of MPAs for sirenian conservation. In that regard, participants noted that comprehensive overviews of the topic appear in a publication by Marsh and Morales-Vela called "Guidelines for Developing Protected Areas for Sirenians" and in Reynolds and Morales-Vela's presentation on day one of the Martinique conference.¹⁸

Recommendations from Workshop 8

Workshop 8 agrees to the following key recommendations:

A regional approach to MPAs for sirenians is **recommended** (e.g., Great Barrier Reef Marine Park Authority; northern South America; Amazon basin) to promote goals of internationally endorsed regional management plans (e.g., Caribbean-wide MMPA), but a parallel program to review and recommend improvements to existing, focused, sirenian-based MPAs is also needed to assess whether they are located in optimal locations (hotspots), involve useful processes and scope (buffer zones), and produce results in the form of conservation benefits.

Given the close proximity of sirenians to human communities and their attendant activities, it is especially important to **develop** achievable goals and activities based in the communities, with good communication and transparency among stakeholders (e.g., Chetumal Bay and the Colombian Amazon).

Reintroduction programs, such as that being developed in Guadeloupe, represent a creative option with the potential to improve sirenian conservation, but those programs **require** careful and transparent consideration of science, local cultural values, potential threats, legal constraints, and full stakeholder involvement at all stages.

¹⁸ Marsh, H. and B. Morales-Vela. In press, 2012. "Guidelines for Developing Protected Areas for Sirenians" *In*: Hines, E., J.E. Reynolds, III, A.A. Mignucci-Giannoni, L.V. Aragones, and M. Marmontel (eds.). *Sirenian Conservation: Issues and Strategies in Developing Countries*. University Press of Florida, Gainesville; and Reynolds, J.E. and B. Morales-Vela. 2011. Optimizing the value of MPAs for conservation of sirenians. Second International Conference on Marine Mammal Protected Areas, 7-10 November, Martinique, see p10 of this report.

Workshop 9: Scientific Information to Support MSP: MSP for Marine Mammal Conservation, as well as Considerations of Marine Mammal Science in Broader MSP¹⁹

Coordinators: Tundi Agardy (Sound Seas, USA) and **Patricio Bernal** (Global Ocean Biodiversity Initiative – GOBI, IUCN, Switzerland)

Participants: Tundi Agardy, Patricio Bernal, Alexei Birkun, Nancy Daves, Jacques Denis, Lionel Garder, François Gauthiez, Christina Geijer, Hassani Sami, Tiare T. Holm, Erich Hoyt, Jorge Jimenez, Kristin Kaschner, Dan Laffoley, Véronique Moriniere, Anne Nelson, Giuseppe Notarbartolo di Sciara, Denis Ody, Jessica Redfern, Ric Sagarminaga van Buiten, Brian D. Smith, Steven Tucker, Chloë Webster, others

Introduction and Overview

The presentations for this combined workshop focused on global level planning processes, regional planning processes, and more localized initiatives within MPAs, as well as areas in which MPAs did not yet exist. In effect, practitioners provided experiences and not just opinions on what kinds of information about marine mammals were most useful for spatial management that specifically targeted marine mammals under threat - but also what kinds of information about marine mammals could inform broader marine spatial planning (MSP), in order to ensure that conservation of marine mammals was embedded in the planning processes taking place. The kinds of science discussed included information about distribution, abundance, population trends, behavior and ecology (especially in terms of critical areas), pressures, and impacts. We discussed information important to planning (whether for new MPA site selection and design, or MSP initiatives) as well as information important to management, such as monitoring to determine management efficacy and to allow for adaptive management.

Capsule summaries of the presentations for this café-style workshop were as follows:

- Kristin Kaschner presented on the methodology she used in the GOBI process, comparing use of distribution/ occurrence data with enhanced range maps.
- Patricio Bernal presented on the Convention on Biological Diversity (CBD) process and GOBI, as well as the special case of identifying ecologically or biologically significant areas (EBSAs) in the Arctic.

- Giuseppe Notarbartolo di Sciara presented findings of the EBSA and CHOMP (Critical habitat of Mediterranean predators) initiatives in the Mediterranean.
- Christina Geijer addressed the utility of fin whale data in supporting MSP in the Mediterranean, highlighting two types of uncertainty and their implications.
- Ric Sagarminaga van Buiten spoke to the use of marine mammal research findings in influencing the location of shipping lanes in the Alborán Sea, Mediterranean.
- Denis Ody addressed marine mammal research in the Pelagos Sanctuary (also Mediterranean) including investigation of population size and distribution, as well as hormonal condition of fin whales as an indication of reproductive status.
- Brian D. Smith presented work in the Swatch-of-No Ground, Bangladesh, where mark/recapture and genetic research has informed the selection of a prospective protected area network.

Full summaries follow below.

Presentations

Species distributions and critical areas

Kristin Kaschner (Univ. Freiburg, Germany)

Much progress has been made over the past 10 years to compile available information on marine mammal occurrence and distribution in online data repositories such as OBIS-SEAMAP (seamap.env.duke.edu/), which in total now contain more than 700,000 point records. However, there are large taxonomic and geographic biases affecting this data set: Taxonomically, the difficulties lie in the fact that more than half of these records represent sightings or strandings that have only been identified to the genus or family level. For records identified to the species level, there is much variation in data availability for different species; while there are fewer than 10 or no occurrence records for more than a third of all recognized species, combined records of the top 10 species represent 75% of all available data for marine

¹⁹ Note: Workshop 9 and Workshop 4B each incorporated parts of Workshop 6 originally planned as a separate workshop tentatively called "GOBI-UNEP/LifeWeb Technical Session: Identifying EBSAs and Critical Habitats in the Wider Caribbean and East Pacific to Inform Marine Mammal Management Planning".

mammals available through OBIS-SEAMAP (November 2011). Geographically, monitoring effort is highly concentrated in northern hemisphere continental slope and shelf waters; even in the most intensively surveyed areas, marine mammal species inventories remain incomplete after decades of survey efforts due to the relative rarity and low detectability of many species (Kaschner et al, 2011). A recent analysis of global cetacean line transect coverage estimates that on average only about 10% of the known range of cetacean species has been covered by dedicated surveys and a much smaller percentage has been covered frequently enough to allow the detection of relevant population changes (Kaschner et al, submitted).

The skewed distribution of monitoring effort in the marine environment has large implications in terms of our ability to directly deduce species habitat use or biodiversity patterns from available data. In addition, it also hampers the use of such data to generate predictions of species occurrence using standard species distribution modeling tools. While systematic, spatially-explicit gap analyses can help us to develop better future data collection strategies, the size of the marine environment and the high costs of monitoring efforts will likely preclude a noticeable improvement of the current situation in the foreseeable future. In light of urgent conservation issues, I argue that in the meantime and until better data become available, alternative types of information need to be considered that can inform marine spatial planning processes at larger scales.

One possible alternative is the refinement of expert-drawn binary range maps through the application of methods that enable the visualization of a species environmental niche envelope. In essence, these techniques produce distribution maps in a GIS/ spatial modeling framework that allows for the incorporation of expert knowledge in environmental rather than geographical space. Examples include the Relative Environmental Suitability (RES) model (Kaschner et al. 2006) or the AquaMaps approach (www.aquamaps.org) (Kaschner et al. 2008, Ready et al. 2010), both of which supplement suboptimal point occurrence data with other available information and expert input to describe species habitat usage and environmental preferences in the form of so-called niche envelopes. Ideally, envelope settings should be defined based on consensus of a group of species experts in a workshop setting or through an iterative process in a wiki-type environment. By relating agreed envelopes to local environmental conditions in geographic space, range maps can be produced that balance errors of omissions and commission thus narrowing down potential species occurrence as much as possible.

The resulting distributions have several advantages in comparison to standard presence/absence range maps. Firstly, maps represent reproducible and testable hypotheses about species distributions, based on clearly described underlying assumptions, which can easily be reviewed and modified as new information becomes available. Secondly, outputs can be displayed in the form of gradients of relative habitat suitability, shown to be correlated with relative occurrence for a number of species (Kaschner et al, 2006). During marine spatial planning processes, such information about relative occurrence, especially for species with near cosmopolitan ranges, can be helpful in prioritizing important habitat or areas in need of protection and it can also allow the visualization of biodiversity hot spots where optimal conditions for different species might coincide (Kaschner et al. 2011). Finally, by investigating the relationship between predicted relative species occurrence and observed densities, inferences may be made about species densities in unsurveyed areas (see also Panel 2, Kristin Kaschner's presentation).²⁰

Making visible the ultimate global commons. Identifying ecologically or biologically significant areas (EBSAs) in the ocean: the CBD process

Patricio A. Bernal (IUCN High Seas Initiative, Switzerland)

The need to inform policy processes based on the best scientific data and information available is a huge challenge in the ocean, due to its scale, fluid nature and 3-D character. The ocean is a medium essentially opaque to electromagnetic radiation, where direct observations through remote sensing techniques are severely limited to the monitoring of the surface layers of the ocean and the inference by extrapolation and modelling of the associated 3-D dynamics. This relative "invisibility" of the marine realm is a true obstacle limiting comprehension by the general public and policy makers of this fascinating domain of nature, the healthy functioning of which underpins much of our life-support system on Earth.

With the purpose of acting in a precautionary manner and to contribute to the management of marine resources and to the development of networks of representative MPAs, in 2008 the Convention on Biological Diversity (CBD) established seven criteria to identify ecologically or biologically significant areas (EBSAs):

- Uniqueness or rarity.
- Special importance for life history of species.
- Importance for threatened, endangered or declining species and/or habitats.
- Vulnerability, fragility, sensitivity, slow recovery.
- Biological productivity.
- Biological diversity.
- Naturalness.

²⁰ References in this presentation are: Kaschner K, Watson R, Trites AW, Pauly D (2006) Mapping worldwide distributions of marine mammals using a Relative Environmental Suitability (RES) model. *Marine Ecology Progress Series* 316:285-310; Kaschner K, Ready JS, Agbayani E, Rius J, Kesner-Reyes K, Eastwood PD, South AB, Kullander SO, Rees T, Close CH, Watson R, Pauly D, Froese R (2008) AquaMaps: Predicted range maps for aquatic species. World wide web electronic publication, www. aquamaps.org, Version 08/2010; Kaschner K, Tittensor DP, Ready J, Gerrodette T, Worm B (2011) Current and future patterns of global marine mammal biodiversity. *Plos One* 6:e19653; Ready J, Kaschner K, South AB, Eastwood PD, Rees T, Rius J, Agbayani E, Kullander S, Froese R (2010) Predicting the distributions of marine organisms at the global scale. *Ecological Modelling* 221:467-478

The process of identifying EBSAs using the best scientific data and information available, discounting their further use in management, is equivalent to establishing an open-ended scientific program with the goal of revealing the true ecological complexity of this "oceanic life-web", updating it as new data and information becomes available.

The Global Ocean Biodiversity Initiative (GOBI) was created with the initial support of the German Federal Agency for Nature Conservation (BfN) and funded by the German Federal Ministry for Environment, Nature Conservation, and Nuclear Safety (BMU) to assist States and relevant regional and global organisations to identify EBSAs using the best available scientific data, tools, and methods to provide guidance on how the CBD's scientific criteria can be interpreted and applied towards management, including representative networks of MPAs and to assist in developing regional analyses with relevant organisations and stakeholders.

Today we have a fully competent observation system for the physics of the ocean. It has enabled the refined depiction at multiple scales of the distribution of heat and momentum up to six days in advance, information critical for weather and climate forecasting. Life on the global ocean is far from being uniformly observed or sampled. Most scientific observations of ocean life are made near rich countries, near shore and near surface. Despite a huge increase in coverage and access to global ocean biodiversity data in the past ten years, there are significant gaps in coverage mainly in the Southern Hemisphere. The North Atlantic is well covered, while in the Pacific, albeit with representative sampling, coverage is much sparser. Coastal, surface, bottom and waters immediately overlaying the bottom are better studied than the vast ocean interior. In 2005 there were 5 million records in OBIS, while today there are more than 31 million records of 112,000 species from 744 databases.

New ways of observing the living ocean have emerged and are transforming our vision. Tracking top predators in the Pacific Ocean provides new insights on the behavior and ecology of key species in the marine food web: marine mammals, turtles, large migratory fishes and birds. Applying the new techniques of genomics in the ocean we have found that its abundance and genetic diversity exceeds anything imagined before: It is thought that in one liter of seawater there are a billion individual microbes of 24,000 genetically distinct types (OTUs). Researchers estimate that marine microbes make up 50 to 90% of the ocean's entire biomass. Upward-looking sonar placed at the bottom give us detailed descriptions of otherwise cryptic ecological interactions between vertically migrating meso- and macro-zooplankton, myctophid fish, squids, marine mammals and larger fishes.

Finally, as an example of current work in the Arctic, the results of a workshop held at Scripps Institution of Oceanography in November 2010 were presented. The workshop convened 34 scientists and indigenous peoples' representatives with expertise in various aspects of Arctic marine ecosystems and species and produced a set of maps depicting 77 Arctic marine EBSAs based on the CBD criteria. In addition, 13 areas were identified where most or all seven of the CBD EBSA criteria were met, and in some cases with one or more of the criteria achieving a global level of significance.

How knowledge of top predators' critical habitat can support placing Mediterranean MPAs in areas beyond national jurisdiction on the map

Giuseppe Notarbartolo di Sciara (Tethys Research Institute, Italy)

A large portion of the Mediterranean Sea is still beyond national jurisdiction due to the reluctance of many states in the region to declare their EEZs. Thus, most MPAs have been designated in territorial seas and therefore only in coastal habitats. Two recent, separate efforts are described here to identify open sea areas in the region that warrant protection due to their ecological value. Both were largely based on knowledge of the distribution and abundance of top marine predators.

The first effort, promoted by UNEP's Mediterranean Action Plan in 2009 in cooperation with the European Commission, concerns the identification of sites in Mediterranean Areas Beyond National Jurisdiction where the designation of SPAMIs (Specially Protected Areas of Mediterranean Importance) could be envisaged by the Parties to the Barcelona Convention. The state of the art on Mediterranean ecology is insufficient as a baseline to develop effective representative networks of MPAs in the High Seas. In order to delineate EBSAs (ecologically or biologically significant areas) coinciding with high priority areas, and considering that large portions of the Mediterranean Sea are very data-poor, the published knowledge was supplemented with expert opinion. Locally derived indicators were employed as proxies of marine biodiversity hotspots. The Mediterranean was subdivided into eight sub-regions and in each of these a total of ten EBSAs were identified by asking a pool of experts in Mediterranean marine ecology, biodiversity, oceanography, and geomorphology, who recommended 90 polygons that they thought were relevant for the effort on the basis of seven criteria developed by the Convention on Biological Diversity.

The impetus for the second effort, presented at the CIESM Congress of Venice (2010) derived from the opportunity to designate MPAs for selected apex marine species having umbrella and/or flagship properties, which could support the protection of a wider number of species, or marine biodiversity in general, ultimately enhancing the conservation status of the whole region. There is a strong need in the Mediterranean to integrate placebased protection for a variety of different taxa of apex species sharing the same ecosystem, so that justification for MPA designation becomes more compelling and the chance of successful results increases. For example, threats that marine mammals share with other species (e.g., bycatch) can be addressed by the same management measures. Just as importantly, mitigating one marine mammal threat (e.g., bycatch in driftnets) by inducing shifts in gear use (e.g., from driftnets to longlines) may end up increasing a marine turtle threat. So there is a need for integrated management policies. A collaborative effort was undertaken to map habitat of several groups of marine top predator and charismatic species (i.e., marine mammals, seabirds, marine turtles, sharks, and bluefin tuna), in a process in which expertand data-derived knowledge is made to overlap. This effort was also intended to support the identification of EBSAs in the Mediterranean, an initial step in the planning of representative regional MPA networks.

Similar results for the two separate efforts provided a first indication of areas of special relevance to marine biodiversity conservation in the Mediterranean. A roadmap for implementation was suggested, including:

- The creation of an *ad hoc* multi-disciplinary group (comprised of a minimum of one expert for each of the relevant disciplines and methods) charged to perform a thorough inventory of the available knowledge and expertise, including the identification, enrollment and involvement in the process of the various scientific institutions and experts that are known to actively operate in the sub-region.
- The conduct of targeted research to determine with greater specificity the ecological characteristics of each EBSA, its boundaries, and direct threats to the area's biodiversity.
- Analyses to determine the optimal spatial management scheme for each of the MPAs, including whether protected areas should be zoned, what sort of regulations should be instituted, how areas should be monitored and regulations enforced, and their appropriate governance regime.
- The development of a strategic plan to elaborate the priorities within the MPA network, including considerations of the chronology for planning and implementing a region-wide MPA network.

Through the lens of uncertainty: Protecting migratory habitats. Insights from fin whale conservation in the Mediterranean Sea

Christina Geijer (University College, London)

Migration routes represent critical habitats for seasonally migrating whales. Nevertheless, very few migratory habitats currently fall under some sort of protection. One reason for this is the challenge of uncertainty and obtaining reliable scientific information to inform conservation. In examining the perspective of migratory whale protection as seen through a lens of uncertainty, it is useful to look at insights from fin whale (*Balaenoptera physalus*) migration and conservation in the Mediterranean Sea. As a result of adaptations to a specific, semi-enclosed marine environment, resident Mediterranean fin whales exhibit uncharacteristically dynamic migratory behavior. This inherent variability coupled with extensive research gaps has left Mediterranean fin whale migration patterns in a state of uncertainty.

In order to design more appropriate and effective conservation strategies to protect fin whales throughout their range, it can be helpful to examine the concept of scientific uncertainty itself. Uncertainty can be dissected and systematized into "epistemic" uncertainty - knowledge gaps which can be reduced by gathering more data - and "ontological" uncertainty - the inherent complexity and variability of a system, for which the uncertainty cannot be reduced by additional information. The main challenge to migratory habitat protection through marine protected area (MPA) networks and/or marine spatial planning (MSP) is a high level of ontological uncertainty, since migration pathways will be too unpredictable for zonation. If high ontological uncertainty prevails, it may be more appropriate to focus conservation efforts on wider-scale restrictions pertaining to the sector(s) presenting the major threat(s) in order to protect wide-ranging species during their migrations. By contrast, if ontological uncertainty is low, protecting migratory routes as critical habitats or zones within an area-based conservation framework is more realistic.

However, even in circumstances of low ontological uncertainty, an important question to consider is whether MPA networks or MSP should be considered the obvious choice for migratory habitat conservation? The geopolitical climate within which the science is being applied – that is, the science–policy interface – influences the choice of conservation tools. As the Mediterranean case study demonstrates, in areas of considerable geopolitical complexity and low political will, the establishment of transboundary MPA networks and MSP represents a considerable – and possibly insurmountable – challenge.

Marine Spatial Planning (MSP) in the Alborán Sea (SW Mediterranean)

Ric Sagarminaga van Buiten (Alnitak, Spain)

Visual and acoustic surveys conducted in the SW Mediterranean Sea by Alnitak have recorded data on cetacean, seabird and sea turtle observations, human activities, and *in situ* notations for the calibration of oceanographic telemetry data on physiography, sea surface temperature, chlorophyll, among other things. The analysis and modeling of this data has been used to obtain mapping data for management showing abundance of key protected species, priority habitat, risk zones and establishment of conservation actions under the framework of the European Union's Maritime Strategy Framework Directive and the relevant United Nations organizations (FAO, IMO, UNEP).

Since 2005, in the context of the EU LIFE Nature Project INDEMARES, Alnitak has incorporated data from electronic monitoring systems such as PAM GUARD, Cpods, Dmons, satellite tags, AIS and CCTV.

Alnitak's presentation highlighted specific case studies showing the utility and cost efficiency of the data collected and its analysis to put in place concrete management measures including design

of MPAs, spatial management of high risk fishery operations, and reconfiguration of maritime traffic separation schemes.

In addition to key, urgent issues addressed by Alnitak with regards to risks to biodiversity in the sectors of fishing, defense, tourism, transport and energy, the data collected is currently an important contribution to Spanish authorities in charge of MSP as part of the implementation of the Maritime Strategy Directive.

Identification of physiological status in reproductive hormonal analysis of fin whales in the Pelagos Sanctuary

Denis Ody (WWF France, France)

Coauthors: Brigitte Siliart and **Caroline Berder** (ONIRIS, France), **Thierry Legavre, Ronan Rivallan** and **Ange Marie Risterucci** (UMR AGAP, CIRAD, INRA, Université Montpellier, France) and **Aurélie Tasciotti** (WWF France, France)

Knowing the population birth rate and its dynamic in a given area can provide important information about the state of this population to managers. The aim of the present work is to determine the reproductive status of fin whales in the northwestern basin of the Mediterranean Sea, and to provide answers on the status of reproduction of individuals (breeding males and pregnant females) and the birth rate and seasonality of reproduction in this species.

Biopsy research at sea from May to October was organized by WWF France in 2010 and biopsies of 67 individuals were collected. Sex determination and genetic identity using eleven microsatellite loci were carried out for each individual. The genetic identity data were compared within 2010 samples and with 2009 samples.

The rate of progesterone, testosterone, estradiol and androstenedione was measured for each sample. All the steroids were measured by radioimmunoassay: RIA Kit IM1188 Beckman Coulter for progesterone, RIA Kit Spectria OD68628 IDS for testosterone, RIA Kit Spectria OD68633 IDS (Immunodiagnostic Systems) for estradiol, and RIA Kit IM1322 Beckman Coulter for androstenedione.

The sex hormone profiles from fat can distinguish pregnant females from breeding males. The other animals, females and non-breeding males cannot be differentiated only by the sex hormone profile.

When the progesterone rate is above 100 ng / g fat, the female is unambiguously pregnant. From 67 individuals biopsied in 2010, 14 were pregnant females. The results of the 2011 campaign will enable us to check the presence of young and the hormonal changes (if there are recaptures).

For sexually active males, the rate of androstenedione was greater than 6 ng / g without progesterone increasing. Of 67 individuals biopsied in 2010, 30 were breeding males. These tests provide indirect information on the age of individuals. Other individuals biopsied were females with low progesterone levels, or less active males.

The seasonal and annual recaptures finally allow us to analyze the hormonal changes of individuals. A pregnant female biopsied in July and in September 2010 had strong progesterone levels in the range of >375 ng / g fat in July and 298 ng / g fat in September 2010.

This demographic information emphasizes the importance of the Pelagos Sanctuary for fin whale conservation.

Scientific information for MSP: Experiences from the Swatch-of-No Ground, Bangladesh

Brian D. Smith (Wildlife Conservation Society (WCS), USA)

Coauthors: Rubaiyat Mowgli Mansur, Elisabeth Fahrni Mansur and Zahangir Alom (WCS, Bangladesh)

About 25 km from the rim of the Sundarbans mangrove forest lays the Swatch-of-No Ground (SoNG), a 900+ meter deep rivereroded submarine canyon that sustains the world largest sediment fan. Spatial planning for a potential PA for cetaceans in the SoNG has been inhibited by not being able to survey across the border with India which is currently in dispute.

The Indian Ocean is an 'ecological cul-de-sac' for cetaceans. Cool upwelled waters in the SoNG may be a vital ecological refuge for mobile marine species that cannot adapt to increasing ocean temperatures or potential declines in biological productivity. Indo-Pacific bottlenose dolphins are the most abundant species occurring in the head of the SoNG. Knowledge of their ranging patterns is vital for developing plans to protect cetaceans in the submarine canyon.

Vessel-based surveys were conducted to photo-identify Indo-Pacific bottlenose dolphins in the SoNG during the winter seasons of 2005-2009. From a total of 376 dolphin groups detected along almost 8,000 km of trackline and about 40,000 dorsal fin photographs, a total of 1,144 individual dolphins were identified using distinctive marks on their dorsal fins.

To estimate population parameters, we used a Pollock's robust mark-resight design. These types of models use photo-identification and sightings data from open and closed sampling periods. Unlike traditional open mark-recapture models, these models can estimate temporary movement in and out of the study area, i.e., whether we were sampling the entire population or only a subset of a larger superpopulation.

Results of the study indicate a population of about 2,000 dolphins. This makes it among the largest assessed of the species. Overall apparent survival was estimated as 0.96 (95% CI = 0.80-0.99). Inter-seasonal probabilities of transitioning to an unobservable state were estimated as 0.05-0.36 indicating substantial movement in and out of the study area. While the overall numbers of dolphins are encouraging and survivorship appears fairly high, 31.6% of the 1,126 photo-identified individuals exhibited marks or wounds that were probably related entanglements with fishing gear. If the true survival rate for bottlenose dolphins in the SoNG is at the lower end of the 95% confidence interval, this could indicate a declining population possibly due to mortality caused by fisheries interactions.

Genetics can be used to investigate the population identity and dispersal of cetaceans – vital information for MSP. Analysis of the mitochondrial control region of 38 samples of Bryde's whale from the SoNG indicated that they were more closely aligned with the small nearshore form *B. edeni* in the Indo-Pacific. Comparisons with other samples of *B. edeni* in the northern Indian Ocean showed remarkably low genetic diversity probably indicating substantial demographic connectivity. Future microsatellite analyses of genetic samples should provide information on dispersal patterns.

Take home lessons for MSP from our experience in the SoNG are:

- Innovative techniques for estimating population parameters can provide information about movements in and out of a study area, which may be bounded by international borders, field logistics, or lack of funding to expand the study to a larger area.
- This information is vital for knowing if a PA or PA network is too small to encompass critical habitat for an entire cetacean population. However, if the PA or PA network is found to be too small, little information is provided on how large it should be or how the area(s) should be configured.
- Genetics are another powerful tool for answering some of the same questions but generally over a larger area and longer time-scale.
- Information provided by robust population estimation techniques and genetics is a good start, but insufficient for MSP. In situations like the SoNG, transboundary research initiatives are an essential next step.

Conclusions from Workshop 9

- On the basis of presentations and the follow-up discussion, Workshop 9 generated three classes of conclusions and recommendations:
- Highlights of the kinds of science proving most useful for MSP.
- Considerations for the use of marine mammal science in MSP (including constraints to the above).
- Action items needing to be taken up by the marine mammal community writ large, the ICMMPA steering committee, and the newly formed Marine Mammal Science in MSP Network.

The main findings are summarized as follows:

Kinds of data and information most useful

Marine mammal science is needed to inform planning and management – i.e., monitoring that allows for adaptive management. Priority scientific information includes distribution of key marine mammals (beyond just occurrence), abundance, population dynamics, population trends, population genetics, pressures (human uses of concurrent space), and impacts on marine mammals. The use of science to provide information on thresholds, and identification of change indicators, is particularly important for managers. The identification and quantification of the extent of existing and potential conflicts between marine mammals and various sectors using the marine environment is also informative for MSP. Recognizing that the starting point was the question "MSP for what?", the workshop participants suggested better recognition of the importance of marine mammals as indicators for ecosystem health.

Effort considerations and reliability of data

For large-scale assessment and MSP efforts (e.g., GOBI, CBD), there is a need to improve data being used and to recognize the importance of effort considerations. We recommend judicious use of models, and highlight the importance of using expert knowledge at these scales. Recognizing uncertainty, being honest about uncertainty, and dealing with uncertainty is crucial, especially understanding the nature and levels of uncertainty. Information about data gaps is useful for allocating resources for research and in influencing spatial planning processes.

Both regional MSP initiatives and those within regions and within MPAs can allow us to groundtruth global science-based assessments. The workshop thus recognizes and encourages the use of MPAs as trial areas or experimental tools for testing and developing MSP approaches (MPAs have demonstration value beyond conservation and management *in situ*!). However, the group acknowledged the limitations of both MPAs as a tool for MSP, and the fact that MSP itself (in all forms) may not be the most appropriate solution to all marine mammal challenges.

It is imperative that we promote data-sharing among ourselves (marine mammal scientists and conservationists). The workshop also acknowledged the importance of transboundary efforts in

providing robust scientific information for spatial planning, management and conservation.

Sharing analytical results is as important as data-sharing. Sharing information about potential EBSAs and ongoing MSP processes in the open oceans with the general public provides a deeper understanding of the importance of marine mammal information to promote better use of MSP and MPAs.

The group agreed about the importance of collecting, compiling, and considering information on noise in the marine environment in all spatial planning, regardless of scale. As a priority, the group recommended exploiting every opportunity to deploy noise-monitoring technology in existing observation platforms.

Action items

Action items will be considered as Workshop 9 recommendations below.

Recommendations from Workshop 9

Recognizing the need to improve understanding of the importance and utility of marine mammal science in MSP, workshop participants **agree** to work on an outreach strategy to assist colleagues with marine mammal MSP, especially in data-poor, species-rich areas of the world.

This will include:

Developing a best practices guide and standards for using marine mammal science in MSP. A best practices guide would capture state-of-art knowledge and practical experience in using marine mammal science for effective MSP. As part of this, or complementary to it, we **recommend** developing a standardized approach for making spatially explicit risk assessments, including considerations of the impacts of shipping, offshore energy, and land use, especially in relation to release of contaminants. There is a standardized approach for vulnerability assessments for IUCN, and this effort is not meant to compete with or substitute for that, but rather to push the vulnerability assessments into the MSP domain, for uptake by planners.

Related to recommendation 1 but listed as a separate targeted initiative: we propose to **investigate** options to incorporate the niche envelope and other modeling approaches into the IUCN Red List mapping.

Developing an action plan to identify and address critical data gaps. This action plan would address how to use expert-knowledge-based (Delphic) approaches to compile information that complements data collected on marine mammals to identify areas of knowledge as well as areas of "ignorance". It would also address how to predict species distribution in unsurveyed areas, and how to prioritize new data collection to allow validation across a wide range of predicted values.

Establishing a shipping sector task force. Recognizing the need to work directly with sectors and governance bodies regulating those sectors, the workshop **recommends** formation of a task force for developing guidelines for how to engage with sectors (focusing on education and awareness). Engaging with the shipping industry and IMO is the top priority and can be accomplished at the global scale. Cross-regional exchange of lessons learned about working with other sectors across networks of MPAs is encouraged, building on the recommendations and initiatives coming out of ICMMPA 1.

Planning for ICMMPA 3 and beyond. The group **recommends** a full or two-day workshop for the next conference, to advance knowledge and also to take stock of how well this workshop had fulfilled its commitments in these action items. To go beyond, and to take advantage of other fora coming sooner, the group plans to use upcoming conferences (World Parks Congress and IMPAC 3 meetings in 2013) as stepping stones to disseminate some of outcomes, products and recommendations from this conference to the greater MPA/MSP community. The group plans also to collaborate with party delegations to UN processes to provide information and advice on how to use marine mammal science to inform COP decision-making. This can help ensure that relevant information about marine mammal important areas gets incorporated into the CBD process of EBSA identification.



Endangered North Atlantic right whale spouts in the classic v-pattern which helps distinguish this species. Photo by NOAA

Workshop 10: Management of Whale Watching in Marine Mammal Protected Areas (MMPAs)

Convener: Chris Schweizer (Department of Sustainability, Environment, Water, Population and Communities, Australia)

Co-Chairs: José Truda Palazzo, Jr. (CCC – Cetacean Conservation Center, Chile/Brazil) and **Miguel Iñíguez** (Fundación Cethus and Whale and Dolphin Conservation Society, Argentina; apologies for absence)

Rapporteur: Ryan Wulff

Participants: Mike Bossley, Carole Carlson, Mauricio Failla, Marie-Christine Grillo-Compulsione, Gaël Hubert, Artie Jacobson, Stéphane Jeremie, José Martins da Silva, Jr., Pascal Mayol, Craig McDonald, José Truda Palazzo, Jr., Romain Renoux, Caroline Rinaldi, Philippe Robert, Chris Schweizer, Albert Sturlese, Lesley Sutty, Gaëlle Vandersarren, Oswaldo Vásquez, Chloë Webster, Ryan Wulff, others

Introduction

MPA managers, marine mammal researchers, and NGO representatives attended Workshop 10, on whale watching, to:

- Share information and discuss the management of whale watching in marine mammal protected areas (MMPAs).
- Identify three key recommendations to advance the management of whale (and dolphin) watching globally.

The discussions were afforded a sense of immediacy due to the current attention devoted to whale watching guidelines in the Wider Caribbean and in Australia, and to the International Whaling Commission's "Five Year Strategic Plan for Whalewatching". The recent regional workshop on Marine Mammal Watching in the Wider Caribbean, held in Panama in October, produced proposed overarching principles and general guidelines and stimulated further discussions and actions on whale watching in the region. In Australia, there is currently a Commonwealth review of whale watching policy and guidelines, as well as a review at the state level in Queensland, with efforts being made nationally to try to harmonize the regulations across jurisdictions. In addition, the International Whaling Commission's "Five Year Strategic Plan for Whalewatching" was effectively launched in the MMPA community with a separate side event at the conference.

Presentations

Whale and dolphin watching – an Australian perspective 2011

Artie Jacobson (Department of Sustainability, Environment, Water, Population and Communities, Australia)

In 1980 the Australian Government banned whaling in all Australian waters. Australian governments have since established numerous marine protected areas around its vast coast. Additionally Australia has declared the Australian Whale Sanctuary, which covers the entire EEZ and the Australian continental shelf, and has instituted management measures such as the National Guidelines for Whale and Dolphin Watching. It is Australia's intention to provide a consistent approach to implementing laws to protect cetaceans from adverse interactions.

Over recent decades, a diverse and successful whale and dolphin watching industry has developed on the east and west coasts in both temperate and tropical zones. These programs provide opportunity for large numbers of people to have a close encounter with a whale or dolphin but under professionally administered arrangements.

Australia acknowledges the social, economic and environmental benefits of a sustainable whale and dolphin watching industry and is eager to promote the use of these animals in international waters as an alternative to whaling. Australia also accepts the challenges of advancing a responsible and sustainable whale watching industry to conform to best practice whale and dolphin watching principles.

Whale watching in the Mediterranean Sea: Toward a label

Marie-Christine Grillo-Compulsione (ACCOBAMS -

Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area, Monaco) and **Pascal Mayol** (Souffleurs d'Ecume, France)

Whale watching in the Mediterranean Sea seems to be growing rapidly. An area of particular interest to whale watching is the Pelagos Sanctuary for Mediterranean Marine Mammals located within the Corsico-Provençal-Ligurian Basin, west of central Italy and south of France and Monaco.

The rationale behind the establishment of the sanctuary is "to protect the whales and dolphins in prime cetacean habitat in the Mediterranean waters of France, Monaco and Italy". The habitat, located from near shore to deep pelagic waters, includes cetacean feeding grounds as well as areas used by migrating and breeding cetaceans. The sanctuary consists of 47% national waters and 53% international or high seas waters.

There is concern however, that the whale watching industry is developing in an unplanned manner, i.e., no controls on the number of operations, commercial observation effort being concentrated in certain areas, intrusive approaches by vessels and inadequate education of operators and the general public.

In order to improve whale watching standards to better protect cetaceans from adverse interactions, both ACCOBAMS parties and the Pelagos Sanctuary are developing an accreditation program, i.e., eco-labeling, to promote sustainable whale watching within a high profile marine environment, firstly in Pelagos and then in all the ACCOBAMS area. The accreditation program will include training of the operators in the delivery of a quality whale watching experience and the commitment from all members of the program to respect the code of good conduct. This will also require operators to conform to agreed approach distances. The first training session will take place in spring 2012 in France.

In order to be able to apply the label in international waters a study of the legal aspects associated with this was conducted. A dedicated communication plan is being developed to promote the label within industry and to the wider public. A logo is also being developed.

Marine mammal watching in Brazilian marine protected areas

José Martins da Silva, Jr. (Aquatic Mammals Center, National Biodiversity Institute – ICMBio, Brazil)

Aquatic mammal watching can be either a solution to marine mammal conservation or a problem, depending on the way it is planned and managed.

It becomes a solution when the tourist activity is matched with visitor orientation and associated expectations, provides environmental awareness towards marine conservation and enhances the value of the non-lethal use of aquatic mammals.

If not properly managed, however, it can become a problem for the animals, causing mortality and wounds from boat strikes or behavioral changes due to continual harassment. Where aquatic mammal watching activities take place inside protected areas, solutions are maximized and problems minimized due to an improved capability to implement and enforce adequate management measures.

The Brazilian marine area consists of $3,555,796 \text{ km}^2$. Of this only 1.57% is managed as marine protected areas, totaling 102 units (55,716 km²) of which 38 are fully protected (4,977 km²) and 64 are of multiple use (50,739 km²).

Aquatic mammal watching is a growing activity in Brazil, particularly in protected areas and encompassing several species such as *Eubalaena australis*, *Megaptera novaeangliae*, *Sotalia guianensis*, *Stenella longirostris*, *Trichechus manatus* and *Otaria flavescens*.

In 2010, 275,000 people participated in these ecotourism activities in Brazil.

Presentation on the Regional Workshop on Marine Mammal Watching in the Wider Caribbean Region, Panama City, Panama, 19-22 Oct 2011

Carole Carlson (Dolphin Fleet and Provincetown Center for Coastal Studies, USA)

A growing, yet not fully realized component of tourism in the Wider Caribbean Region (WCR) is marine mammal watching. With a potential for growth in existing operations and the possibility of new ones emerging, it is an opportune time to develop a regional plan for the development of a high-quality, responsible marine mammal tourism industry that conforms with best practices, including enhanced coordination and partnering among stakeholders and information sharing.

To this end, a four-day workshop, developed under the framework of the Cartagena Convention and its SPAW Protocol, including the Marine Mammal Action Plan, was held in Panama City in October 2011. The workshop brought together 38 participants, both tour operators and officials, from 22 countries and territories.

The goals of the workshop were to:

- Assess the extent of problems and needs and identify opportunities in existing marine mammal watching operations.
- Identify areas with potential for marine mammal watching activities.
- Discuss the formulation of regional codes of conduct for observing marine mammals.
- Standardize data collection forms and organize baseline research on cetaceans.
- Document existing marine mammal educational materials.
- Discuss next steps.

The draft report of the workshop will be presented by UNEP-CEP to the SPAW Parties at COP in 2012 for consideration and decision on further action.

Once finalized, the report with guidelines and recommendations will be available in Spanish, French and English on: www. cep.unep.org/meetings-events/regional-workshop-on-marinemammal-watching-in-the-wider-caribbean-region.

The evolution of marine mammal policies and whale watching in the East Caribbean, Martinique and Guadeloupe

Lesley Sutty (East Caribbean Coalition for Environmental Awareness – ECCEA)

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The Organisation of East Caribbean States (OECS) is a chain of six independent small island developing nations that encompass the southern Caribbean Sea. From north to south they run from Antigua and Barbuda down to the island of Grenada. Central to this zone are the French West Indies, Martinique and Guadeloupe, Overseas Departments of France.

Marine mammals remain of great conservation and cultural significance to many people that live within this area. Historically, marine mammals were seen as treasured ancestral creatures by Tupi Arawakan tribes that inhabited these territories for more than 3,000 years. Discovery of the Americas brought with it drastic change in this subregion through commercial whaling and a final intensive hunt of North Atlantic humpback whales by Norway in 1925 which dramatically impacted populations.

Whale watching within the East Caribbean area is considered a critical growth industry for conservation, cultural, social and economic reasons. It is unlikely that whale watching would have become the industry it is today within the area had the islands not been exposed to a series of unexpected political scenarios and external pressures from 1992 onwards. These influences were responsible for establishing block adhesion to policies that threatened the International Whaling Commission's (IWC) whaling moratorium, the region's marine mammal conservation agenda and the OECS joint objection to the creation of the Antarctic Whale Sanctuary, ultimately adopted by the Parties to the IWC in 1994 (see www.eccea.org: Socio-Economic and Political Aspects of Aid Provided by Japan to the Fishing Industry in the Small Independent Islands in the East Caribbean).

The East Caribbean Coalition for Environmental Awareness (ECCEA) 1991 Trinidad resolution for a Caribbean Sea whale sanctuary took place at the same time as the French government proposal to declare a sanctuary in the Southern Ocean surrounding Antarctica, which was overwhelmingly accepted in 1994. Again coinciding with this was another complex initiative to develop a strategic plan for a Caribbean whale sanctuary reinforced in 1995 by a regional consultation process. The aim of the plan was to initiate change in human behaviour and build public support for marine mammal preservation and ocean biodiversity at both government and community level.

The process resulted in the ECCEA regional initiative for Community Based Nature and Heritage Tourism, Environmental Education and the Conservation of Island Ecosystems in the East Caribbean. This initiative identified a number of projects which included a whale watching and nature observation segment as well as the creation of parks and MPAs. Associated spin off trades were also designed to create alternative economies and alleviate poverty. While the projects were developed and undertaken in collaboration with government departments, they were directed by community leaders with valuable traditional knowledge. As part of the process, domestic legislation was either charted or endorsed by governments.

Technical assistance was also considered critical to the success of projects, including:

- Whale watching training workshops,
- · Capacity building exercises, and
- Marine mammal education and awareness programs.

The result of this long-term initiative would be:

- The creation of a series of no whaling zones linked for both political and conservation reasons.
- The establishment of the Agoa marine mammal sanctuary in the French West Indies.
- The cooperative expansion of marine mammal protected areas in the region that includes the Commonwealth of Dominica's Morne Trois Pitons World Heritage Site.

Great concern remains that while some islands have moved away from pro-whaling principles, others have hung on tenaciously, practicing both whale watching and the lethal hunting of small cetaceans and humpback mother calf pairs. The practice of lethal hunting significantly conflicts with whale watching which is now a major growth industry in the Caribbean Basin (currently generating approximately USD \$55 million annually in tourism expenditures).

In some areas, however, marine mammals have suffered collisions on occasion and have exhibited changed behaviour as a result of intensive commercial whale watching activity.

The ECCEA and the Martinique Society for the Study, Protection and Development of Nature (Sepanmar) have submitted a *modus operandi* for commercial and non-commercial approaches to cetaceans for local, regional and national application. These are compatible with current French legislation for Marine Mammals that defines harassment as illegal. It is anticipated that through the application of these guidelines adverse impacts will be reduced.

The ECCEA also suggests the implementation of a number of initiatives such as the closure of key cetacean habitat through MPA declaration, accreditation schemes such as labeling and certification, monitoring and reporting programs and regular performance assessments based on resilience principles. These changes to cetacean conservation management should ensure transparent and sustainable operations based on the Australian and Kaikoura experience.

Summary of Discussion

With presentations covering a range of situations in various countries, participants were given a good overview of different whale and dolphin watching landscapes and standards. These included the historical, social, economic and environmental conditions in key whale watching areas of Australia, Brazil, the Mediterranean, the Caribbean and more locally the eastern Caribbean.

Following each presentation, workshop attendees were encouraged to raise questions with presenters and discuss issues as a group on the local operational environments that were presented and on whale watching generally.

Significant discussion took place on the question of how to achieve sustainable and responsible whale (or marine mammal) watching within MMPAs, and it was suggested that the key approaches to take include:

- Starting with the community in order to create a strong sense of ownership over the program and particularly promoting the economic benefits to developing countries.
- Working closely with key stakeholders to develop, maintain and implement national (or international) guidelines that will sustain high standards – preferably prior to the establishment of the industry or the MMPA.
- Working cooperatively across jurisdictions/states for migrating species.
- Utilizing a gradual or incremental approach in whale watching areas to allow for management and industry growth to develop responsibly and with caution.
- Implementing a comprehensive educational program that delivers accurate information.
- Adopting a non-adversarial approach with operators by providing services to improve the delivery of the program, i.e., interpretive material, open dialogue to improve conditions of operation and incentives such as labeling.
- Having enforceable regulations and the capacity and authority to enforce these during the season to serve as lessons learned.
- Through this action, demonstrating to both the industry and the general boating public that management takes cetacean conservation and associated non-compliance seriously.

Education was also considered important in ensuring that the visitor experience was not only enhanced during the actual encounter but was used to promote whale conservation generally. It was also discussed that education and research should work hand in hand to improve relationships between researchers and operators and potentially facilitates cooperative arrangements that would benefit parties, the visitor and the whales. This would potentially include research findings to be communicated to the industry to then be used to improve educational programs and conversely for operators to inform researchers of their day-to-day observations to assist researchers to undertake their research.

The recurring issue of "uninformed" recreational vessel operators impacting on both whale welfare and the activities of a responsible whale watching industry was raised. It was suggested that managers give due consideration to the issue of whale and vessel interactions regardless of whether the vessel was commercial or recreational and that these issues should be considered when developing management frameworks.

It was also noted that while different approach limits were applied within different areas and for different species – for example, humpback whales vs. gray whales vs. right whales – the most consistent approach limit applied was 100 meters. The issues of the use of aircraft for advanced spotter services and as a whale watch platform were also discussed as matters of concern.

There was also some discussion on formal whale watching programs being a solution that could lead to enhanced public awareness and the capacity to apply controls on the types of interactions. But they could also present problems, i.e., require administrative and management resources, cause vessel congestion in the vicinity of a whale and increase the risk of collision, influence whale behavioral changes, and cause conflict between users. It was suggested that, through the declaration of MMPAs, solutions were potentially maximized and problems more than likely minimized.

Following on from this, it was generally agreed that MMPAs, compared with "unprotected" marine areas, provided additional benefits for the protection of whales. These benefits manifest mainly in the form of mitigating adverse impacts associated with whale watching where operators were better managed through guidelines, approvals (and associated conditions), regulations or a mix of these.

In most instances where controls were applied they included the application of:

- Specified approach limits.
- Limiting the number of vessels with a "caution zone".
- Speed restrictions when in proximity to whales and dolphins.
- Industry controls by limiting the number permits issued.
- Educational standards through conditions of permissions.
- Improved stakeholder engagement.

Various other initiatives that were being implemented in different regions were outlined. These included an accreditation program, a marine mammal monitoring system, national guidelines (enacted through law), a data collection system that involved the whale watching industry, and a national compliance program prompted by the whale watching industry. Also discussed was the concept of sister sanctuaries – a useful management tool for a consistent approach to managing migratory species across migratory paths and territorial seas.

Concern was expressed of the risk of establishing "paper parks" – i.e., declaring an area as a protected area but without applying any management regimes. This led to a shared view among participants that a necessary component of successful MMPA delivery was the establishment and ongoing implementation of appropriately resourced management programs.

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Land-based whale watching which occurred in most countries was promoted and encouraged as "minimal impact and minimal energy" alternative to vessel-based whale watching.

It was also suggested that where whale watching and whaling took place concurrently that this was to be discouraged or preferably opposed.

There was also a useful discussion on the advantages and challenges of establishing universal standards to guide whale and other marine mammal watching activities – such as uniform minimum approach distances, and discouragement of swimwith programs, among other things.

Workshop discussions placed significant emphasis on the benefits of MMPA management agencies and the community, including NGOs, working together to share lessons learnt in order to build efficiencies into developing and maintaining sound marine mammal watching practices and management. The ultimate goal was that this would contribute to marine mammal conservation at a local level and, more importantly, globally.

Issues Identified for Further Consideration

- ICMMPA 3 should engage a diversity of stakeholders, especially managers, to more effectively get across the range of management issues/ messages through more broad and informed input. The Steering Committee should not necessarily be all scientists – particularly if ICMMPA is meant to be operationally oriented.
- There is a need to better utilize national synergies and networks that are more focused on migrating populations as they travel across jurisdictional boundaries. The challenge is to integrate different states' policy and management initiatives and not have them run separately or in isolation, and at the expense of sound population conservation.
- Further discussion should be arranged on aerial whale watching (maybe as an item for ICMMPA 3).
- There is a need to explore issues associated with the use of spotter planes to find marine mammals as a tool to improve the chances of encountering whales and subsequently assist industry to better meet customer expectations.
- Land-based whale watching should be promoted and encouraged as a "minimal impact and no energy" alternative to vessel-based whale watching.
- There is a need to improve the knowledge of the whale watching industry and MMPA managers through joint educational ventures.
- There is a need to encourage the implementation of accreditation (labeling) programs for whale watching operators.
- There is a need to promote responsible whale and dolphin watching by improving customer awareness of the rules of engagement with cetaceans. Informed customers will keep operators honest.

- There is a need to establish whale watching performance measures to assess the success of management including accreditation initiatives.
- Operators should be discouraged from promoting guarantees of seeing an animal as this places pressure on the operator to potentially interfere (breach an approach limit) with a whale or dolphin – and it may encourage corruption, i.e., if a master of vessel were paid to get closer.
- There is a need to develop a process to address the challenges with swim-with operations and the economic incentives provided by customers to the operator.

Recommendations from Workshop 10

Workshop 10 agrees to the following:

Where opportunities exist for marine mammal watching activities in MMPAs, managers should think early on about how best to address both the commercial and recreational activities from a training, regulatory and compliance aspect. They should **work** closely with stakeholders and the local community in moving forward to explore, establish or refine appropriate management frameworks, including voluntary and/or regulatory measures.

The integration of scientific research and collaboration should be **explored** with local scientists or institutions in MMPAs with marine mammal watching activities. When pursuing opportunities for data collection, training and standardization are important.

Marine mammal watching operations in MMPAs provide a good vehicle to increase general understanding and public awareness about marine ecosystems and the value of MMPAs. As such, marine mammal watching operations should be **encouraged** to ensure activities are presented in a broader context than with a single species focus.



Endangered short-beaked common dolphins travel in the proposed Alborán Sea MPA in the Mediterranean. Photo by Lucy Molleson

Side Event 1: Ship Strikes in the Caribbean and Mediterranean: Studies and Solutions

Presented by Pascal Mayol (Souffleurs d'Ecume, France), Marie-Christine Grillo-Compulsione (ACCOBAMS Secretariat – Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area, Monaco), and Gaëlle Vandersarren (SPAW – Regional Activity Centre, Guadeloupe)

The scientific community and shipping companies are seriously concerned about collisions between vessels and large cetaceans in different regions of the world, such as in the Mediterranean and Caribbean seas.

In the Caribbean Sea, a research program on collisions has started.

The Caribbean's marine biodiversity, including cetaceans, is protected by the Cartagena Convention. In this framework, the Marine Mammal Action Plan, adopted in 2008, is the instrument that deals with ship strikes under the agreed protocol for Specially Protected Areas and Wildlife, the so-called SPAW Protocol.

Last year, the SPAW Regional Activity Center (SPAW-RAC) started to collate information on vessel activity and collisions. The first data collected showed that vessel strikes are an issue, and that big and small species can be affected in different parts of the region. Following that conclusion, a group of regional experts²¹ looking at regional shipping routes overlaid traffic maps on a distribution map of marine mammals in order to target potential areas of conflict.

The first results of this research reveal that collisions happen in the Caribbean more often than we thought. The studies will be continued and completed by collecting more data on vessel activities and strikes. It will also be essential to improve communication with people from the maritime sector and marine environment. In parallel, it would be relevant to think about measures that could be implemented in the region in order to limit the risk of collisions.



In the Mediterranean Sea, the REPCET system is now operative.

In the Mediterranean Sea, covered by the ACCOBAMS treaty and including the Pelagos Sanctuary for Mediterranean Marine Mammals, researchers, engineers and representatives of maritime transport companies have joined forces to develop REPCET, the REal-time Plotting of CETaceans, a collaborative computer system based on the density of the navigation network.

On board each equipped vessel, crew members can instantly transmit positions of detected whales to other ships using an input interface. A mapping interface displays the alerts sent by other contributors. For each alert, the system calculates and broadcasts a dynamic risk area. Inside these areas crew members can enhance their watchfulness, add some observers and reduce the speed. This allows them to detect whales over a longer distance, to give enough time to evaluate the situation and operate the best avoidance procedure. The system is designed to integrate distribution prediction models, and to enable any type of sensor, in future, to automatically detect the animals. Thanks to the observations provided by REPCET-equipped vessels, we will learn much about cetacean presence and distribution. A simulation of the REPCET system is available at www.repcet. com/simulateur_en.

A collaboration between the Pelagos Sanctuary for Mediterranean Marine Mammals in the ACCOBAMS area and the SPAW-RAC and Agoa Sanctuary in the Caribbean is hoped for in the near future, in order to benefit from mutual experiences regarding knowledge of the ship strike issue and the measures to limit it.

²¹ Including the French Navy, CROSS AG, the French Marine Protected Areas Agency (AAMP), the East Caribbean Coalition for Environmental Awareness (ECCEA), the NGO Sepenmar and the SPAW-RAC/UNEP office.



A humpback whale dives deep off California, a spectacle for whale watchers in the Gulf of the Farallones National Marine Sanctuary. Photo by Tom Kieckhefer.

Side Event 2: International Whaling Commission (IWC) Five-Year Strategic Plan for Whale Watching

Presented by Lorenzo Rojas Bracho (Mexican Commissioner to the IWC), **Chris Schweizer** (Australian Alternate Commissioner to the IWC), and **Ryan Wulff** (United States Alternate Commissioner to the IWC and Chair of the IWC's Standing Working Group on Whale Watching)

The International Whaling Commission's *Five Year Strategic Plan for Whalewatching* aims to set the agenda for the development of a prosperous and responsible whale watching sector, consistent with international best practice.

As interest in whale watching grows, it is vitally important that best practice management is adopted and promoted across the world. A responsible whale watching industry offers the opportunity for countries to showcase their nation's marine biodiversity and ecosystems, and hence aid in the conservation of cetaceans.

Recognizing the recent and potential growth in whale watching, the IWC has developed and endorsed this *Five-Year Strategic Plan for Whalewatching*. When undertaken in a sustainable way, whale watching is able to deliver significant benefits to coastal communities across the globe.

The strategic plan sets out five objectives – research; assessment and monitoring; capacity building; development; and management. The actions associated with each objective will assist countries interested in building sustainable whale watching industries and ensuring the ongoing delivery of economic, environmental and social benefits.

As one of the key proponents of the strategic plan, Australia has committed itself to helping other countries build their whale watching sector and constantly looks to improve its own whale watching programs. To this end, a review is currently underway of its *National Guidelines for Whale and Dolphin Watching* to ensure Australia's approach reflects the best science; incorporates community and industry needs; and promotes international best practice while delivering economic social and environmental benefits to numerous Australian communities.

For more information about the Strategic Plan or to obtain a copy, please visit *iwcoffice.org/_documents/sci_com/IWCStratPlanWW.pdf*



The Florida Keys National Marine Sanctuary has resident populations of several marine mammal species, including the endangered West Indian manatee. Photo by Laurel Canty-Ehrlich, Office of National Marine Sanctuaries, NOAA



Hawaiian monk seal, Laysan Island, Hawaii. Photo by James P. McVey, NOAA Sea Grant Program.

Martinique Declaration

Declaration of Intent by the Following Partners on Cooperation between Existing and Projected Marine Mammal Sanctuaries in the Caribbean Region: The Agoa Sanctuary, Stellwagen Bank National Marine Sanctuary, the Dutch Caribbean project, the Marine Mammal Sanctuary of the Dominican Republic and the Regional Activity Center for the SPAW Protocol (the present partners)

Noting that marine mammal conservation issues are fundamental to marine issues within and beyond respective national jurisdictions,

Taking advantage of the fruitful exchanges of ICMMPA 2 and thanking the organizers for the success of this new step towards marine conservation,

Considering the regional framework provided by the Action Plan for the Conservation of Marine Mammals in the Wider Caribbean Region under the SPAW Protocol, and the opportunities it offers,

Congratulating the current national efforts in the Caribbean region in terms of marine mammal conservation and marine mammal sanctuary creation, as well as

Noting and encouraging the mobilization of different Caribbean countries and territories,

Aware of the special importance of the Caribbean region which represents a unique situation bringing together four language speaking countries and territories and emphasizing the need for cross-cutting and transboundary approaches in a rich multicultural and politically diverse context,

Highlighting that Caribbean countries and territories share not only the same issues but also the same responsibility of hosting shared marine mammal populations in their respective waters,

Taking into account the need to support national initiatives and strengthening regional cooperation for the conservation of globally distributed species,

Underlining the interest of capitalizing existing partnerships between sanctuaries,

Willing to develop synergies,

The present Government representatives, Agencies and Institutions express their strong willingness to build a deeper Caribbean cooperation on marine mammal issues and declare their determination to:

- Promote the establishment of marine mammal protected areas and other appropriate tools in the Wider Caribbean Region.
- Develop common initiatives and programs related to the development and management of marine mammal sanctuaries, including but not restricted to monitoring, awareness raising, capacity building and communication and on-the-ground management.
- Seek appropriate sources of funding for their implementation.
- Support standardization of regional data collection efforts.
- Share information on marine mammal populations, management experiences and practices,
- Share technical experiences through Sanctuary staff exchanges.
- Help each other strengthen the effectiveness of their management frameworks and their implementation.
- Pursue regular discussions with one another, including if possible organization of meetings in their respective territories or countries.
- Promote the special importance of the Caribbean Sea at international meetings.

Second International Conference on Marine Mammal Protected Areas



Participants of the ICMMPA2 Conference included 150 people from 42 countries. Photo by Agence Kréöl

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Killer whale in Kamchatka, Russia Tatiana lvkovich, Far East Russia Orca Project, WDCS



Southern sea otter, at South Harbor, Moss Landing, California. World Ocean Day Photo Contest Submission by Steve Lonhart
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Minke whales in proposed Ross Sea Region Marine Reserve Photo by David Ainley

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