WORKSHOP REPORT

Role of Cetaceans in Ecosystem Functioning:

Defining Marine Conservation Policies in the 21st Century

28th International Congress for Conservation Biology
Society for Conservation Biology

Workshop Report

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Defining Marine Conservation Policies in the 21st Century

28th International Congress for Conservation Biology
Society for Conservation Biology
26 July 2017, Cartagena, Colombia
Room Barahona 1, Cartagena Convention Center

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Background

For centuries, the great whales (baleen whales and the sperm whale) and other cetaceans[1] (small whales, dolphins and porpoises) were valued almost exclusively for their oil and meat. Widespread commercial hunting reduced great whale numbers by as much as 90 percent, with some populations being hunted to extinction.

In recent decades, changing attitudes toward protecting wildlife and the natural world and the growth of ecotourism provided new cultural and non-extractive economic values for these marine mammals.

Today, whale watching is worth more than $2 billion annually worldwide. Nevertheless, despite compelling economic arguments against the extractive use of cetaceans, commercial whaling continues in defiance of a global ban agreed by the International Whaling Commission (IWC) in 1982.

Even though most great whale species remain far from recovery, cetaceans provide significant ecological contributions to the functioning of the marine ecosystem. A growing body of peer-reviewed scientific literature (see Bibliography) reveals that cetaceans, in particular large whales that migrate long distances, enhance marine primary productivity by fertilizing ocean waters with iron-rich feces and circulating ("pumping") micronutrients that influence the biogeochemistry of the marine ecosystem. Their large biomass also represents an important and stable repository for carbon dioxide (a greenhouse gas) and, upon death, their carcasses contribute to biodiversity and carbon sequestration on the ocean floor.

The value of these services to the functioning of the planet — and the full potential of such services if cetacean populations were fully restored to pre-commercial whaling numbers—is a new source of interest, not only to scientists, but to ecological economists (who ascribe financial values to ecological functions) and to policymakers concerned with conserving biodiversity. These services confirm what the public, since the early 'Save the Whale' movement in the 1970s, has always understood; cetaceans are special.

The global implications of the significant contributions of cetaceans *"to ecosystem functioning that are beneficial for the natural environment and people*" were first formally acknowledged in 2016 when the International Whaling Commission (IWC) adopted a resolution on Cetaceans and Their Contributions to Ecosystem Functioning[2].

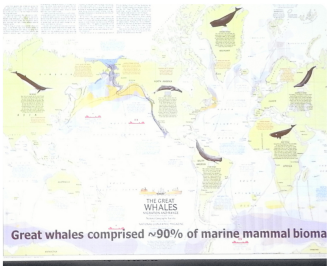
This ground-breaking resolution initiated an IWC review of the ecological, environmental, social, and economic role of cetaceans; directed the IWC to collaborate, including with other international conservation organizations, on the issue; and encouraged member states to integrate the role of cetaceans in future decision-making.

To explore the current understanding of cetaceans' ecological services and their policy implications, including for the IWC, a workshop on the ***"Role of Cetaceans in Ecosystem Functioning: Defining Policies in the 21st Century"*** was organized by the Centro Conservación Cetacea (CCC), Instituto de Conservación de Ballenas (ICB), and the Animal Welfare Institute (AWI) at the Society for Conservation Biology's International Congress for Conservation Biology (ICCB Congress) in July 2017.

This report summarizes the presentations and resulting discussion and proposes some initial steps forward for interested stakeholders including government decision-makers.


Whale pump: Culls can be counterproductive, decreasing primary productivity, reducing fish stocks


Ecological Pathways
Predators
Nutrient transfer
Carcasses
Prey, trophic cascades


THE GREAT WHALES
Great whales comprised ~90% of marine mammal bioma

Joe Roman. PhD. University of Vermont

Whales as MARINE ECOSYSTEM ENGINEERS

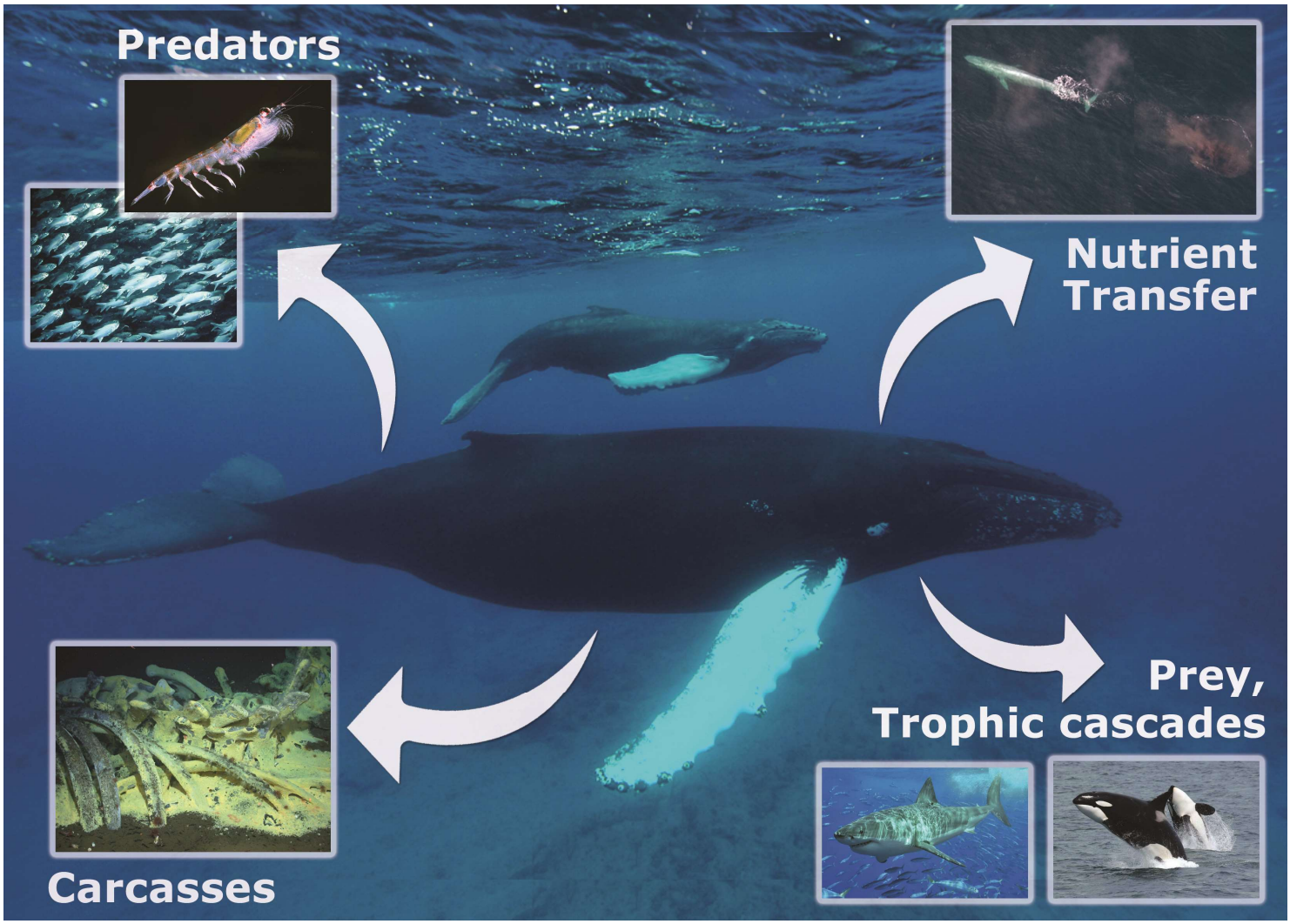


Figure 1. Four pathways in which whales can influence marine ecosystems.

Ecology

With their large size, abundance, and global migrations, historically great whales were dominant predators in the ocean and accounted for approximately 90 percent of marine mammal biomass. Commercial whaling reduced great-whale biomass by more than 85 percent, with population declines of approximately 66 to 90 percent depending on the species. As a result of these declines, ecological processes likely also changed, but until recently, with the exception of predation, the functional roles of whales in the ecosystem have largely been overlooked.

Whales can influence marine ecosystems in at least four ways: as predators on fish and invertebrates, as prey to predators such as killer whales, as carcasses (or whale falls), and as vectors of nutrient transfer, also known as the whale pump (Fig 1).

Ecosystem

As whale populations increase, we expect to see a rise in associated ecosystem services along with conflicts, real and perceived, with human activities such as commercial fisheries. New field observations and an increased understanding of historical population dynamics are likely to provide evidence of undervalued whale services to ecosystem functioning. To date, research has largely focused on services such as whale watching, which is easy to quantify, or whaling, which has a long history. Expanded research efforts will improve our estimates of the many other benefits of an ocean repopulated by the great whales. These include the following services (from most to least studied).

Use Values

Tourism

Whale watching, approx. US$2 billion per year (O'Connor *et al.* 2009).

Climate regulation

Whale falls & whale pump.

Enhanced productivity

Whale pump & movement of nutrients from feeding grounds to lower nutrient breeding grounds.

Nonuse Values

Enhanced Biodiversity and Evolutionary Potential

Largely through deep-sea species dependent on whale falls.

Culture and Conservation

As charismatic species whales can attract attention and funding. Their value extends well beyond uses by humans to issues of animal welfare and relational values.

Ways Forward

To advance our understanding of the role of living whales in marine ecosystems, the following needs were identified:

- Continue assessment of whale ecology.
- Increase focus on ecological functions: extend research beyond provisioning value to nonuse values such as marine stewardship and stranding programs.
- Model the role of whales in blue carbon and nutrient transfer.
- Assess the role of whales in maintaining ocean resilience and enhancing fisheries.

It is hoped and anticipated that the ecological functions and ecosystem services identified to date are just the start of our understanding of cetaceans in marine ecosystems.

Sue Fisher, Consultant, Animal Welfare Institute

Whales & Ecosystem Functioning

DEFINING CONSERVATION POLICIES IN THE 21ST CENTURY

The unique physical characteristics of cetaceans—long-lived, slow-breeding, high-biomass mammals with high fidelity to specific feeding and breeding grounds—made their near obliteration last century by competing fleets of factory whaling ships inevitable. Understanding their uniqueness and its implications for their survival, a body of international law, beginning with the 1972 United Nations Convention on the Law of the Sea, requires that cetaceans be treated differently from fish and receive dedicated conservation efforts. Yet, the IWC, which was established in 1946 for the management and conservation of whales, has functioned for most of its seven decade history mostly as a utilitarian resource management body.

The United Nations Conference on Environment and Development (UNCED)[3] changed the global conservation paradigm in the 1990s to an ecosystem-based approach for managing and conserving biodiversity. While the IWC has in recent years considerably broadened its conservation mandate, it has continued to focus on the recovery of whales for the sake of their potential use by human consumers, not for the benefit of marine biodiversity.

The IWC's recognition in 2016 of the ecological contribution that cetaceans make to a healthy planet, and the associated resolution, represented a paradigm shift for the organization on its 70th anniversary. It not only recognized the ecological contribution of cetaceans to primary productivity and carbon sequestration on the international stage for the first time, it placed it at the center of the IWC's work.

The resolution directs the IWC's Scientific Committee—which continues to spend most of its time and resources focused on whale management issues—and its Conservation Committee to take responsibility for expanding the growing body of research on the topic. It also charges the IWC, and individual contracting governments, with integrating the value of cetaceans' ecosystem services into all future decision-making.

Adopting conservation policies to ensure that cetaceans can make the maximum possible ecological contribution is relevant to a host of legal instruments concerned with climate change, fisheries management, and biodiversity, as well as the United Nations' Sustainable Development Goals. It will also have relevance to a long-anticipated UN Agreement on High Seas Marine Biodiversity[4].

Given the range of cetaceans' ecological functions, the **Next Steps** section of the report identifies some tangible first steps to integrate their consideration into global conservation policies.

Discussion & CONCLUSIONS

The workshop presentations demonstrated that cetaceans should no longer be managed as if they are isolated species in the oceans or valued according to the size of their populations relative to their potential consumptive use by humans. Future policy making, both at the IWC and in other relevant multilateral environmental agreements (MEAs), must consider the role that cetaceans play in healthy functioning ocean ecosystems and how such ecosystem values can influence planetary health. However, it is also evident that an ecosystem-based approach to conserving biodiversity is a concept that has largely been ignored by the IWC. A dedicated strategy is needed to implement a new approach for managing
cetaceans to enhance their ecological contributions and develop relevant conservation policies.

Panelists highlighted that, as flagship species, cetaceans can be pioneers in advancing the consideration of ecological services provided by wildlife in decision-making at the national, regional, and international level. They can play an important role, for example, in advancing the concept of blue carbon in the context of climate change mitigation.

Panelists also addressed additional audience questions on what scientific research is needed to better understand the full range of ecosystem services provided by cetaceans, how to evaluate the economic value of these services, how to compel governments to commit to relevant conservation measures, and how best to both educate the public about the ecosystem functions provided by cetaceans and to facilitate the involvement of all interested stakeholders in ongoing discussions on this topic.

Next Steps
SCIENCE

Identify, complete and publish scientific research on ecological services of cetaceans

The IWC's Scientific Committee (SC) is charged with undertaking a gap analysis and developing a plan for remaining research needs. An Intersessional SC Correspondence Group to advance the work was established at IWC66.

Identify ecosystem services that have not yet been studied and develop a plan of work.

In particular, complete research on the spatial effect of cetaceans on gross primary productivity for current whale populations and identify how such productivity would increase if whale populations were restored to pre-commercial whaling levels.

Promote the value of the ecosystem services provided by cetaceans throughout the scientific community in scientific publications, at scientific conferences and in other relevant fora.

Next Steps
ECONOMICS

Complete evaluation of the economic value of ecosystem services provided by cetaceans for each focus area (supporting enhancement of primary productivity and regulating carbon sequestration) and their cultural value, including through whale watching[5].

Identify relevant economic evaluation methods and interested economists.

Consider how Regional Fisheries Management Organizations could internalize the lost value to the marine ecosystem of hundreds of thousands of bycaught cetaceans annually in the cost of fishing and the market value of fish[6].

Engage with relevant experts, including IWC Bycatch Working Group.

Next Steps
POLICY

Integrate consideration of cetaceans' ecological role into national, regional and international decision-making on biodiversity and environment.

Collaboration and cooperation is explicitly sought in the IWC resolution and could be initiated by IWC.

New research on cetaceans (and pollinators) will help to start conversations about integrating the value of wildlife's ecosystem services into relevant MEAs

For example, the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** (Resolution Conf. 9.24) seeks data on the economic value of a species' ecological role to inform decisions on regulating international commercial trade but such information is rarely provided.

Integrate consideration of cetaceans' role in mitigating climate change into national and global climate change policies.

The **United Nations Framework Convention on Climate Change** requires conservation and enhancement of carbon sinks, including coastal and marine ecosystems[7]. The Paris Agreement (2015) reiterates the need for enhancement of sinks and the importance of ensuring the integrity of all ecosystems, including oceans.

Support efforts to increase understanding of the value of coastal and oceanic **"blue carbon"**[8] in the context of climate change mitigation

Integrate consideration of the ecological role of cetaceans in ocean conservation, including Marine Protected Areas (MPA) policy.

Ensure that decisions on a new **High Seas Biodiversity Agreement**[9] are informed by the need to protect cetacean and other marine ecosystem functions.

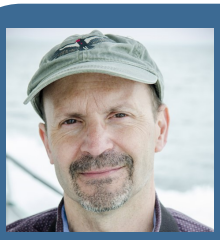
A comprehensive network of MPAs will support, and be supported by, the role of cetaceans in ecosystem functioning.

Next Steps
PUBLIC OUTREACH

A better-informed public will convey to policy-makers the value of ecosystem functions provided by cetaceans as a key reason to protect them.

Educate the public to reconsider the value of cetaceans — from sources of consumable products or objects of entertainment to allies — in our efforts to mitigate negative impacts of human-caused over-fishing, loss of biodiversity, and climate change.

Presenters & Experts
AT PANEL DISCUSSION



Joe Roman, PhD.
University of Vermont

Dr. Joe Roman is a conservation biologist, author, and fellow at the Gund Institute for Environment at the University of Vermont. His broad research interests span endangered species policy, marine mammal ecology and conservation, and biodiversity and human health. He has been an Environmental Policy Fellow with the American Association for the Advancement of Science, a Fulbright Scholar in Brazil, a McCurdy Scholar at the Duke University Marine Lab, and a Hrdy Visiting Fellow at Harvard University.

Joe is the author of *Listed: Dispatches from America's Endangered Species Act* (Harvard University Press, 2011), the recipient of the Rachel Carson Environment Book Award; and *Whale* (Reaktion 2006), a cultural history of whales and whaling. His science and nature writing has appeared in a number of peer-reviewed scientific journals and featured in The New York Times, New Scientist, Audubon, Conservation, among other journals. His research has been covered by the Associated Press, National Public Radio, The New Yorker, New York Times, Wall Street Journal, Washington Post, and other media outlets. Joe is the editor 'n' chef of Eat the Invaders.

Sue Fisher
Consultant, Animal Welfare Institute

Sue Fisher trained as an attorney in the United Kingdom. Since 1994 she has worked in policy/advocacy roles at animal protection and wildlife conservation NGOs in the UK and United States. Her primary area of expertise is the conservation of whales and management of whaling by the IWC and the regulation of trade in endangered species by CITES. She is a longstanding board member of the Species Survival Network (SSN), a coalition of over 100 conservation/animal protection organizations worldwide working on wildlife trade issues. Sue lives in the US state of Oregon and is currently a consultant on marine issues for the Animal Welfare Institute.

Roxana Schteinbarg
Coordinator Instituto de Conservación de Ballenas

Roxana Schteinbarg graduated from the University of Buenos Aires in 1992 as an agronomist and has coordinated a variety of projects both in state agencies and as a private consultant. In 1996, she co-founded the Argentinean NGO Whale Conservation Institute (Instituto de Conservación Bellenas (ICB)). ICB has been vital to ensure the continuity of the world's longest continuous scientific research program on southern right whales originally initiated by Dr. Roger Payne in Chubut in the 1970's.

In 1999, Roxana assumed the role of executive coordinator of ICB. Thanks to her creative ideas and management skills, over the last 20 years Roxana has achieved outstanding results in marine mammal conservation, education, and communication, including promoting the drafting of a bill for the creation of a sanctuary of marine mammals in Argentina. She has attended IWC meetings since 2006 as accredited observer. Her greatest desire is the end to whaling operations and the oceans' protection from the negative impacts of human activity.

Barbara Galletti
President Centro de Conservación Cetacea

Barbara Galletti is founder and president of the Chilean non-governmental organization, Centro de Conservación Cetacea (CCC). Since CCC's creation in 2001, she has been actively involved in whale conservation and cetacean scientific research projects in Chile. She has consolidated CCC as one of the most important civil society organizations in Chile, leading projects for the recovery and conservation of blue and southern right whales, the creation of a whale sanctuary in Chilean Exclusive Economic Zone, and the establishment of a Whale Sighting Network, among others. Her achievements have been acknowledged by the Rufford Innovation Award (2006) and the Future for Nature Award (2011). Barbara is also technical advisor of the Chilean delegation at International Whaling Commission. She graduated as Hydraulic Industrial Civil Engineer with a distinction degree from the Catholic University of Chile and has studied cetaceans, ecological economics, environmental justice, and socially responsible finance.

References

[1] The terms cetaceans, whales and great whales are used interchangeably in the text.

[2] IWC2016-3. Available at: https://iwc.int/resolutions

[3] UNCED subsequently promulgated the Convention on Biological Diversity.

[4] For a recent update, see: http://enb.iisd.org/vol25/enb25141e.html

[5] See for example: https://www.mmc.gov/priority-topics/value-marine-mammals/

[6] See for example, Lent, R., Squires, D. 2017. Reducing marine mammal bycatch in global fisheries: An economics approach. Deep–Sea Research Part II 140 (2017) 268–277. http://dx.doi.org/10.1016/j.dsr2.2017.03.005

[7] Art 4.1(d) UNFCCC: All parties shall: "*… promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all GHGs not controlled by the Montreal Protocol, including …coastal and marine ecosystems.*"

[8] http://thebluecarboninitiative.org/about-the-blue-carbon-initiative/

[9] The fourth session of a Preparatory Committee on the elements of a draft text of an international legally binding instrument under the UN Convention on the Law of the Sea (UNCLOS) on the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction concluded on 21 July 2017. It recommended that the General Assembly make a decision as soon as possible on the convening of an inter-governmental conference to elaborate the text of the agreement.

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