Complementing Development with Conservation:

A Workshop for the Management Planning for Arabian Sea Humpback Whales in Oman

Organised and hosted by:

سلطنة عمان
SULTANATE OF OMAN
هيئة البيئة
ENVIRONMENT AUTHORITY

جمعية البيئة العمانية
Environment Society of Oman

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Table of Contents

الملخص التنفيذي 3

Executive Summary 5

Introduction 7

Background 7

Workshop Objectives 7

Workshop Details 7

Day 1: Presentations on Arabian Sea Humpback Whale, CMPs and Industry Perspectives 8

Welcoming Addresses 8

Laying the Groundwork 11

ASHW Conservation Status and Threats: National and Regional 11

Overview on Regional Conservation Management Plans (CMPs) and Implementation 12

Conservation Management Plans 14

Industry Perspectives on Whale Conservation Initiatives 15

Complementing Development with Conservation Objectives – The Tourism Industry Perspective 15

ISSF Approach to Tuna Sustainability 16

The Western Gray Whale Advisory Panel – Industry Partnering with Science for Whale Conservation 17

World Shipping Council – An Industry Perspective 18

Environmental Impact Assessments as A Tool for Assisting Whale Conservation Management in Oman 19

Panel Discussion 21

Day 2: Building A Plan 25

Introduction 25

Resources to Support the Drafting of a National and Regional Conservation Plan for ASWH 25

Timeline for a National ASHW Conservation Plan 26

Timeline for a Regional Conservation Management Plan 27

Roadmap to a National and Regional Conservation Plan for ASWH 27

Table 1: Monitoring for Management 28

Table 2: Threat Mitigation Measures 31

Table 3: Stakeholder Mapping and Official Cooperation and Coordination Requirements 34

Table 4: Requirements and Sources of Support; Industry Partners and Approaches 36

ANNEX 1: Workshop Agenda 38

ANNEX 2: List of Participants 40

ANNEX 3: Key Ecological Attributes of Arabian Sea Humpback Whales 44

الملخص التنفيذي

استضافت كلٌّ من هيئة البيئة في عُمان وجمعية البيئة العُمانية ورشةَ عملٍ متعددة الأطراف بتاريخ 28 – 29 نوفمبر من عام 2022، تحت عنوان "اكتمال التنمية بجهود الصون: ورشة عمل حول التخطيط لتدابير شؤون حيتان بحر العرب الحدباء في عُمان"، إذ بعد ما يزيدُ عن عشرين عاماً من الأبحاث المُكرسة لدراسة وصون هذه الحيتان في عُمان، فقد بات لدينا الذخيرة الكافية من البيانات والمعلومات حول توزع وانتشار أفراد القطيع ووفرة أعداده والمخاطر التي يواجهونها، من أجل تمكين الأطراف المعنية بهذا الشأن من التخطيط للتدابير بعيدة المدى الكفيلة بحماية هذه الفصيلة الفرعية والمميزة من الأخطار ومن الاتجاه نحو هاوية خطر الانقراض الذي يهدد وجودها في المقام الأول.

جرى اليوم الأول من الورشة بحضور 66 شخصاً (حضور فعلي 53 وعبر الإنترنت 13)، بينما اجتمع حضورياً في اليوم الثاني 33 شخصاً للانخراط في عمليات التخطيط الممهدة لخارطة الطريق نحو الخطة الوطنية لجهود الصون، والسبيل لسلطنةِ عُمان للمساهمة في خطة التدابير الإقليمية لجهود صون حيتان بحر العرب الحدباء (CMP). مثل الحضور عدداً من المؤسسات الحكومية المعنية هي هيئة البيئة، ووزارة الثروة الزراعية والسمكية وموارد المياه، ووزارة النقل والاتصالات وتقنية المعلومات، وخفر السواحل، ووزارة الطاقة والمعادن، كما تواجد ممثلون عن القطاع الصناعي شملوا النفط والغاز، والشحن البحري، والموانئ، والسياحة. حظيت الورشة بحضورٍ خاص لخبراء المفوضية الدولية لصيد الحيتان (IWC)، والاتفاقية الدولية لصون الأنواع المهاجرة من الحيوانات الفطرية (CMS)، والاتحاد الدولي لصون الطبيعة (IUCN)، والذين زودا الورشة ببعدها الدولي فيما يتعلق بالتعاون الإقليمي المُقترح ما بين المفوضية الدولية لصيد الحيتان واتفاقية صون الأنواع المهاجرة ضمن إطار عمل خطة التدابير الإقليمية لجهود صون حيتان بحر العرب الحدباء.

تضمن اليوم الأول من الورشة تقديم عروضٍ مرئيةٍ عن الوضع الراهن لحيتان بحر العرب الحدباء والمخاطر التي تواجهها، فهي الفصيلة الفرعية الوحيدة في العالم من الحيتان الحدباء التي تتميز بعدم هجرتها ضمن المسارات الطويلة ما بين مناطق التغذية في شمال للكرة الأرضية ومناطق التكاثر في جنوبها، وهي منفصلة وراثياً ومنعزلة عن غيرها من حيتان المحيط الهندي، مما يعرضها للكثير من الأخطار، بما في ذلك التشابك مع معدات الصيد، والاصطدام مع السفن، وفقدان الموائل الطبيعية وتدهورها، وانتشار الضجيج تحت الماء المرتبط بالتنمية الساحلية وحركة السفن، وإزعاجات النشاطات السياحية، إضافةً إلى الأضرار المُحتملة التي يحدثها التغير المناخي على الموائل والفرائس. بيّن العرض المرئي الذي قدمته المفوضية الدولية لصيد الحيتان الوسائل التي توفرها خطط تدابير الصون الإقليمية لتعزيز تأمين التمويل والتعاون اللازمين، ولدفع جهود التعامل مع المخاطر التي تواجه هذه الحيتان المُهددة بالانقراض، بينما عبرت العروض التي قدمها القطاع الصناعي عن كيفية مساهمة نشاطات الغاز والبترول، والسياحة، والشحن البحري، والصيد ضمن مبادرات الحد من المخاطر التي تتعرض لها الحيتان، والاستفادة منها في نفس الوقت. وجرى اختتام اليوم بعرض ختامي يسلط الضوء على الدور الهام لدراسات تقييم الأثر البيئي (EIAs) وما يرتبط بها من عمليات، كونها الوسيلة الأكثر شيوعاً وجاهزية بين يدي الجهات المعنية الحكومية منها أو الخاصة، لتقييم أثار النشاطات البشرية على قطعان الحيتان، والحد منها والتعامل معها.

سلطت الجلسة النقاشية الضوء على عددٍ من التحديات، كان أبرزها التشابك مع معدات الصيد والتعامل معها، كما وجهت الجهات الأربعة المُمثلة للقطاع الصناعي رسالةً واضحة تعبر عن رغبة الجميع ومصلحتهم في حماية الحيتان من مخاطر التشابك أو الاصطدام مع السفن أو إزعاجات الضجيج المائي أو فقدان وتدهور الموائل، وذلك نظراً لأهمية الدور الذي تقوم به الحيتان لضمان سلامة السلسلة الغذائية البحرية واستمرارها، إضافةً إلى تقديمها لخدماتٍ جليلةٍ للنظام البيئي. يؤمن المسؤولون ضمن القطاعات الحكومية والصناعية في جميع أنحاء العالم بفوائد الإدارة القائمة على والمراعية

لشؤون النظام البيئي، وتعي أيضاً مسؤوليتها عن اتخاذ تدابير استباقية لمنع الآثار السلبية للأنشطة البشرية التي تعتبر ضرورية للتنمية الاقتصادية ورفاهية الإنسان.

اتفق كافة المشاركون على ضرورة تضمين أكبر شريحة مُمكنة من الأطراف المعنية بهذا الشأن، وذلك من أجل وضع معايير فعالة للوصول إلى أفضل الحلول، كما أقروا بأن هذه الورشة هي الخطوة الأولى للمُضي قُدماً على مسيرة التعاون المشترك للأطراف المعنية وأصحاب المصلحة نحو الخدد ذات المدى البعيد لصون حيتان بحر العرب الحدباء.

شهد اليوم الثاني من الورشة نقاشاتٍ مستفيضةٍ حول الخطوات والعوامل المؤدية إلى وضع خطة وطنية، وإلى أوجه المساهمة العُمانية في الخطة الإقليمية. وقد بدأ اليوم بمشاركة الجميع في عملية ترتيب الأولويات لتحديد المخاطر الأكثر إلحاحاً وضرراً على حيتان بحر العرب الحدباء، ليستنتجوا أن التهديدين الأكثر خطراً هما التشابك مع معدات الصيد، والشحن البحري (الاصطدام مع السفن، والضجيج المائي، وبناء الموانئ) وبالتالي ضرورة التعامل معهما، بينما المخاطر المرتبطة بالنشاطات الساحلية للتنقيب عن الغاز والبترول واستخراجه، وبالسياحة، والتغير المناخي، فقد تباينت الآراء حولها من حيث خطورتها وأولويتها.

تعاون المشاركون فيما بينهم للخروج بقوائم متعددة توضح ما يلي: 1) نواقص المعرفة والأولويات اللازمة لمراقبة ورصد كلاً من الحيتان والمخاطر التي تتعرض لها، 2) وسائل التعامل مع المخاطر، 3) تحديد الأطراف المعنية بالشأن، الوطنية منها أو الإقليمية أو الدولية، والأدوار التي يُمكن أن ينهضوا بها ضمن الجهود المشتركة لصون حيتان بحر العرب الحدباء، إضافةً إلى تحديد الموارد والدعم اللازمين لهذا التعاون، وقد شملت قائمة الأطراف المعنية: الخبراء والعلماء، ومنظمات المجتمع المدني، والمنظمات الحكومية الدولية، والمؤسسات الحكومية، وجهات القطاع الصناعي، وأبناء المجتمعات الساحلية/المجتمع المدني

يبدأ الجدول الزمني لوضع خطة العمل الوطنية عندما تقوم هيئة البيئة وتحت قيادتها بتشكيل "فريق عمل" لأصحاب المصلحة المتعددين، والذي يُكلف بمهمة صياغة الخطة بناءً على نتائج ورشة العمل هذه. وسيكون لهذا الفريق العامل ولاية محددة المدة.

من ثم، سوف يعمل "فريق العمل" على مناقشة وتحديد الوسائل الكفيلة بتحقيق مساهمة عُمان في التعاون المشترك للمفوضية الدولية لصيد الحيتان واتفاقية صون الأنواع المهاجرة من الحيوانات الفطرية ضمن إطار الخطة الإقليمية لتدابير شؤون الصون، علماً أن كافة الاجتماعات المشتركة للطرفين الداعمة لهذه الخطة سوف تحدث بين عامي 203 – 2024. وهذا من شأنه رفد الإجراءات المتضافرة الحالية لاتفاقية صون الأنواع المهاجرة حول حيتان بحر العرب الحدباء، والتي تمت المصادقة عليها في مؤتمر الأطراف في اتفاقية صون الأنواع المهاجرة في عام 2017، والتي كان الغرض منها تعزيز صياغة واعتماد الخطة الإقليمية لتدابير شؤون الصون.

كما جرى الاتفاق على وجود جهود جانبية موازية تُركزُ على إعداد مقترح مبني على الانتشار النموذجي (الافتراضي) والفعلي (المدروس) لحيتان بحر العرب الحدباء، ومدى ارتباطه بحركة الشحن البحري، ومن ثم تقديمه للمنظمة البحرية الدولية لمساعدتها في إعداد معايير وقياسات مسارات الحركة التي تضمن الحد من مخاطر التصادم مع السفن، وكما هو الحال مع بقية إجراءات المتابعة والتنسيق المُقترحة لهذه الورشة، فإن إعداد المقترح الخاص بالمنظمة البحرية الدولية (IMO) يتطلبُ تعاوناً وثيقاً ومستمراً بين مجموعةٍ واسعةٍ من الأطراف المعنية ذات المصلحة، وعلى الأخص، وزارة النقل والاتصالات وتقنية المعلومات، والمجلس الدولي للشحن البحري.

Executive Summary

On November 28tth-29th, 2022, the Oman Environment Authority (EA) and the Environment Society of Oman (ESO) hosted a multi-stakeholder workshop titled 'Complementing Development with Conservation: A workshop for the Management Planning for Arabian Sea humpback Whales (ASHW). in Oman'. Following over 20 years of dedicated conservation-based research on ASHW in Oman, there is now sufficient data available on the whales' distribution, abundance, and threats to allow stakeholders to design effective management strategies to prevent this unique Endangered subpopulation of whales from sliding further toward extinction.

Fifty-three in-person, and 13 online participants attended the first day of the workshop, while on the second day 33 participants engaged in face-to-face planning exercises, constructing a road map toward both a National Conservation Action Plan and how can Oman participate in a Regional Conservation Management Plan (CMP) for ASHW. Stakeholders included representatives of government agencies ranging from the EA and Ministry of Agriculture, Fisheries Wealth, and Water Resources (MAFWWR) to the Ministry of Transport, Communications and Information Technology, the Coast Guard, and Ministry of Energy and Minerals. Participants also included industry representatives from oil and gas, shipping, ports, fishing and tourism. Representatives of the International Whaling Commission (IWC), Convention on Conservation of Migratory Species of Wild Animals (CMS) and International Union for the Conservation of Nature (IUCN) provided an international perspective with respect to the proposed joint IWC-CMS regional ASHW CMP.

The first day of the workshop included presentations on ASHW status and threats. ASHW are the only known subpopulation of humpback whales in the world that does not undertake long-distance migrations between high-latitude feeding grounds and low-latitude breeding grounds. Genetically distinct and isolated from other populations in the Indian Ocean, the population faces numerous threats, including entanglement in fishing gear, ship strikes, habitat loss and degradation, underwater noise related to coastal construction and shipping, disturbance from marine tourism, and potential impacts of climate change on their habitat and/or prey. Presentations by the IWC highlighted ways in which regional Conservation Management Plans can foster fund-raising, collaboration, and support to address threats to Endangered whale populations, and industry presentations demonstrated how the oil and gas, shipping, fishing and tourism industries can all contribute to, and benefit from initiatives to mitigate threats to whales. A final presentation highlighted the role of Environmental Impact Assessments (EIAs) and related processes as the most common and readily available tools available to government and industry stakeholders to assess and mitigate the impacts of human activities to whale populations.

During a panel discussion several challenges were highlighted, particularly with regards to addressing fisheries entanglement. A consistent message from all four represented industries was that it is in everyone's interest to prevent whale entanglements, ship strikes, oil spills, disturbance from underwater noise, and habitat loss or degradation, because whales form an integral part of healthy marine food webs and provide important marine ecosystems services. Increasingly, industries and governments around the world are seeing the benefits of ecosystem-based management, and their responsibility to take pro-active measures to prevent negative impacts of human activities deemed necessary for economic development and human well-being.

Participants agreed that a wide range of stakeholders needs to be involved in designing effective mitigation measures, and that the workshop should be seen as the first step in forming an ongoing cross-stakeholder collaborative process to design ASHW conservation strategies.

During the second day of the workshop, the steps and 'ingredients' for both a national plan and how can Oman contribute to a regional plan were discussed in more detail. Participants engaged in a prioritization exercise to assign levels of urgency to the main threats to ASHW. Fisheries entanglement and threats related to shipping (ship strikes underwater noise and port development) were seen as the two highest-priority threats to address, while threats related to offshore oil and gas exploration and development, tourism and climate change were viewed as high priorities by some, and lower priorities by others.

Participants collaborated to complete a series of tables that mapped 1) knowledge gaps and priorities for monitoring of both the whales and potential threats; 2) means to mitigate threats; and 3) national, regional and international stakeholders, their potential roles in collaborative ASHW conservation and the resources and support that would be required for their collaboration. Stakeholders listed in these tables included scientists, NGOs, IGOs, government agencies, industry representatives, and coastal communities/civil society.

A timeline for the development of a National Action Plan would begin with the EA endorsing and leading the formation of a multi-stakeholder working group that would be tasked with drafting the plan based on the outcomes of this workshop. This working group would have a time-bound mandate.

In the second instance, this working group would also discuss how Oman could contribute to a joint IWC-CMS regional Conservation Management Plan, taking into account the schedule of CMS and IWC meetings that could support and endorse the CMP in 2023 and 2024. This would build on the existing CMS Concerted Action for Arabian Sea humpback whales, which was endorsed at the CMS Conference of Parties in 2017, and was intended to promote the drafting and adoption of a regional CMP.

It was also agreed that a parallel effort could focus on using the ASHW observed and modelled distribution in relation to shipping traffic to develop a proposal to the International Maritime Organisation (IMO) to put routing measures in place that would reduce the risk of ship strikes. As with all of the proposed follow-up actions to this workshop, preparation of a proposal to the IMO would require close and ongoing collaboration between a range of stakeholders, including, in particular, the Ministry of Transport, Communications and Information Technology in Oman and the World Shipping Council.

Finally, it was noted that most conservation measures adopted for Arabian Sea humpback whales would also benefit other species of whales and dolphins in Oman. While the ASHW is currently the best-studied and understood whale species in Oman, there is growing evidence that other cetacean species, like blue whales, also represent unique Northern Indian Ocean populations that merit further study and protection.

Introduction

Background

Arabian Sea humpback whales (ASHW) comprise a small and unique sub-population of humpback whales (possibly fewer than 100 individuals off the coast of Oman), resident in the Arabian Sea year-round. Genetic, photo-identification and acoustic evidence indicate that they are genetically distinct and isolated from neighbouring humpback whale populations in the Indian Ocean. The sub-population has been the focus of discussions in the Scientific Committee of the International Whaling Commission (IWC) since the 1990s with the revelation that 242 humpback whales were illegally killed by Soviet whaling vessels in the 1960s. The IWC, the International Union for the Conservation of Nature (IUCN), and the Convention on Migratory Species (CMS) have all expressed the urgent need for cross-cutting conservation actions to be taken at the government level to address the critical threats Arabian Sea Humpback Whales are facing. These threats include ship strikes, noise pollution, disturbance from unregulated tourism and entanglement in fishing nets. The IWC Scientific Committee (SC) has been exploring the possibility of forming a Conservation Management Plan (CMP) for the ASWH population since 2011. Every year since that time, the population has featured as a high priority on the IWC SC agenda with research updates from across the region reported to the Conservation Management Plan subcommittee. In 2017, the Convention on Migratory Species approved a Concerted Action for Arabian Sea humpback whales, and since that time the IWC and the CMS have discussed the potential benefits of a joint IWC-CMS Conservation Management Plan that could facilitate collaboration between a larger number of ASHW range countries.

Most of what is known about ASHW today is based on dedicated cetacean research conducted off the coast of Oman over the past 20 years. While observations of humpback whales have been recorded by fishing captains in Pakistan, and acoustic data and opportunistic sightings have been recorded off the west coast of India, Oman has played a leading role in furthering our understanding of the population's distribution, abundance, habitat preferences, and genetic identity.

Workshop Objectives

In light of the ASHW's precarious conservation status, and Oman's leading role in hosting research and conservation efforts for the population to date, the workshop had dual objectives: 1) to involve relevant government and industry stakeholders in discussions about how the research conducted over the past 20 years can be applied to the development of a national conservation action plan for ASHW; and 2) to discuss what steps would be required for Oman to participate in a joint IWC-CMS regional Conservation Management Plan (CMP) for ASHW. Noting that public and private sector interests often interpret 'conservation' to be restricting of development, an important step in considering the CMP process was to understand the implications for socio-economic interests at the national level and how they may support Oman's blue economy initiatives. Presentations on the state of our knowledge and understanding of the ASWH population and its conservation status in Oman, followed by examples of ways in which four key industries (shipping, tourism, fisheries and oil and gas) have played leading roles in whale conservation initiatives around the globe provided the background and context for workshop participants to explore the ways in which a CMP could be complimentary to Oman's strategy for development and resource management.

Workshop Details

The workshop was held on the 28th and 29th of November 2022 at the Hilton Garden Inn Muscat (Al Khuwair, Muscat) in the Sultanate of Oman under the patronage of Dr. Ahmed bin Abdullah bin Mahroos Al Sayari, Environment Authority Chairman Advisor.

Day 1: Presentations on Arabian Sea Humpback Whale, CMPs and Industry Perspectives

Welcoming Addresses

Figure 1: Eng. Ahmed al Shukaili, Environment Authority

Engineer Ahmed Al Shukaili, Director of Marine Environment Conservation Department, Environment Authority: Eng. Al Shukaili welcomed participants on behalf of Oman's Environment Authority, who were formally hosting the workshop. Of Oman's 20 species of whales and dolphins, the ASHW is one of the most threatened, considered Endangered on the IUCN Red List of Threatened Species, and impacted by a range of human activities. It can be considered an indicator species providing insight into the health of marine and coastal ecosystems in Oman. Eng. Shukaili welcomed the wealth of research that has been conducted on ASHW in Oman's waters, especially the satellite tagging in recent years which has provided insight into the whales' habitat use and co-occurrence with threats such as shipping. He also welcomed the publication of the Marine Mammal Atlas of Oman. The data collected over the past 20 years by local and international researchers will help Oman to design marine protected areas and work toward its target of protecting 10% of its EEZ.

Figure 2: HH Sayyida Tania al Said, President ESO.

HH Sayyida Tania Al Said, President, Environment Society of Oman: HH Sayyida Tania welcomed participants on behalf of the ESO and thanked the Environment Authority for hosting the event. She provided a brief history of the ESO, which was founded in 2004 in large part to facilitate whale and dolphin research and conservation efforts in Oman. Although most whale populations have been recovering since the 1986 global moratorium on commercial whaling, Arabian Sea humpback whales, which show a unique fidelity to Oman's waters, remain threatened with fewer than 100 individuals thought to remain off the coast of Oman. While continued research on this population is essential to monitor its health, status and threats, enough is now known about the population and its conservation needs to start mitigating threats. It is hoped that this workshop can start the process of conservation planning in balance with development.

Dr. Rebecca Lent, Executive Director, International Whaling Commission: While the IWC was originally founded to help regulate whaling, in recent years the IWC's activities have been focusing increasingly on whale conservation and threat mitigation. Dr. Lent briefly introduced some of the IWC programmes and initiatives that are helping to address threats to whales worldwide. These include the Strandings Initiative, the Bycatch Mitigation Initiative, the Global Entanglement Response Network, the Ship Strikes Working Group, and working groups focusing on climate change, chemical pollution and ocean noise. The IWC has formal collaborations with the International Maritime Organisation (IMO), the Food and Agriculture Organisation (FAO) and other intergovernmental organisations responsible for the management of

industries that impact whales globally. The IWC has also supported work in Oman, including a 2015 workshop on whale disentanglement and stranding response, and the January 2021 disentanglement of a humpback whale in Duqm Port. The IWC Secretariat looks forward to supporting this workshop and its outcomes.

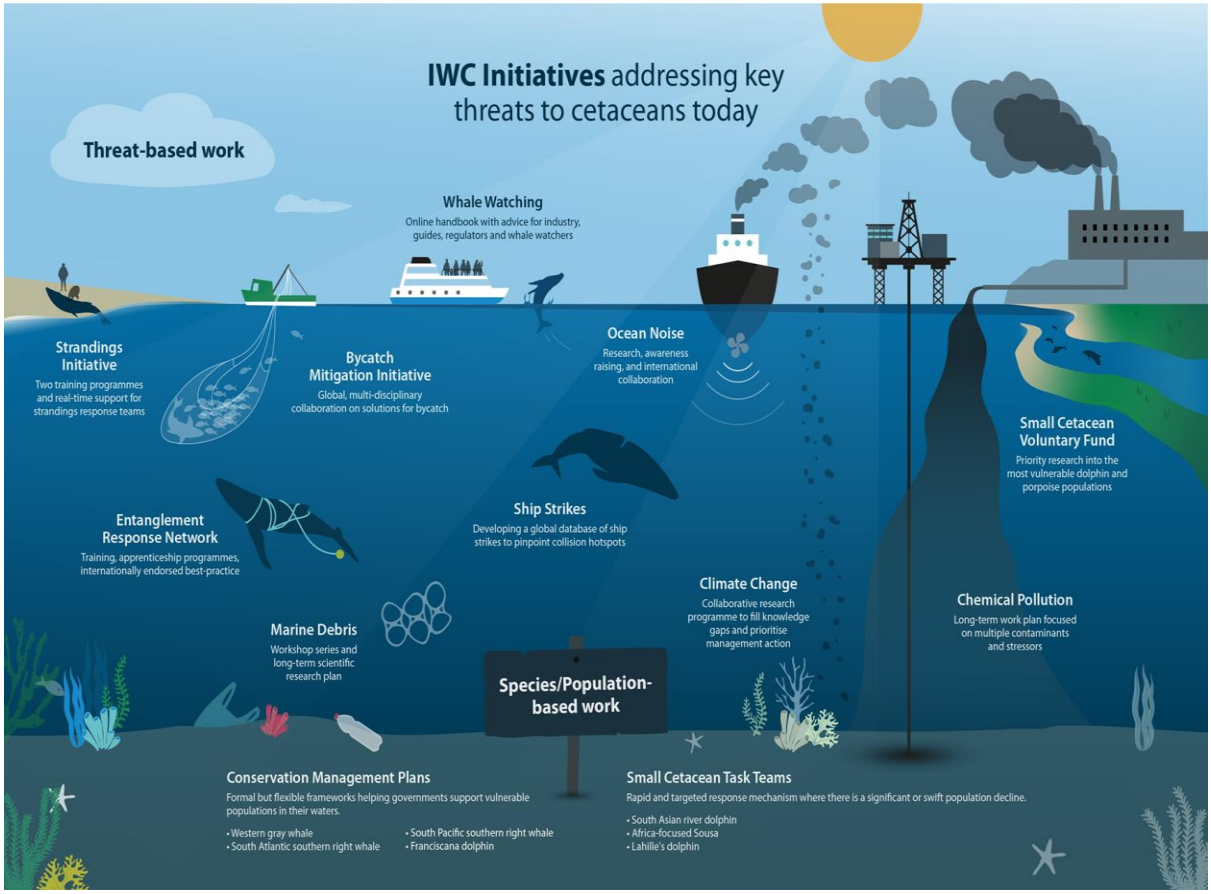


Figure 3: Infographic illustrating the ways in which the International Whaling Commission supports whale and dolphin conservation (reproduced with permission from the IWC).

Rouba Abou-Atieh, Executive Coordinator, Convention on Migratory Species Office - Abu Dhabi: Ms Abou-Atieh thanked the Environment Authority and the ESO for hosting and organizing the workshop, and provided some background on the CMS, which has 133 member state parties dedicated to protecting migratory wildlife around the globe. Among ASHW range countries, all relevant countries except Oman, Kuwait and Qatar are signatories to the CMS, but Oman is a signatory the Memorandum of Understanding on the Conservation and Management of Marinet Turtles and their Habitats in the Indian Ocean and Southeast Asia (IOSEA), hosted by the CMS. The CMS Concerted Action for Arabian Sea humpback whales, which was originally adopted by the CMS Conference of Parties at its 12th Meeting (COP12) in 2017 and revised, extended and adopted by the COP13 in 2020, has laid the foundation for regional collaboration and has galvanized action in countries like India and Pakistan, where capacity building workshops have taken place, Marine Protected Areas have been created and new research programmes have been started. However, the Concerted Actions is intended as a time-bound instrument with the end-goal of developing a joint IWC-CMS regional conservation management plan, with full government and industry participation and buy-in. It is very much hoped that this workshop can be an important steppingstone in achieving that goal.

Dr. Hussein Al Muscati, Director of Development & Management of Fisheries Resources, Ministry of Agriculture, Fisheries Wealth, and Water Resources: Dr. Al Muscati welcomed participants and thanked the EA and the ESO for hosting and organizing the workshop. He emphasized the important role that whales play in maintaining the balance in marine ecosystems as well as their role in regulating climate change through a system known as the 'whale pump'. Whales transport carbon and other nutrients vertically through the water column and help create conditions for phytoplankton blooms that support the entire food chain and help to absorb CO_2 from the atmosphere. Taking these important ecosystem services into account, the International Monetary Fund has estimated that a single great whale is worth more than 2 million US Dollars. This should clearly motivate government and industry partners to protect whales. The Ministry of Agriculture, Fisheries Wealth and Water Resources is committed to the various conventions to which it is a party to protect whales and mitigate fisheries bycatch, and looks forward to collaborating with other stakeholders for the protection of ASHW.

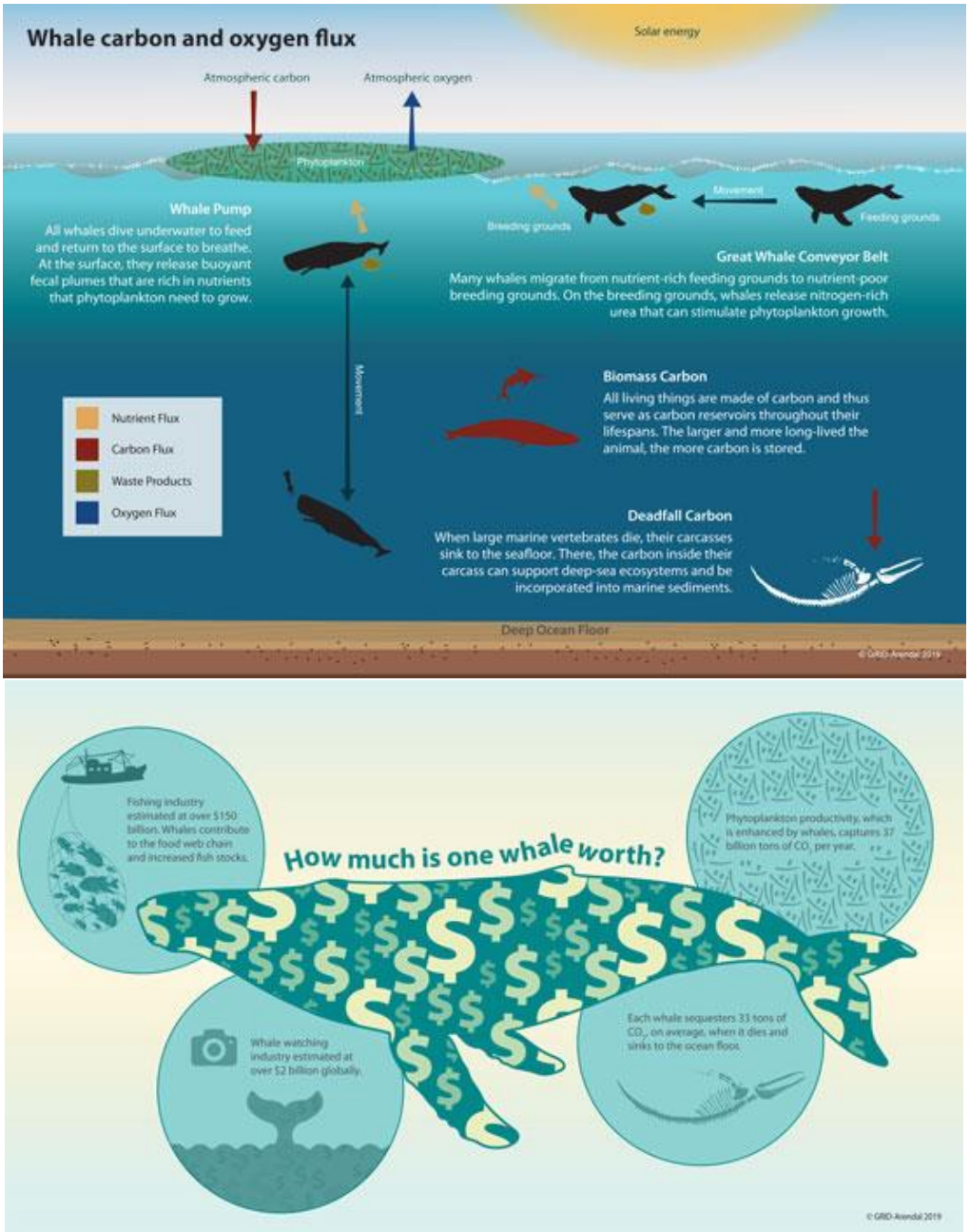


Figure 4: Illustrations of the 'Whale Pump' reproduced from the International Monetary Fund: https://www.imf.org/en/Publications/fandd/issues/2019/12/natures-solution-to-climate-change-cham

Laying the Groundwork

ASHW Conservation Status and Threats: National and Regional

Dr. Andrew Willson, Future Seas Global SCP, Founding Director

A PDF of the power point presentation delivered by Dr. Willson can be found here.

Dr. Willson provided an overview of research conducted on ASHW in Oman from 2000 onward. This has revealed the following key points about the population using the waters off of Oman and likely the wider Arabian Sea:

- Every other population of humpback whales in the world undertakes long migrations between high latitude feeding grounds, where they take advantage of high productivity in summer months, and low latitude/tropical breeding grounds where they generally fast while they focus on mating, calving and nursing young.
- In the 1990s evidence emerged that humpback whales were present in the Arabian Sea year-round, and whales that were illegally hunted by soviet whaling fleets off the coasts of Oman, Pakistan and India between 1964 and 1966 had full stomachs and embryos that indicated whales were adhering to a Northern Hemisphere breeding cycle, despite having no feasible migration routes to northern feeding grounds.
- Upwelling of cold, nutrient rich waters during the Southwest Monsoon/Khareef allows humpback whales to find both abundant prey and the warm protected water that they need for reproduction within the tropical latitudes of the Arabian Sea.
- Photo-identification studies indicate that fewer than 100 individuals use the waters off the coast of Oman, while genetic studies show that these individuals have been isolated from other Indian Ocean populations for more than 70,000 years. Current population modeling which is still undergoing peer review indicates that the population is likely following a trajectory of steady decline.
- Satellite tagged whales generally stayed within Oman's EEZ, although one individual crossed the Arabian Sea to the Southern tip of India and back again.
- Habitat modelling from boat-based surveys and satellite tagging, as well as humpback whale song recorded by passive acoustic monitoring shows that the Gulf of Masirah and the Hallaniyats Bay are 'hotspots' for ASHW in Oman.
- These areas, particularly the Gulf of Masirah, are also important for fisheries and shipping.
- A recent visual health assessment of ASHW in Oman found that 66% of all animals examined showed evidence of past entanglement in fishing gear, while four animals had evidence of scarring attributable to ship strikes/propellor damage. Whales also had a high prevalence of skin lesions thought to be caused by a poxvirus – a possible sign of weakened immunity and overall fitness.
- Current and future planned research is focusing on assessing body condition and other indications of health and fitness, while at the same time monitoring and quantifying overlaps with potentially threatening human activities like gillnet fisheries, and oil and gas exploration and production. A ship strike risk assessment has been prepared from species distribution modelling. Initial results show moving shipping traffic (transiting through Oman's waters) further offshore could reduce the risk of lethal strikes by as much as 80%. The first results have been presented to industry and government for review. The study is due for publication in 2024.
- Research efforts in Oman are also conducted in the framework of regional collaboration through the Arabian Sea Whale Network.

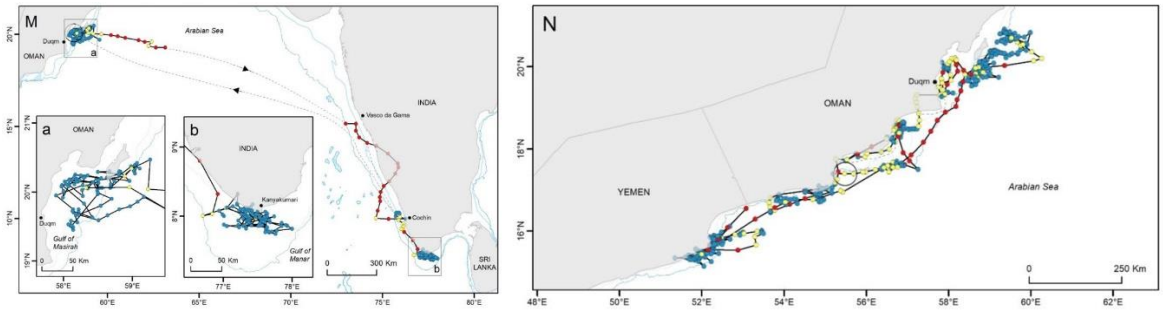


Figure 5: Tracks of individual whales that were satellite tagged off the coast of Oman between 2014 and 2017. Reproduced from Willson, 2021. PhD Thesis.

Overview on Regional Conservation Management Plans (CMPs) and Implementation

Dr. Iain Staniland, International Whaling Commission, Head of Science, Conservation and Managment

A PDF of the power point presentation delivered by Dr. Staniland can be found here.

Dr. Staniland provided an overview of Conservation Management Plans (CMPs) as a tool to promote regional collaboration for the conservation of whale or dolphin populations that span the boundaries of multiple countries. There are now five IWC CMPs in place around the globe for Western Pacific gray whales, Southwest Atlantic and southeast Pacific right whales, Franciscana dolphins and South American river dolphins. Arabian Sea humpback whales have been flagged as a priority species for an IWC CMP since 2010.

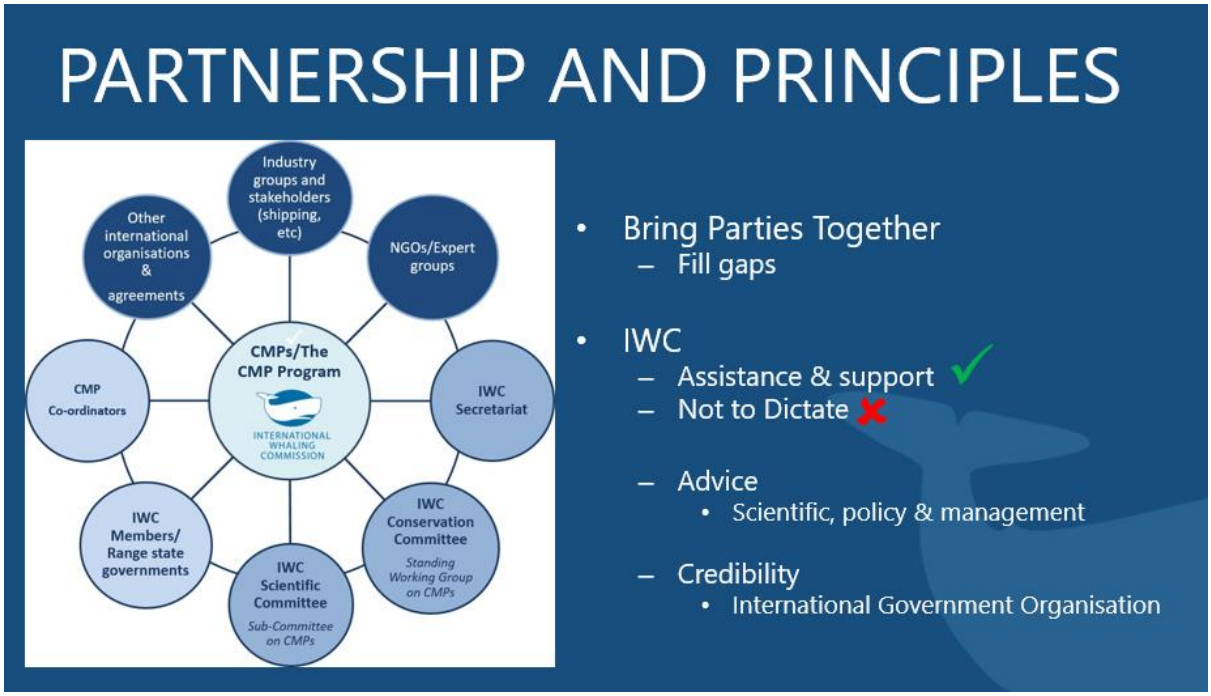


Figure 6: Excerpt from Dr. Staniland's presentation illustrating partners involved in a regional Conservation Management Plan.

Cetaceans move over large distances and so can end up breeding, feeding or moving through several countries' territorial waters. Healthy populations rely on consistent protection across domestic, political and international borders but levels of protection often differ markedly between countries and regions. CMPs address these challenges by providing a co-ordinated and collaborative framework for countries to work together to conserve vulnerable populations that they share. Whilst governments are at the heart of

the process other key stakeholders include conservation organisations, local authorities and industries like fisheries or shipping. CMPs are voluntary undertakings and are intended to complement national legislation and management methods in participating governments, not to replace domestic measures.

The Commission's Secretariat provides administrative support, including outreach and promotion of the CMP initiative, helping participating governments to cost CMP actions and helping to manage financial contracts. The IWC's Scientific Committee also provides technical support and recommendations, and a Standing Working Group on CMPs under the IWC's Conservation Committee can provide support to member parties with the process of nominating and implementing and monitoring the success of CMPs. While the IWC does not have extensive funding directly available for CMPs, it can provide seed funding through Voluntary Contributions received from Contracting Governments, assistance with fund-raising, and modest grants for research through the Scientific Committee Research Fund. This fund has supported research and conservation work in Oman and India multiple times over the past 10 years.

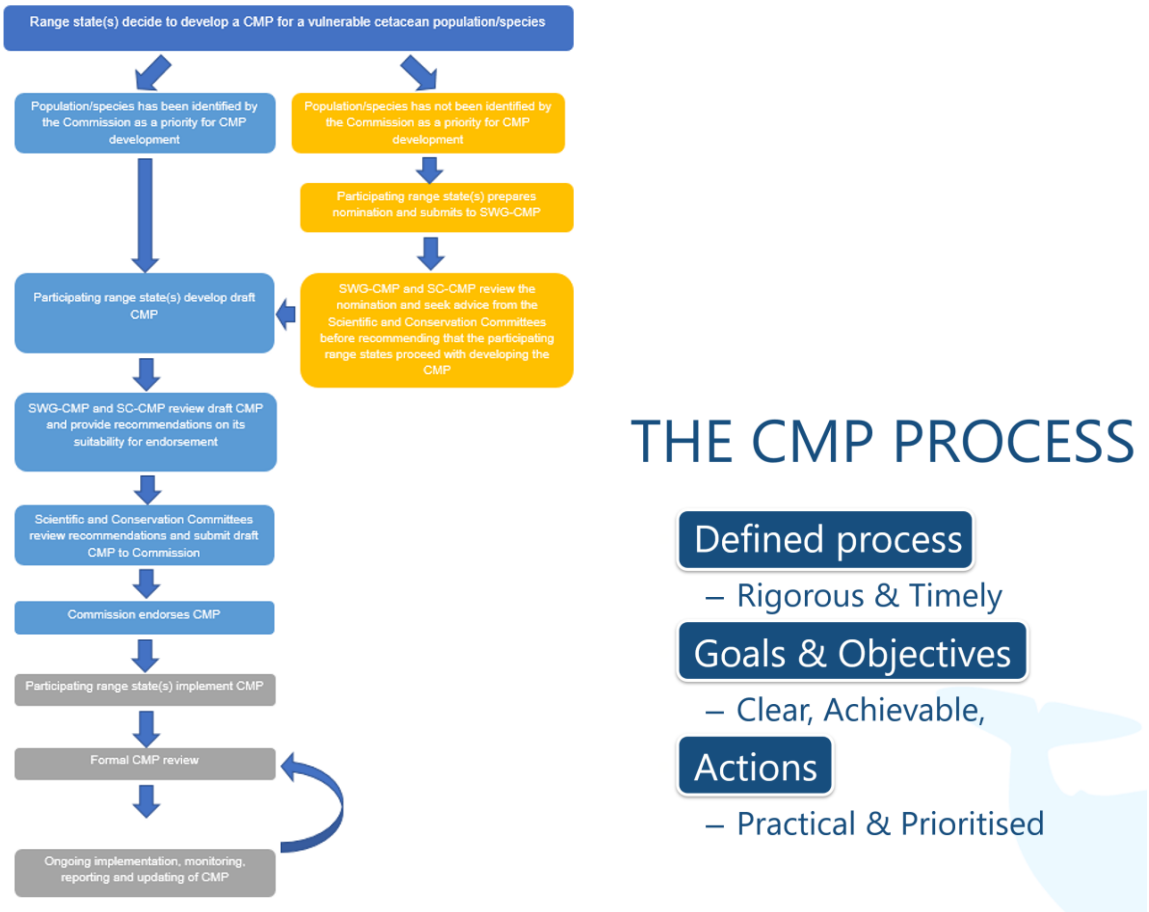


Figure 7: Excerpt from Dr. Staniland's presentation illustrating the steps involved in establishing a regional Conservation Management Plan.

Dr. Staniland presented an overview of the process that is followed in nominating, evaluating, endorsing, and implementing a CMP. The process is well defined, but tailor- made to suit each species and each group of countries participating. There are also existing examples of CMPs that involve collaboration between the IWC and other international platforms, such as the joint IWC-IUCN CMP for Western Gray whales (see below).

Conservation Management Plans

Miguel Iñíguez, Fundación Cethus, IWC delegate Argentina, Vice chair of the IWC Conservation Committee

Mr. Iñiguez's presentation can be viewed here.

Mr. Iñiguez provided insight into his involvement with four existing and planned CMPs for Southwest Atlantic southern right whales, Franciscana dolphins, South American river dolphins and Central American humpback whales. In each case, CMPs have been an important tool to promote cooperation among countries and a wide range of stakeholders, including local communities. Each CMP has 4 main components:

- Information on biology and the status of the population or species
- A summary of current and potential threats
- Recommended actions to address the identified threats
- Implementation strategies

CMPs are valuable not only in their ability to unite countries that share whale populations, but also to involve a wide range of government, industry, NGO and academic/scientific stakeholders in conservation measures. One element essential to CMP success is the appointment of an able coordinator who can act as the spider in the web and facilitate communication and collaboration between these different stakeholders.

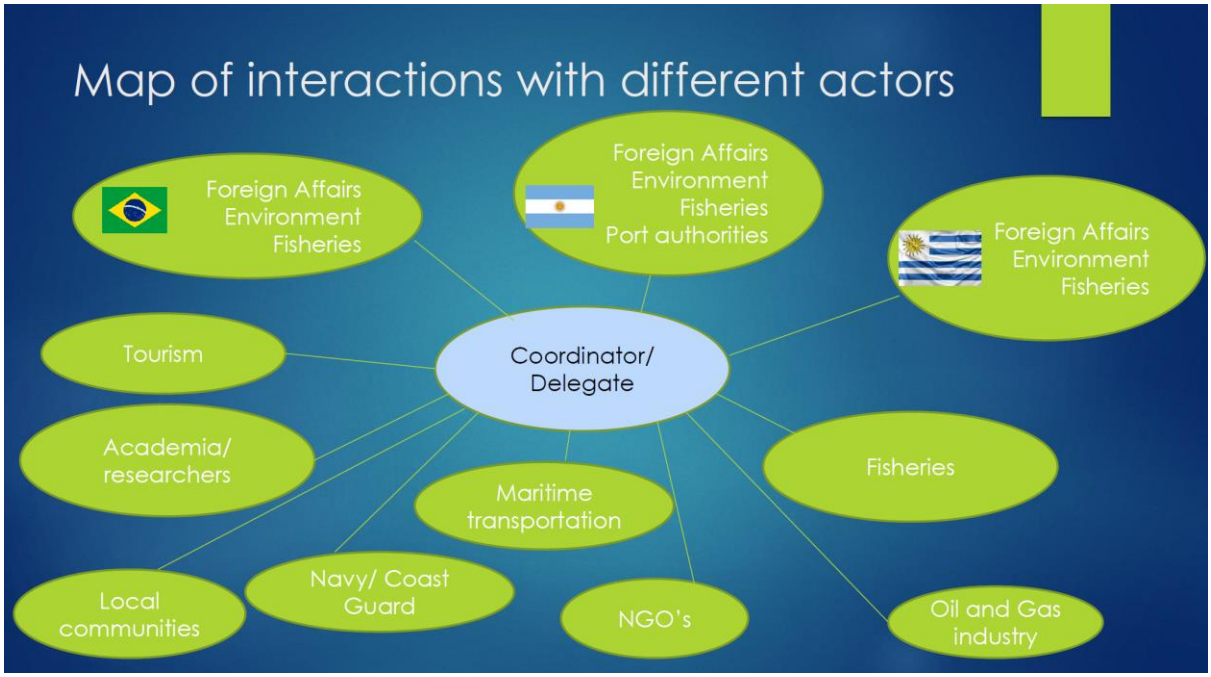


Figure 8: Excerpt from Mr. Iniguez's presentation illustrating the partners involved in a CMP for fransciscana dolphins in South America.

Industry Perspectives on Whale Conservation Initiatives

Complementing Development with Conservation Objectives – The Tourism Industry Perspective

Dr. Barry McGovern, Pacific Whale Foundation

Dr. McGovern's presentation can be viewed here.

Dr. McGovern provided background on the Pacific Whale Foundation, which runs whale and dolphin watching tours in Hawaii and Australia through a subsidiary company, and also has a research programme that employs scientists who study the whales as well as the potential impacts of whale watching. He summarized the short-and long-term impacts that whale watching can have on whale and dolphin populations. Where disturbance from tourism activities persist, they can lead whales or dolphins to:

- Avoid vessels and abandon important feeding, breeding or resting sites;
- Reduce feeding, nursing, or social bonding, which are all vital to animals' long-term well-being;
- Increase their levels of stress hormones, which can impact their immune systems and render them more susceptible to disease and/or result in lower levels of reproduction or shorter life spans.
- Sustain serious injuries from propellor damage or the increased energetic demands of avoiding vessels or traveling further for food/rest.

Research has determined that a number of precautions can be taken by the tourism industry to mitigate or minimize the impacts of their activities. These include:

- Limiting the number of vessels that are allowed to operate in a particular area;
- Establishing minimum approach distances;
- Establishing speed restrictions around whales and dolphins, and;
- Limiting the amount of time that whales or dolphins can be exposed to tourism vessels.

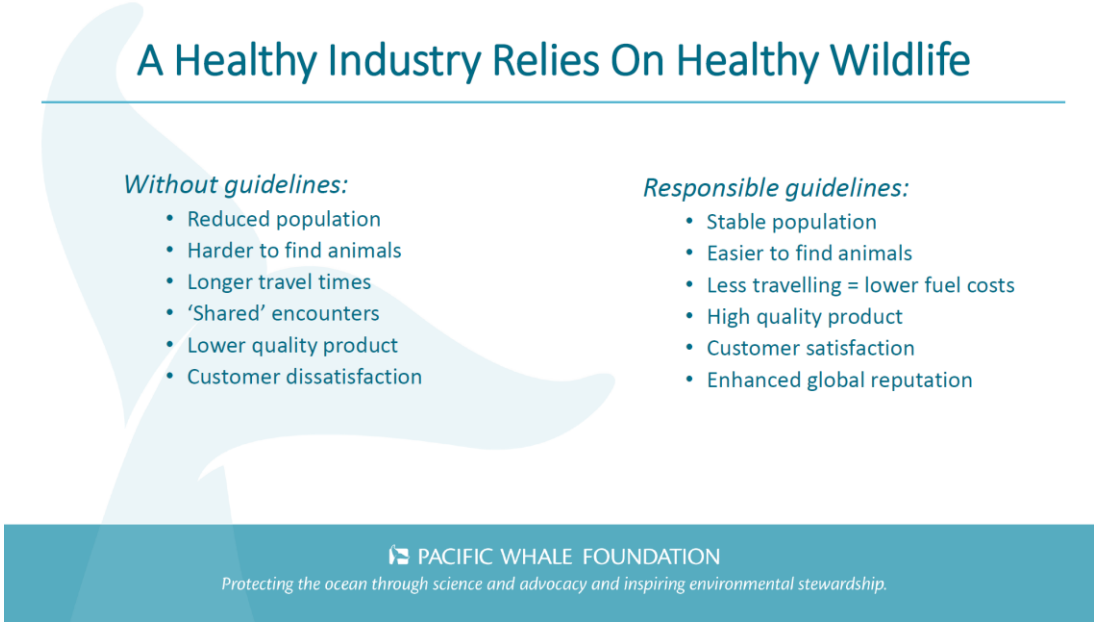


Figure 9: Excerpt from Dr. McGovern's presentation illustrating the benefits of responsible regulation of whale watching tourism.

Where these types of measures have been put in place, the tourism industry has actually benefited (see figure below), as tourists in most locations are willing to pay higher prices for tours where the sighting potential is higher (i.e. animals have not been chased away), where sightings feel more exclusive (i.e. there are not too many other vessels watching the same whales); and where they feel that the tours are

conducted in a responsible manner that 'protects the environment'. Research also showed that 87% of dolphin watching tourists in Oman supported the implementation of legally enforceable guidelines that would prevent disturbance to target dolphin populations. Finally, Dr. McGovern urged stakeholders in Oman to consider implementing legally enforceable measures sooner rather than later, especially as there is not (yet) a whale watching industry focusing on Arabian Sea humpback whales. Once an industry is established, irresponsible habits are very difficult to change, while good habits are easier to form from the start. Tourism review sites like Trip Advisor and Google Reviews allow tourists to share their reviews of whale and dolphin watching experiences, and a well-regulated industry can allow Oman to develop a reputation for sustainable tourism.

ISSF Approach to Tuna Sustainability

Dr. Hilario Murua, International Seafood Sustainability Foundation

Dr. Murua's full presentation is available in PDF format here.

The International Seafood Sustainability Foundation (ISSF) was formed in 2009 to undertake and facilitate science-based initiatives for the long-term conservation and sustainable use of global tuna stocks, reducing bycatch and promoting tuna ecosystem health. In doing so the ISSF supports Regional Fisheries Management Organisations (RFMOs) and advocates for RFMO members. They interact with Member governments, NGOs, markets, and fishing vessels and fishing companies.

Bycatch mitigation is one of ISSF's greatest priorities in relation to whale conservation. ISSF has developed a range of tools that participating companies and vessels can u se to reduce bycatch. This includes Conservation Measures that ISSF participating companies adopt to facilitate real, continuous improvement across global tuna stocks. For example, ISSF Conservation Measure 3.2 prohibits participating companies to purchase tuna caught in large-scale pelagic driftnets. ISSF also works with participating companies to meet their RFMO obligations for observer coverage within fishing fleets. The ISSF Proactive Vessel Register allows the public to see which vessels are adhering to ISSF Conservation Measures to improve sustainability and reduce bycatch, contributing to the Dolphin Safe tuna label that is used in the United States.

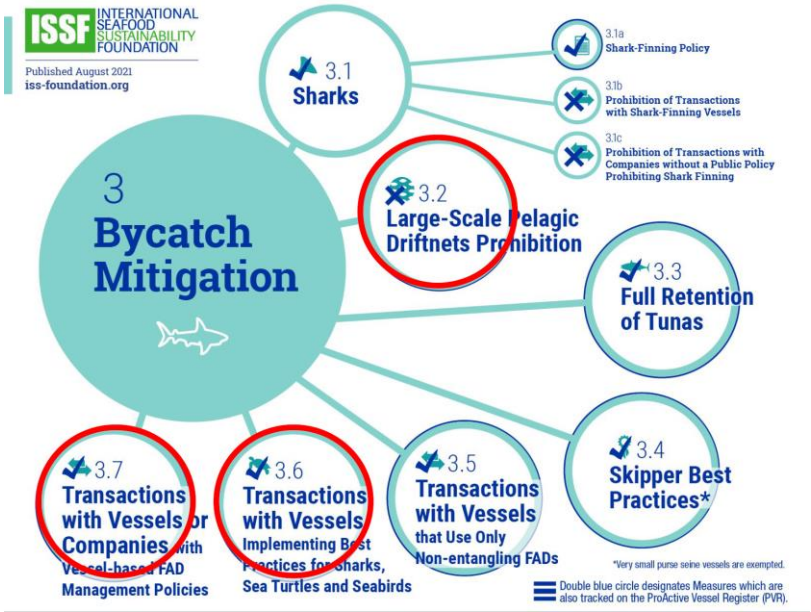


Figure 10: Excerpt from Dr. Murua's presentation illustrating ISSF Conservation Measures to mitigate cetacean bycatch in tuna industry.

The Indian Ocean Tuna Commission (IOTC) is the RFMO of greatest relevance to Oman. The IOTC has recently been collaborating with the International Whaling Commission and scientists in member countries to discuss and test methods to reduce whale and dolphin bycatch in Tuna fisheries. This includes better enforcement of Resolution 17/07 on the prohibition of large-scale driftnets in the IOTC area, and a resolution to set gillnets 2m below the water surface, a method proven to reduce dolphin bycatch in Pakistan gillnet fisheries.

There are also initiatives to reduce cetacean bycatch globally under the US Fish and Fish Product Import Provisions of the Marine Mammal Protection Act. The import provisions require countries exporting fisheries products to the US to demonstrate that they have measures in place to adequately manage marine mammal populations that interact with fisheries, and that management strategies include adequate measures to maintain bycatch at sustainable levels. NOAA has published a Compliance Guide which has motivated many fisheries and fish exporting nations to collaborate with idustry and/or cetacean scientists to be able to demonstrate active management of marine mammal interactions with fisheries.

The Western Gray Whale Advisory Panel – Industry Partnering with Science for Whale Conservation

Stephanie Lock, Shell Australia, Vice President for Health, Safety, Security , Environment

Ms. Lock provided an overview of the successful partnership between an oil and gas company, the International Whaling Commission, and the International Union for the Conservation of Nature (IUCN) with the aim of mitigating the impacts of offshore oil and gas development off of Sakhalin Island, Russia on a Critically Endangered population of gray whales. Activities undertaken jointly through recommendations of the Western Gray Whale Advisory Panel (WGWAP), supported rigorous research and conservation programme that eventually contributed to the doubling of the gray whale population feeding off of Sakhalin Island from an estimated 74 individuals in 1995 to more than 200 in 2015. The collaboration between industry, scientists, and intergovernmental organisations was positive for all involved, and is summarised in this report produced by the IUCN, WWF and the International Fund for Animal Welfare (IFAW). The Western Gray Whale is still the focus of an IWC Conservation Management Plan.

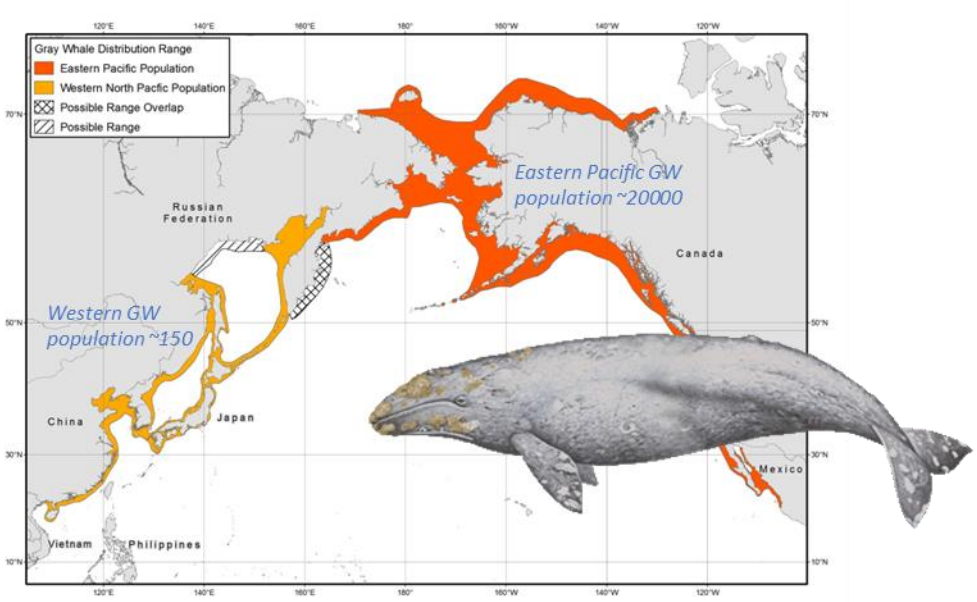


Figure 11: The distribution of Western gray whales, whose primary feeding ground overlaps with oil and gas concessions off the coast of Sakhalin Island, Russia.

World Shipping Council – An Industry Perspective

Captain Wolfram Guntermann, Hapag Lloyd, Director of Regulatory Affairs

Captain Guntermann's presentation can be found in PDF format here.

The World Shipping Council (WSC) has 22 member companies that collectively operate 90% of the world's liner vessel services. Their purpose is 'to shape the future growth of a socially responsible, environmentally sustainable, safe, and secure shipping industry'. The WCS has consultative status at the International Maritime Organisation (IMO).

Figure 12: Logos of members of the World Shipping Council.

Liner shipping operates within a schedule of fixed port rotations with more than 260 services in the Middle East and South Asia. An examination of one company's vessel traffic around Oman's coastline demonstrated that most traffic passes more than 50kms from shore, but traffic approaches to within less than 30km of shore at Muscat, Ras al Hadd, and Ras Madrakah.

In general, the WCS and their members are in favour of routing measures that move ships away from peak whale densities rather than speed restrictions which can impact cargo delivery schedules. In addition to being the most effective means to reduce the risk of ship strikes, it keeps emissions and the risks of spills further from shore.

Captain Guntermann presented a case study from Sri Lanka, in which the WSC has led the shipping industry in an effort to shift a shipping lane away from a blue whale feeding area on the continental shelf. The current Traffic Separation Scheme (TSS) routes ships close to Sri Lanka's southern shore creating a ship strike risk for whales, as well as the risk of collision with small-scale artisanal fishing boats taking advantage of the same productivity that attracts the whales. In 2017 the WSC wrote a letter to the Prime Minister of Sri Lanka requesting that the TSS be moved further south into deeper waters to avoid overlap with feeding whales and artisanal fisheries. In 2018 the WSC and the IMO hosted a joint workshop with Sri Lankan stakeholders to promote this move, but this has proved to be a slow political process.

The WSC would welcome the opportunity to work with the relevant stakeholders in Oman to use the available data on humpback whale distribution to explore which IMO tools, either TSS, Particularly Sensitive

Sea Areas (PSSAs) and/or Areas to be Avoided (ATBA) might be most appropriate to reduce the impact of shipping on ASHW in Oman. Collaboration between government, industry and civil society will be essential to find the 'sweet spot' between liner shipping, port operations, and science-based conservation management.

Environmental Impact Assessments as A Tool for Assisting Whale Conservation Management in Oman

Robert Baldwin, Five Oceans Environmental Services, Director

Robert Baldwin's full presentation can be found in PDF format here.

The presentation summarised the legal underpinnings for Environmental Impact Assessments (EIAs) in Oman, explaining that all planned developments in Oman are required to undertake EIAs, and that these must be evaluated and approved by the Environmental Assessments and Permits Centre before permits for the development project are issued by the Environment Authority (EA). Permits are issued with conditions that set out the legal obligations for developers to mitigate the environmental impacts of their project. For Special Economic Zones, this authority can be transferred, as has been done in the case of RD79/2013 which transferred functions of the EA to the Special Economic Zone at Duqm (SEZAD).

EIAs should entail several steps:

1. A screening study to determine whether an EIA is required- a Strategic Environmental Assessment (SEA) can help to put the planned development in the context of other existing and planned developments and sensitive habitats.
2. A scoping study to determine what should be included in the EIA.
3. A review of, or collection of baseline data on the existing environment and flora and fauna in and around the area of planned development. In the case of whales and dolphins, the Marine Mammal Atlas of Oman can be a very useful tool, as it includes a lot of baseline data on different whale and dolphin species and their habitats in Oman. However, users should be aware that for certain species and certain areas of Oman's coastline, there are still significant data gaps.
4. Impact assessment and mitigation measures. This is the central component of the EIA, and should involve careful consideration of size and severity of potential impacts against the sensitivity, importance and value of potential receptors, as well as the timeframe in which impacts may occur and their reversibility. It should also include an assessment of the cumulative and synergistic impacts of the planned development in conjunction with existing or other planned developments. The recommended mitigation measures must be 'SMART' – **s**pecific, **m**easurable, **a**chievable, **r**ealistic and **t**imely.
5. Monitoring and Management Measures: The EIA should include a recommended plan for ongoing monitoring to make sure that mitigation measures are being followed, and that they are effective in reducing risks to target fauna and/or their important habitats.

In addition to baseline information on Oman's cetaceans and their habitats, the Marine Mammal Atlas of Oman also contains information on potential threats to cetaceans and mitigation measures that can

Figure 13: Communication resources developed to promote whale strike mitigation measures off the Port of Duqum in Oman.

eliminate or reduce those threats. These can be used by developers to design Construction Environmental Management Plans (CEMP) and Operational Environmental Management Plans (OEMP).

A case study on the Port of Duqm demonstrates how the Port Authority collaborated with scientists from an Environmental Services Provider to develop a Whale Mitigation and Monitoring Plan (WMMP) that would minimize the risk of whale ship strikes. This plan used data on whale habitat use to design five zones with differing levels of mitigation actions if and when whales are observed. This plan has been called into action on multiple occasions when humpback whales were observed inside the port itself, presenting a risk to operations as well as to the whales themselves.

The presentation also included an overview of the hierarchy of actions that can be included in a developer's environmental planning. These can range from preventative actions (the preferred option), to remediation actions to compensate for unavoidable damage by restoring or offsetting impacts to the environment. In the case of Endangered Arabian Sea humpback whales, restoring the population after losses occur is almost impossible given their slow rates of reproduction and long life spans. As such, avoiding and minimising impacts should be a priority.

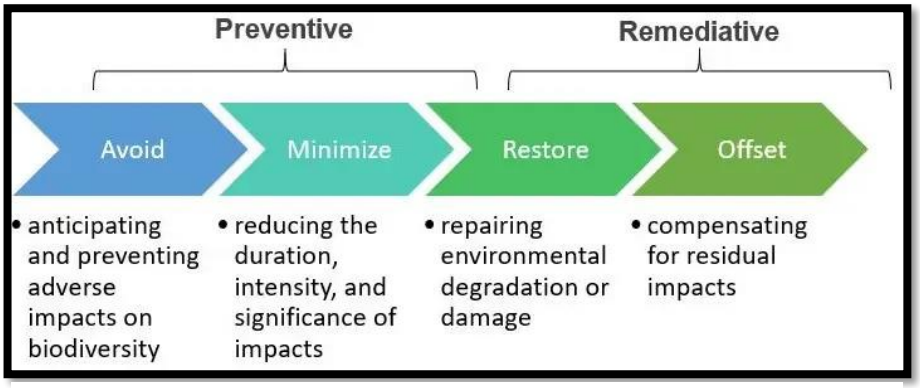


Figure 14: the mitigation 'hierarchy' which should be built into Environmental Management Plans.

The SEA and EIA processes can play an important role in an ASHW Conservation Management Plan. Range countries should be encouraged to identify internationally financed developments / industries / activities, both ongoing and planned, occur within the whales' critical habitat. The CMP should then encourage audits to understand which of these developments / industries / activities conform with the Equator Principles, intended to provide 'a common baseline and risk management framework for financial institutions to identify, assess and manage environmental and social risks when financing projects, followed by studies to assess obligations where these are not being met'. Where these principles are not being met, the CMP should encourage studies to assess obligations and provide support to the government or industry stakeholders to design suitable management plans.

Panel Discussion

Moderated by: Dr. Gianna Minton, Independent Consultant, Megaptera Marine Conservation and Deputy Chair of the IUCN SSC Cetacean Specialist Group
Panel Members: Captain Guntermann, Iain Staniland, Miguel Iniguez, Andrew Willson, Barry McGovern, Hilario Muara

Question: How can we mitigate the impact of fisheries entanglement for ASHW? Are there deterrent devices that can be effective? Some fishers have tried sub-surface gillnets, but they need training.
Answer: This is indeed a big challenge given that 99% of the fisheries in Oman are artisanal fisheries using gillnets set from dhows or skiffs and each dhow can set nets up to 7km long each night. Furthermore, the areas of high productivity that are good fishing grounds, also provide important prey for whales, creating a high degree of overlap. Acoustic deterrent devices ('pingers') have generally not been as effective with baleen whales as they have with dolphin species. Furthermore, while setting nets 2m lower in the water has proven an effective way to reduce dolphin bycatch, this adjustment needs to be tested to determine if is as effective for whales. A (partially IWC funded) study will start in 2023 in the Gulf of Masirah to assess the co-occurrence of fisheries and whales on a finer scale, using the existing data on whale distribution and high-resolution satellite imagery and direct observations of fishing effort. This study can help stakeholders to collaborate to design effective mitigation strategies for the areas of highest risk. This could involve some seasonal measures to reduce risks when whales are most likely to be present. The IWC's Bycatch Mitigation Initiative and Bycatch Expert Panel is also available to work with local stakeholders to advise on mitigation measures that can be tested in Oman through robust trials. IWC support would be part and parcel of a CMP.

A CMP can also help participating countries and fisheries meet their obligations for the US Marine Mammal Protection Act Import regulations. In Argentina the CMPs for right whales and franciscana dolphins have helped spur collaboration between fishermen, scientists and government agencies to effectively reduce bycatch. This active management of marine mammal bycatch is important for a country's status on the List of Foreign Fisheries.

Question: Underwater archaeology teams associated with the Ministry of Heritage and Culture working in the Hallaniyat Islands have had multiple sightings of humpback whales. How can these most effectively be shared? Is there a manual on how to report sightings?
Answer: The ESO currently maintains a cetacean sighting database and the ASHW photo-identification catalogue. They have produced a video encouraging members of the public to report sightings. However, this could be complemented by a simple A4 PDF with instructions on how to report a whale sighting and what kinds of photos and data are useful. Dorsal fin and tail fluke photos are most useful, along with information about the exact location, date, and time of day. The ESO will try to produce this in the coming weeks. Sightings can also be shared with the Environment Authority through their hotline: 80071999.

Figure 15: Photographs used to individually identify humpback whales in the Oman catalogue. A simple illustrated A4 guide could help citizen scientists/industry representatives collect photos useful to understand and manage ASHW in Oman.

Question: Can ballast water that is taken on in one part of the world and discharged by ships into Oman's marine environment present a threat to whales?
Answer: Ballast water can indeed introduce invasive species to the marine environment that could out-compete native species and disturb the entire ecosystem. This could affect whales' prey or introduce parasites or diseases that could present a health threat. Captain Guntermann explained that ballast water exchange is regulated by an IMO international convention as well as specific local regulations. D1 of the IMO Ballast Water Convention encourages 'midwater ballast water exchanges'– so that ballast water is released in open/deep water environments that are less sensitive to invasive species. D2 of the convention specifies that new ships must be equipped with ballast water treatment facilities that can ensure that most viable organisms are removed from ballast water, using, for example Ultraviolet light to kill any organisms that may be present before water is discharged.

Question: The WSC has clearly stated that it favours routing measures that take ships away from shore and/or away from areas of whale concentration over speed restrictions. However, when approaching and leaving ports, ships must transit through nearshore areas. How does the WSC feel about speed restrictions in areas immediately surrounding ports?
Answer: Indeed, the priority should be moving ships away from whales through Areas to be Avoided (ATBA) and/or Traffic Separation Schemes. Measures that are seasonal and/or triggered by whale presence as well as voluntary measures can be more difficult to implement, especially if they cause unexpected delays or disruptions to shipping schedules and delivery of goods. However, speed reduction zones in close proximity to ports could be practical, especially if they are likely to improve navigational safety for the ships themselves and other vessels in nearshore areas.

Question: SEZAD staff have directly observed the high density of fishing nets in and around the Duqm Port area, making it difficult for a vessel to safely navigate at the end of the afternoon as they were all being set, and presumably presenting a navigational risk to ships and whales as well. What can be done to manage this high density of fishing effort and reduce risks?

Answer: The Ministry of Agriculture, Fisheries Wealth and Water Resources (MAF) is working with fishermen to try and find ways to reduce risks of bycatch of whales and dolphins and sharks. Fishers do not want to catch whales in their nets and are very motivated to find ways to reduce bycatch, but they need help. The MAF looks forward to working with other stakeholders to find solutions, including testing sub-surface gillnetting, which would reduce the risk of propellor entanglement for smaller vessels in where nets are set.

Question: There is a new fishery for sardines in Oman, which removed 400,000 tonnes of sardines from the Gulf of Masirah last year. Are there any studies to indicate how this might affect whale populations that are known to feed on sardines?
Answer: Soviet whaling records show that in Oman whales were feeding mostly on sardines while off the coast of Pakistan and India they were feeding on crustaceans/krill. The satellite tagging data from Oman indicates that some whales, in addition to spending time in the shallow waters of the Gulf of Masirah that are known to host high densities of sardines, also spent time further offshore diving to depths of up to 120m, where they may have been feeding on lantern fish or crustaceans. This indicates that if a sardine prey base is not available, the whales may switch to other prey, but we do not know whether this alternate prey is more marginal, and whether a shift might impact the whales' overall health and body condition. This is why current studies are focusing on the use of drones to measure body condition over time. Furthermore, while fisheries may be depleting sardine stocks, climate change may also be impacting productivity and prey availability for whales. Surveys in Dhofar in March 2021 and in the Gulf of Masirah in November 2022 both detected fewer whales than in other years, coinciding with sea surface temperature anomalies that caused clearer, warmer water than usual. Climate change is more difficult to manage than fisheries effort, so perhaps efforts should be made to try and protect sardine stocks.

Question: How is climate change affecting ASHW in Oman?
Answer: There is already evidence that warmer temperatures over the Himilayan mountain range is undermining mixing of the water column in the Arabian Sea and causing the oxygen minimum zone to rise to shallower depths than normal, linked to harmful algal blooms cause mass die-offs of different species. Because the impacts of climate change are almost impossible for us to manage in a short timeframe, we should be doing all we can to address other threats to whales.

Question: Are there other whale species that would benefit from national action plans or Conservation management plans?
Answer: There is growing evidence that other cetacean species, like blue whales, also represent unique Northern Indian ocean populations that merit further study and protection. Because the ASHW is currently the best-studied and understood whale species in Oman, it is the natural focus of the first conservation plan. Most conservation measures adopted for Arabian Sea humpback whales would also benefit other species of whales and dolphins in Oman, although in some cases, separate measures may be required to account for differing distribution/hotspots and or risks.

Question: Can you please clarify how recent population estimates for ASWH were derived? If there is a shared population between Oman and India, how can we know what the total population is?
Answer: Genetic studies based on samples collected in Oman clearly indicate that ASHW diverged from other Indian Ocean populations roughly 70,000 years ago. However, the tracks of a single satellite tagged whale, one photographic match, and similarities in song recorded off the coasts of Oman and India indicate that there is ongoing exchange across the Arabian Sea. The population estimate of 82 animals published as part of the IUCN Red List assessment is based on mark-recapture analysis of photographs taken off the coast of Oman between 2000 and 2004. Updated mark-recapture estimates and population modelling, based on photos taken off the coast of Oman through 2018 are still undergoing peer review, but indicate

that the population is steadily declining. These estimates are based only on photos taken of individually recognisable whales off the coast of Oman, and cannot easily take into account how many whales are on the other side of the Arabian Sea where photo-identification studies have not been conducted. We know from sightings reports made by tuna vessel captains that ASHW are frequently seen in Pakistan and that they are also recorded acoustically off the West coast of India. Some of the population models currently undergoing review try to extrapolate estimates for the coast of Oman to other areas that have similar suitable habitat for ASHW off the coasts of Pakistan and India, but these make a lot of assumptions. A regional CMP would help to foster research in areas where it is needed to fill in important knowledge gaps like this.

Question: On a very practical level, what are the next steps required to work toward a National Action Plan for ASWH and a regional CMP?

Answer:

- Those present felt that the EA was in the most natural position to coordinate a process to develop a national action plan. It was agreed that the participants of this workshop should be invited to form a working party or task force that could coordinate the inputs of relevant government agencies, as well as industry stakeholders, Scientists and the ESO. The ESO will work with the EA to help make this happen as a follow up to this workshop.
- The WSC is keen to be part of this process, and to work with relevant stakeholders in Oman to determine how to reduce ship strike risk, through, for example, submitting a request to the IMO to create a Particularly Sensitive Sea Area (PSSA), Area to be Avoided (ATBA) or Traffic Separation Scheme (TSS). Although this proposal has been difficult to progress in Sri Lanka, where government and industry are both on board (as was the case in Boston, USA), the process can work quickly and be very effective.
- Under IWC procedures, a regional CMP nomination requires an analysis of threats and recommended mitigation measures. This work is planned for Day 2 of the workshop. A nomination/proposal document with these tables should be submitted to the IWC Scientific Committee for review. The IWC can help with preparation of relevant documents.
- Once the SC nomination has been endorsed by the IWC Scientific Committee, it needs to be formally endorsed by the Commission itself. The next Commission meeting will take place in the autumn of 2024.

Following a brief summary of the day's presentations and discussions, the workshop was closed at 15:30.

Day 2: Building A Plan

Introduction

Dr. Gianna Minton provided a brief summary of the main take-home messages of Day 1:

- Arabian Sea humpback whales are Endangered, isolated, and face many threats.
- Addressing these threats requires collaboration between a wide range of stakeholders, both at national and at regional/international level.
- Industry and investors welcome conservation initiatives. They do not want to harm whales and in many instances mitigation measures can have benefits for industry.
- There are frameworks in place to provide regional and international support for whale conservation in Oman and the Arabian Sea.
- A regional CMP that combines the strengths and membership of the International Whaling Commission and the Convention on Migratory Species would optimise participation from relevant range countries:

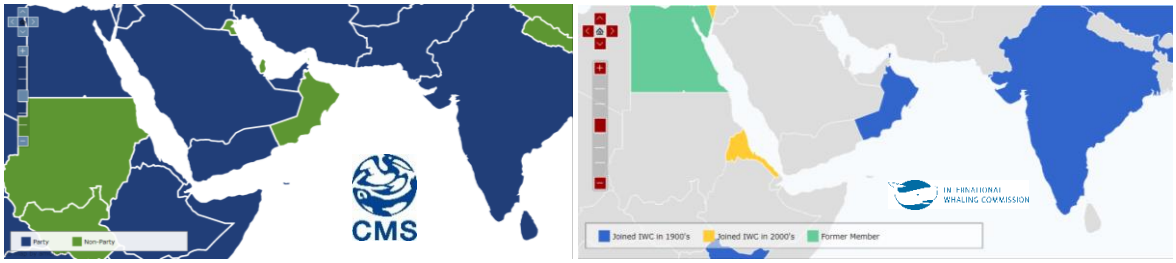


Figure 16: Maps illustrating ASHW range country membership to the Convention on Migratory Species (left) and the International Whaling Commission (right). A joint CMS-IWC Conservation Management Plan would maximise on range state membership from both IGOs.

Participants introduced themselves through a round-table exercise. The full list of participants and their affiliations can be found in Annex 2.

Resources to Support the Drafting of a National and Regional Conservation Plan for ASWH

The task for Day 2 would be to build a very practical road map and complete some of the assessments that would be required for a CMP nomination. Dr Minton summarised some of the resources that would be useful in creating this road map:

- The Marine Mammal Atlas of Oman
- the CMS Concerted action for Arabian Sea humpback whales
- The IUCN's Marine Mammal Protected Areas Task Force's Important Marine Mammal Areas eAtlas
- A WWF guide on mitigating the risks to cetaceans from shipping
- The IWC-CMS Online Whale Watching Handbook
- The FAO guidelines for mitigating marine mammal bycatch and
- The 'Stories of Influence' report from the Western Gray Whale Advisory Panel.

Timeline for a National ASHW Conservation Plan

The group reviewed the specific actions that would be required to draft and implement a national ASWH Conservation Plan in Oman, and a proposed timeline is given below.

	2023											2024
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Nov**	**Dec**	**Jan**
Review of workshop report (EA)												
Appointment of a multi-stakeholder working group (EA)*												
Appointment of focal points from the EA, MAF and ESO to coordinate the process												
Appointment of lead writer and compiler												
Complete first draft of Conservation Plan												
Workshop to review draft Conservation Plan												
Edit and revise Draft												
Final approval and endorsement of Action Plan												

* The Working Group could have a time-bound mandate (e.g. 6-9 months), and membership would begin with workshop participants and the organisations they represent.

Timeline for a Regional Conservation Management Plan

The group reviewed the timeline for nominating and endorsing a joint IWC-CMP Conservation Management Plan:

Date	Action
April 2023	Submit this workshop report to the IWC Scientific Committee meeting (SC 69A).
May 2023	Submit a progress report and request for extension of the ASHW Concerted Action to the CMS. Explain that due to COVID, it has not been possible since the February 2020 CMS COP to achieve the regional CMP that is the end-goal of the Concerted Action.
July 2023	Review of progress report and extension request by CMS Scientific Council.
October 2023	CMS Conference of Parties to review, and hopefully endorse progress report and extension.
April 2024	Submit a final CMP proposal to the IWC Scientific Committee meeting (SC 69B).
May-July 2024	Review by IWC Standing Working Group on CMPs and IWC Conservation Committee.
July 2024	Review by CMS Scientific Council.
Autumn 2024	Present final proposal for endorsement by the IWC Commission meeting (Peru).
Autumn 2026	Present CMP for formal endorsement by the CMS COP.

Roadmap to a National and Regional Conservation Plan for ASWH

The rest of Day 2 of the workshop was spent collaboratively working on completing a series of tables designed to build the elements that would be needed for both a National ASHW Conservation Action Plan, and for Oman to contribute to a regional Conservation Management Plan.

Table 1: Monitoring for Management

Element to be monitored	Knowledge gaps	Means to address gaps	Feasibility (1=low, 3 =high)	Priority (1=low, 3 =high)	Current status (1 =complete, 2=underway, 3= not started)	Resource needs
1a. Whale population – distribution/relative abundance	• Seasonal gaps – khareef • Geographical gaps (e.g. Ras al Hadd) • Impacts of climate change on future distribution of whales • Whale distribution in Arabian Sea areas outside of Oman	- Satellite tagging – timing to cover Khareef and to extend into future - Remote sensing –'whales from space? – may not be the most effective method in Arabian Sea where whale densities are low. - Fisheries interviews – Local Ecological Knowledge - bearing in mind that most fishing crews are foreign with limited knowledge or interest in local ecosystems - Extend boat-based research and tagging efforts to other parts of Oman and other range countries - Passive acoustic monitoring: Note that this indicates presence only – but also useful for other species – e.g. blue whales) and documenting threats (ambient/shipping/construction noise) - Acoustic devices can also be used to provide real-time information for shipping on whale presence (e.g. Hellenic trench)	2 1 2 2 3	3 1 2 3 3	2 3 3 2 2	- Baseline surveys from EIAs (e.g. Duqm) – but usually no related survey effort – can indicate presence, but not relative abundance/density - Satellite imagery (Ministries may be able to acquire) - Regional research platform and collaboration (ASWN) - Funding - Capacity building/exchanges between Oman and other range countries - Reference to Key Ecological Attributes in CMS Concerted Action, and reproduced in Annex 3
1b. Whale population- status, absolute abundance	No known numbers of whales beyond Oman – Eastern side of Arabian sea Small sample sizes for mark-recapture in Oman	- Dedicated cetacean research beyond Oman – photo-identification and genetics - More frequent surveys in Oman – also covering areas outside of Gulf of Masirah and Dhofar - Facilitate reports from members of the public, fishers and other marine users (e.g. Coast Guard)	2 3 3	3 3 3	3 3 2	Create apps/reporting mechanisms for fishers/general public, divers to share sightings and photos (especially photos that can be used for Individual identification) – provide very clear instructions on what and how to report Training for coast guard and other marine users to report sightings Create elite group of motivated fishers to take photos – create incentives

Element to be monitored	Knowledge gaps	Means to address gaps	Feasibility (1=low, 3 =high)	Priority (1=low, 3 =high)	Current status (1 =complete, 2=underway, 3= not started)	Resource needs
1c. Whale population – health and fitness	Health and fitness over time Cause of death/strandings Interactions with other species?	- Use of drone to measure body condition - Examination of photos for disease and scarring - Stable isotope analysis – to understand diet and dietary shifts - Stress hormones in whale blow and/or biopsy samples. - Hormone analysis for pregnancy - Stranding investigation, necropsies to determine health and cause of death - Continued visual health assessment using photographs to monitor fisheries and ship strike scarring, predation, parasites and disease	3 3 3 2 2 3 3	3 3 3 3 3 3 3	2 2 3 3 3 2 2	Funding Surveys to be conducted at regular intervals to understand changes over time. Lab in Oman suitable for hormone analysis (corticosteroids)? Reference to Key Ecological Attributes in CMS Concerted Action, and reproduced in Annex 3
2a. Potential threats – fisheries co-occurrence/evidence for interactions	Higher level information on co-occurrence of fisheries and whales available from satellite telemetry – overlap with artisanal fisheries Finer scale information needed on gillnet fisheries to determine where management interventions most needed	- Continued monitoring whale distribution as above 1a. (Tagging etc) - Use of high-resolution satellite imagery to map and quantify fishing effort. - Use of ByRa toolkit to map co-occurrence of fishing and whales - Studies to better understand gear types used by fishing fleets in core humpback whale areas	3 3 3 2	3 3 3 3 3	2 2 3 3	Funding Collaborations with fishing fleets and fisheries managers Collaborations with bycatch experts Captains trained in reporting sightings and fisheries interactions (e.g. Pakistan model)
2b. Potential threats – shipping co-occurrence/evidence for interactions	Better understanding of impact of underwater noise from shipping on whales Understanding of other whale species' distribution (to avoid displacing risk to other species if shipping	- Passive acoustic monitoring of ship noise and whale presence in and around major ports - Monitoring/ auditing of port vessel management systems to check speeds of vessels transiting important whale areas where advisory notices are issued (i.e. Gulf of Masirah)	3 2	3 2	3 3	Better means to communicate ASHW presence to ships in whale habitat Create a forum of stakeholders to raise funding, assess current practices and overlapping responsibilities

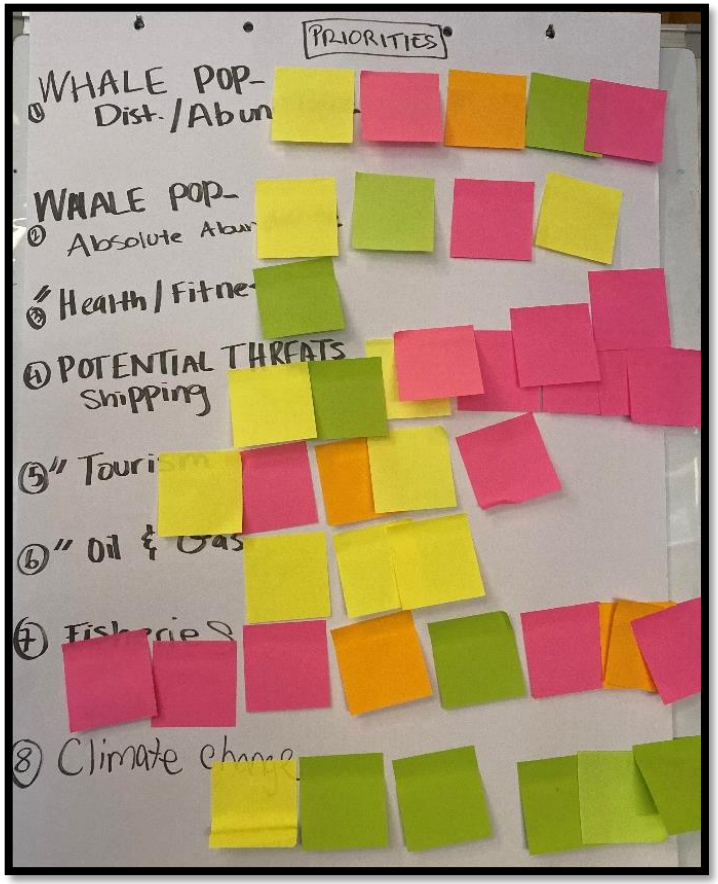
Element to be monitored	Knowledge gaps	Means to address gaps	Feasibility (1=low, 3 =high)	Priority (1=low, 3 =high)	Current status (1 =complete, 2=underway, 3= not started)	Resource needs
	traffic is moved away from humpback whales)	- Analysis of Automatic Identification System (AIS) data to model noise as well as ship strike risk - Studies on blue/sperm/Bryde's whale distribution and relative abundance (can use modelling techniques where boat-based/satellite tagging data not available)	3 3	3 3	2 2	
2c. Potential threats – tourism co-occurrence/evidence for interactions	Unknown impact of ASHW tourism starting in Hallaniyats and Ras al Hadd Updated overview of whale watching operators – numbers and geographical tours	Outreach by phone/email/visit to all tour operators offering whale or dolphin watching to accurately assess and monitor operators who are interacting with ASHW	2	3	3	Create a forum of stakeholders to assess current practices – overlapping responsibilities
2d. Potential threats – oil and gas co-occurrence/evidence for interactions	Understanding of overlap of oil and gas activities and whales (Current blocks under exploration and development in Musandam and Gulf of Masirah)	Inventory of all oil and gas exploration and development in ASWH habitat - need to assess temporary/acute impacts as well as chronic	3	3	3	Resources to ensure that EIAs take ASHW into account at all levels – Marine Mammal Atlas of Oman
2e. Potential threats – Coastal development co-occurrence/evidence for interactions (Includes plastic pollution and chemical pollution)	Understanding of how coastal development plans may impact ASHW habitat	- Review humpback whale distribution in relation to 2040 plan - SEAs, EIAs to take ASHW into account - Long-term monitoring of ASHW habitat for pollutants, including plastic, chemical and noise	3 3 2	3 3 3	3 3 3	Resources to ensure that EIAs take ASHW into account at all levels – Marine Mammal Atlas of Oman Equipment to conduct regular environmental monitoring – pollutants, underwater noise
2e. Potential threats – Climate Change /changes to oceanography and productivity	How climate change may affect ASHW distribution	- Modelling and predictions of climate change impacts on sea-surface temperatures, oxygen minimum layers and productivity in Oman and the wider Arabian Sea	1	1	3	Accurate models of impacts of climate change on Arabian Sea Accurate information on whale prey – including seasonal shifts in feeding grounds and target prey Interface with government and industry planning forums to periodically review influence and threats presented by emerging development strategy

Table 2: Threat Mitigation Measures

Threat to be mitigated	gaps	Means to mitigate	Feasibility (1=low, 3 =high)	Priority (1=low, 3 =high)	Resource needs
Fisheries entanglement – lethal/sub-lethal	Lack of proven technical solutions to prevent bycatch. Time-area closures may not be palatable to fisheries as peak fishing productivity likely to overlap with peak whale presence	- Fisheries management/exclusion zones (EA is considering proposal to create a 'critical area' between Hasik and Hallaniyat) - Trials of technical measures to reduce bycatch – sub-surface gillnets, lights, pingers - Trials of alternative gears to gillnets – e.g. longlines, handlines – comparison of target catch quality and quantity and bycatch rates.	2 2 2	3 3 3	Funding Technical expertise
Overfishing – depleted prey	Sardine fishery may be affecting prey base Understanding of changes related to climate change	- Fisheries stock assessments and management to avoid overfishing - Surveys of phytoplankton/zooplankton and links to sardine abundance (MAF already undertaking) - Monitoring abundance of whale prey (Sardines) in relation to sea surface temperature and other climate-impacted parameters	2 3 1	3 3 2	
Shipping – ship strike	Data on ASHW distribution and co-occurrence with shipping available, but need to understand impact of shifting shipping lanes on shipping and on other species	- IMO routeing measures – PSSA/ATBA/TSS - Collaboration with ports (model already in place from Duqm Port)	3 3	3 3	If Oman wanted to propose routeing measures, would need to work with co-sponsors – other range state governments, NGOs, IGOs Can find allies in shipping industry/WSC
Shipping – underwater noise	Currently no regulations measures in place to protect whales from masking, feeding disruption, or auditory damage.	- Propellors/ship construction to reduce noise output - Movement of shipping lanes away from whale habitats - Speed reduction measures in areas where ships can not be routed around habitat	3 3	3 3	If Oman wanted to propose noise reduction measures, would need to work with co-sponsors – other range state governments, NGOs, IGOs Can find allies in shipping industry/WSC Resource time of experts to compile necessary mitigation solutions for ongoing consultation exercises.

Threat to be mitigated	gaps	Means to mitigate	Feasibility (1=low, 3 =high)	Priority (1=low, 3 =high)	Resource needs
Tourism – disruption of natural behaviour/ underwater noise	Currently no legally enforceable measures in place to regulate whale and dolphin tourism	- Design and implement legally enforceable regulatory measures before too many operators target ASHW (noting that the IWC discourages WW with Endangered populations- especially swim-with/in water interactions). - Make following regulations requirement for maintaining permit - Regular training for operators to ensure understanding of regulations and compliance	2 2 3	3 3 3	Communications – guidelines ESO guidelines already in place – originally drafted for tour operators targeting dolphins -but voluntary Forum of stakeholders to assess current practices and create new legally enforceable guidelines Draft regulation could be submitted to IWC Scientific Committee WW subcommittee for feedback/suggestions if desired
Oil and gas – oil spill/pollution	As surface feeders whales are particularly susceptible to fouling of their baleen with surface oil and ingestion of oil with prey	- Conditions of permitting through EIAs and OEMPs require measures to prevent oil spill - Oil spill response plans take whales into account, particularly on speed and means to contain spills given the risk associated with new developments in the Gulf of Masirah area.	3 3	3 3	Guidelines for mitigation of impacts from oil and gas exploration and production – see for example the best practice guide produced by Flora Fauna International or the resources available from the UK JNCC: https://jncc.gov.uk/our-work/marine-mammals-and-offshore-industries/
Underwater noise from oil and gas or coastal development/construction	Are measures in place to reduce/shield noise?	- Special planning zones – mitigation measures for specific activities - Use of bubble curtains or other means to attenuate underwater noise	2 2	3 3	Guidelines for mitigation of impacts from oil and gas exploration and production – see for example the best practice guide produced by Flora Fauna International or the resources available from the CMS
Coastal development – habitat loss	Are development projects taking critical whale habitat into account?	- Designation of Special planning zones – build on EBSAs and IMMAs to designate certain areas where construction should be limited or only allowed under certain conditions - Rigorous implementation of SEA, EIA and OEMP processes	3 3	3 3	Overview of current and planned coastal development projects in ASHW habitat
Military activity – underwater noise	Sonar/underwater noise	- Training exercises to be conducted outside of important whale habitat if possible	2	2	Provide military with relevant whale distribution information – e.g. Marine Mammal Atlas of Oman Resources available from the UK JNCC and IMMA eAtlas.
Climate Change – reduced productivity	Is climate change already causing prey depletion or shifts in whales' normal seasonal distribution?	- Be prepared to shift areas of mitigation to new feeding grounds if whale distribution changes in response to CC	1	1	Accurate predictive models of climate change impacts in the Arabian Sea.

Participants were asked to rank the elements that they thought were most important to monitor and mitigate. Participants were asked to place a dark pink post-it note next to the elements they thought were highest priority, yellow/orange next to medium priority items, and green next to low priority items (corresponding to the colour scheme in the tables above). Participants considered the mapping of whale distribution and relative abundance more important that absolute abundance or health/fitness. Of the potential threats, fisheries was overwhelmingly considered the most important to monitor and mitigate, while tourism was considered the least important and opinions were mixed on climate change and oil and gas activities.



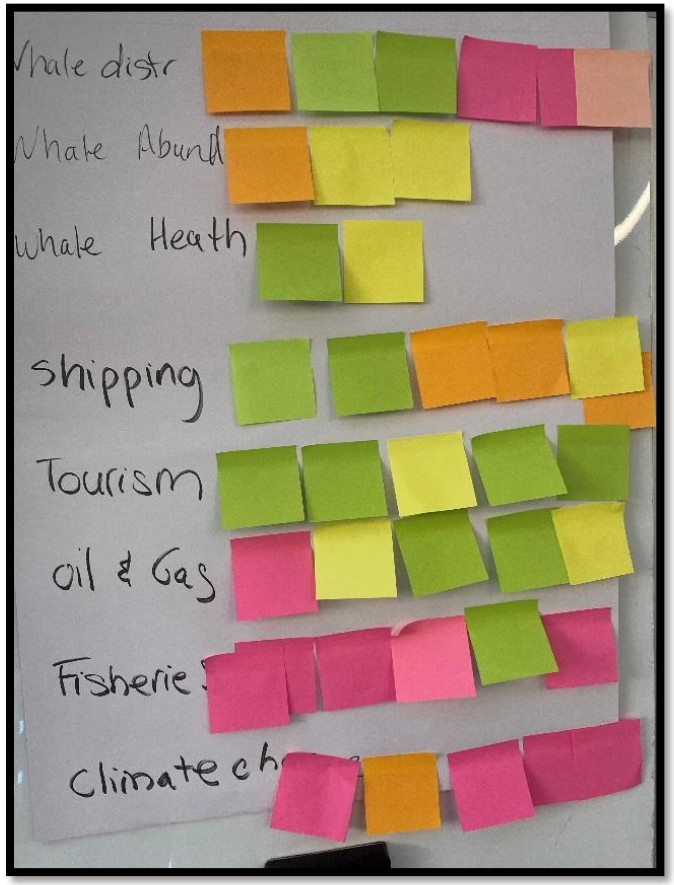


Table 3: Stakeholder Mapping and Official Cooperation and Coordination Requirements

Official cooperation and coordination requirements					
Threat to be mitigated	**National stakeholders**	**Regional stakeholders/organisations (not necessarily other range countries)**	**International stakeholders**	**How to foster national level collaboration**	**How to foster transboundary collaboration**
Fisheries entanglement – lethal/sub-lethal	- Environment Authority (EA) - Oman Stranding working group - ESO in partnership with technical experts from IWC/Consultancies. - MAFWWR (MAF) - Marine Science and Fisheries Center – (MAF) - SQU – Ministry of Higher Education and Research - Fisheries Association (representatives of artisanal fisheries) - Fisheries Development Oman (FDO) - Oman Fisheries Company - Sunat al Bahar – regional fisheries representatives	- Indian Ocean Tuna Commission (IOTC)	- International Whaling Commission - Convention on Migratory Species - FAO (Use International Plan of Action for Sharks as model?) - Global Ghost Gear Initiative	- Create cross-stakeholder working group for ASHW Conservation Plan - Host workshop on bycatch reduction (could be multi-species rather than focusing only on ASHW.	- Host a regional workshop to work toward a regional CMP – include bycatch/entanglement as key topic to be addressed - Host exchanges – e.g. Oman partners to visit Pakistan to learn about crew-based observer programme and sub-surface gillnets - Follow up on IOTC cross-taxa bycatch workshop held in August 2022
Overfishing – depleted prey	- MAF- Marine Science and Fisheries Centre - Fisheries Development Oman	- Indian Ocean Tuna Commission (IOTC)	- FAO - ISST	- Create cross-stakeholder working group for ASHW Conservation Plan	- Through IOTC working groups and scientific committee
Shipping – ship strike and underwater noise	- Ministry of Transport, Communications and Information Technology - Port authorities in Oman and the wider Arabian Sea - AIS data provider(s) - ESO in partnership with technical experts from IWC/consultancies - National Survey authority	Shipping liners operating regional routes – to be identified with support of WSC ROPME Indian Ocean Rim Association	- World Shipping Council - IWC - IMO - AIS data providers (e.g. Marine Traffic, Oceanmind)	- Create cross-stakeholder working group for ASHW Conservation Plan	- Host a regional workshop to work toward a regional CMP – include ship strikes and underwater noise from shipping as key topic to be addressed - World Shipping Council can help with stakeholder collaboration and proposals

Official cooperation and coordination requirements					
Threat to be mitigated	**National stakeholders**	**Regional stakeholders/organisations (not necessarily other range countries)**	**International stakeholders**	**How to foster national level collaboration**	**How to foster transboundary collaboration**
Tourism – disruption of natural behaviour/ underwater noise	- Ministry of Transportation (responsible for permitting). - EA - Ministry of Heritage and Tourism - Coast Guard (surveillance and enforcement) - Whale watching operators - Tourism companies responsible for booking whale watching tours	- Indian Ocean Rim Association	- IWC - Pacific Whale Foundation	- Create cross-stakeholder working group to work on proposed legislation to regulate whale watching in Oman - Once regulations are in place, host workshop to introduce new regulations to tourism operators and those responsible for enforcement	- Host a regional workshop to work toward a regional CMP – tourism as a key topic to be addressed
Oil and gas – oil spill/pollution, underwater noise	- Ministry of Energy and Mining - EA – through EIAs - Supreme Council for Planning and the 2040 strategy - Research organisations - Environmental consultants	- ROPME	- JNCC - CMS - IMO	- Create cross-stakeholder working group for ASHW Conservation Management Plan	- Host a regional workshop to work toward a regional CMP – oil and gas as a key topic to be addressed
Coastal development – habitat loss	- 2040 plan includes marine and coastal areas - EA - Ministry of Housing and Planning - SEZAD	- ROPME	?	- Create cross-stakeholder working group for ASHW Conservation Management Plan	- Host a regional workshop to work toward a regional CMP – coastal development as a key topic to be addressed
Climate Change – reduced productivity	- Adaptation with Climate Change Committee (currently doing SWOT analysis) that involves multiple stakeholders	?	Intergovernmental Panel on Climate Change (IPCC)	- Create cross-stakeholder working group for ASHW Conservation Management Plan	- Host a regional workshop to work toward a regional CMP – climate change as a key topic to be addressed

Table 4: Requirements and Sources of Support; Industry Partners and Approaches

Requirements and sources of support; Industry partners and approaches				
Stakeholder group	**Available resources**	**Resource/capacity gaps**	**Means to address resource gaps**	**Means to address capacity gaps**
National				
Government – environment - EA	- Responsible for conservation - Limited funding available for ASHW research - Stranding working group is active and effective	- EA does not represent Oman at IWC - Still relying on technical support from external experts	- Can collaborate with IWC to apply for grants and collaborate with ESO to implement research and conservation measures	- Consider becoming a signatory to CMS and gain more formal representation with IWC/ (Requires consultation between International depts of EA and MAF) - EA staff to participate in ESO Capacity building programme
Government – fisheries - MAF	- Currently IWC focal point - Knowledge of fisheries and fishery pressure	- Would like technical advice on bycatch reduction and scientific trials	- Can collaborate with IWC to apply for grants and collaborate with ESO to implement research and conservation measures	- Can collaborate with ESO, external experts and IWC Bycatch Expert panel to design and implement trials
Government - tourism	- Responsible for regulating whale and dolphin watching	- Need examples of legally enforceable regulation that could be adapted for Oman	-	- Can collaborate with PWF and IWC Whale Watching Subcommittee for advice on regulating whale watching in Oman
Government - transport	- Responsible for regulating shipping in Oman's EEZ and whale and dolphin watching	- Would benefit from support in process to apply for routeing measures with IMO and design of enforceable whale watching regulations	-	- Can collaborate with World Shipping Council and IWC to receive support on applications to IMO for routeing measures - Can collaborate with IWC and PWF with regards to whale watching
Research groups	- Technical expertise	- Funding	- Collaborate with IWC and ESO to conduct fund-raising	- Can help to offer training for local scientists and build capacity for cetacean conservation in Oman
Civil Society - NGO	- Technical expertise - Communication skills - Active public membership	- Funding	- Collaborate with IWC and ESO to conduct fund-raising	- Collaboration with International NGOs and IGOs for advice and technical support
Fishing industry	- Local ecological knowledge of marine environments and whale or prey hotspots	- Knowledge on whale distribution and high-risk areas - Knowledge of suitable bycatch reduction strategies	- Fisheries Industry could fund bycatch reduction research	- Can collaborate with research groups and IWC Expert Panel to implement bycatch mitigation trials
Shipping industry/Port authorities in Oman	- Funding/income	- Knowledge on whale distribution and high-risk areas	- Shipping industry could help to fund modelling required to design effective routeing measures	- Collaborate with government stakeholders and research groups to create risk models based on whale and shipping distribution
Oil and Gas industry	- Funding/income - Logistics (vessels, fuel)	- Knowledge on whale distribution and high-risk areas - Understanding of risk-mitigation strategies	- Oil and Gas Industry could fund research required to mitigate risks from their offshore exploration and production	- Collaborate with government stakeholders and research groups to create risk models based on whale distribution and ongoing oil and gas activities

Requirements and sources of support; Industry partners and approaches				
Stakeholder group	**Available resources**	**Resource/capacity gaps**	**Means to address resource gaps**	**Means to address capacity gaps**
Tourism industry	- Funding/income - Potential platform for data collection	- Require practical means and motivation to share whale/dolphin sightings data	- Can collaborate with IWC to apply for grants and collaborate with ESO to implement research and conservation measures	- Collaborate with government stakeholders and research groups to design effective regulations to minimise impact of tourism activities on whales
Regional - International				
CMS	- Regional office has experience and expertise from other regional species conservation agreements - International office has global expertise and experience - Political leverage with member countries	- Funding - Expertise and input in relation to ASHW	- Can collaborate with IWC and regional partners to raise funds	- Can share knowledge and experience of CMS's Aquatic Team. Where feasible and relevant, support from CMS Office – Abu Dhabi
IWC	- Technical expertise through Scientific Committee and existing CMPs - Administrative support for CMP through Secretariat - Political leverage through member countries	- Funding - Local political and environmental knowledge	- Can assist with fund raising efforts	- Can provide technical support and advice to range country stakeholders
World Shipping Council	- Global experience of whale routeing measures - Funding/income	- Knowledge on whale distribution and high-risk areas	- Shipping industry could help to fund modelling required to design effective routeing measures	- Research groups to share whale distribution data and tools like Marine Mammal Atlas of Oman and the IMMA eAtlas. - Support range country stakeholders in the design of routeing measures and submission of proposals
IMO	- Body with mandate to endorse and implement routeing measures and global standards for shipping	- Knowledge on whale distribution and high-risk areas	- Encourage Oman's newly appointed IMO rep to explore existing initiatives for routeing within the IMO, and the applications of the various IMO environmental committees to the Oman context	- World Shipping Council can act as catalyst for collaboration between ASHW range countries and relevant IMO working groups
IOTC	- Body responsible for regulating tuna fisheries in the Indian Ocean - Mandates include Ecosystem Approach and Bycatch reduction	- Knowledge on whale distribution and high-risk areas	- Fund raising through member contributions for bycatch reduction trials	- Research groups to increase participation in IOTC Scientific Committee and Ecosystem and Bycatch Working Groups to ensure that whale distribution and entanglement risk are taken into account.

ANNEX 1: Workshop Agenda

Complementing Development with Conservation **Workshop Agenda** Hilton Garden Inn Muscat Al Khuwair, 2nd Floor				
Timing (Oman)	**Title**	**Entity**	**Presenter**	**Language***
Monday, 28th of November 2022				
08:00 – 09:00	Registration			
09:00 – 09:30	Opening remarks/speeches	Environment Authority, Environment Society of Oman, International Whaling Commission, CMS Rep, Ministry of Agriculture, Fisheries Wealth and Water Resources		English/Arabic
09:30 – 10:00	Group Photo Opportunity			
	Main Coffee Break			
10:00 – 10:30	ASHW Conservation Status and Threats: National and Regional	Future Seas Global SPC	Dr. Andrew Willson	English
10:30 – 11:00	Overview on Regional Conservation Management Plans (CMPs) and Implementation	IWC & Fundación Cethus	Iain Staniland & Miguel Iniguez	English
11:00 – 11:20	Short Coffee Break			
11:20 – 12:40	Complementing Development with Conservation Objectives: Industry Testimonials (15-20 minutes each)			
	1. Shipping	World Shipping Council	Captain Guntermann & WSC Reps.	English
	2. Tourism	Pacific Whale Foundation	Dr. Barry McGovern	
	3. Fisheries	International Seafood Sustainability Foundation	Dr. Hilario Murua	
	4. Oil and Gas	Shell	Stephanie Lock	
12:40 – 13:00	Environmental Impact Assessments and Mitigation Plans: Tools to Bridge Development and Conservation Management	Five Oceans Environmental Services	Robert Baldwin	English
13:00 – 14:00	Lunch & Prayer Break			
14:00 – 15:30	Complementing Development with Conservation: Q&A and Panel Discussion	All above entities	Entity Reps.	English/Arabic
15:30 – 16:00	Summary of Day's Discussions			

*Please note that live **English ←→Arabic** interpretation will be available during the entire workshop.

Timing (Oman)	Session Focus	Language
Tuesday, 29th of November 2022		
08:00 – 09:00	Arrival and welcome coffee	
09:00 – 09:30	Review of day 1 discussions and day 2 exercise	English/Arabic
09:30 – 10:30	Round table group exercise - Building a plan, Session 1. Topics to be discussed include: ○ Monitoring for management ○ Threats and mitigation measures	
10:30 – 11:00	Coffee Break	
11:00 – 12:20	Round table group exercise - Building a plan, Session 2 ○ Official cooperation and coordination requirements: National and regional ○ Resourcing a plan. Requirements and sources of support; Industry partners and approaches	English/Arabic
12:20 – 12:40	Group Presentations – Building a Plan	English/Arabic
12:40 – 13:30	Workshop Close: CMP Road Map – How to use the workshop outcomes to work national and/or regional management plan	English/Arabic
13:30 – 14:30	Lunch & Prayer Break	

ANNEX 2: List of Participants

Day 1 – Monday, 28th of November 2022

Name	Organisation	Job Description
In-person Participation		
1. HH Sayyida Tania Al Said	ESO	President
2. Lamees Al Daar	ESO	Emeritus Board Member
3. Suaad Al Harthi	ESO	Executive Director
4. Bashaar Zeitoun	ESO	Admin Manager
5. Maïa Sarrouf Willson	ESO	Research and Conservation Manager
6. Olivia Dalziel	ESO	Corporate Communications Manager
7. Ali Al Rasbi	ESO	Field Conservation, Outreach and Advocacy Officer
8. Rabab Al Lawati	ESO	Conservation Outreach Coordinator
9. Juhaina Al Ghafri	ESO	Communication and Membership Coordinator
10. Mai Abumughli	ESO	Communications and Fundraising Coordinator
11. Mohammed Al Kalbani	ESO/EA	ESO Board Member/DG of Environmental Affairs
12. Dr. Ahmed Mahroos Al Sayari	EA	Advisor to the EA Chairman
13. Ahmed Al Shukaili	EA	Director of Marine Environment Conservation Department
14. Aida Al Jabri	EA	Ecosystem Specialist, Marine Environment Conservation Department
15. Marwa Al Mukhaini	EA	Environment Ecosystem Specialist
16. Sanaa Al Jardani	EA	Environmental Systems Technician
17. Mohammed Al Qarni	EA	Environment Ecosystem Specialist, Coastal Zone Management, Marine Environment Conservation Department
18. Hamed Al Huseini	EA	Environmental Systems Technician
19. Majid Al Khanbashi	EA	Nature Reserves Director
20. Zahra Al Habsi	EA	Environmental Ecosystem Specialist, Biodiversity Department
21. Ahmed Al Busaidi	EA	Specialist in Marine Ecology
22. Badr Saif Al Busaidi	EA	Environmental Ecosystem Specialist
23. Mohammed Al Ruzaiqi	EA	Environment Ecosystem Specialist and Deputy Head of Coastal Management Department
24. Basma Al Shani	EA	Trainee
25. Dr. Hussain Al Muscati	MAFWWR	DG of Development and Management of Fisheries Resources
26. Khalid Khalfan Al Mahrouqi	MAFWWR	Fisheries Development Specialist
27. Maryam Al Shithani	MAFWWR	Deputy Head of Blue Economy Department
28. Ibrahim Al Anboori	MAFWWR	Marine Biologist
29. Dr. Andrew Willson	Future Seas Global SPC	Founding Director

Name	Organisation	Job Description
30. Antonia Vegh	Future Seas Global SPC	Conservation Action Specialist
31. Ammar Al Aamri	Future Seas Global SPC	Internship Trainee
32. Dr. Gianna Minton	Megaptera Marine Conservation	Founding Director Arabian Sea Whale Network Coordinator IUCN Cetacean Specialist Group Deputy Chair
33. Captain Wolfram Guntermann	WSC/Hapag-Lloyd AG	Director Regulatory Affairs
34. Dr. Iain Staniland	IWC	Head of Science, Conservation and Management
35. Dr. Miguel Iniguez	Fundación Cethus	President and Founder
36. Rouba Abou-Atieh	CMS, Abu Dhabi Office	Executive Coordinator
37. Gabriel Grimsditch	CMS, Abu Dhabi Office	Programme Management Officer
38. Huda Al Siyabi	Majlis Al Shura	Marine Science Researcher
39. Na'ma Al Himani	Majlis Al Shura	Environmental Researcher, Health and Environment Committee
40. Mohammed Hamed Al Mahruqi	SEZAD	Acting Manager of Sustainability Department
41. Salim Hamood Al Maamary	Ministry of Heritage and Tourism	Assistant Manager for Quality and Sustainability Section
42. Ayoub Naghmosh Al Busaidi	Ministry of Heritage and Tourism	Head of Section of Underwater Antiquities/ Director of Maritime Archaeology
43. Captain (Naqib) Mohammed Al Muqbali	Royal Oman Police	Coast Guard Headquarters
44. First Lieutenant (Moulazim Awal) Salem Al Alawi	Royal Oman Police	Coast Guard Headquarters/Diving Centre
45. Fawzi Moosa Mansoor Al Tobi	Maritime Security Centre	Legal Department
46. Saoud Sultan Al Araimi	Ministry of Transport	Head of the Maritime Department
47. Hilal Mohammed Al Abri	Ministry of Transport	Maritime Policy Specialist
48. Shadia Al Hadramae	Ministry of Housing and Urban Planning	Environmental Planner
49. Saif Nasser Al Batashi	Ministry of Energy and Minerals	Health and Safety Technician
50. Soumya Dave	Renaissance Services SAOG	Communications Manager
51. Sajukumar Nair	Port of Duqm Company S.A.O.C	Technical Writer
52. Hatim Al Nuumani	Port of Duqm Company S.A.O.C	Health, Safety and Security (HSS)
53. Sameh Mansoor Al Wahaibi	HSBC	Head of Communications & Corporate Sustainability
Online Participation		
1. Dr. Claudia Eckardt	Oman Tourism College	Senior Lecturer & Programme Co-ordinator
2. Weijun Mun	WSC	Director
3. Juma Al Araimi	ESO	Masirah Field Coordinator
4. Azza Al Jabri	Natural History Museum	Museum Director

Name	Organisation	Job Description
5. Hanan Al Nabhani	Natural History Museum	Head of Collections Department
6. Dr. Rebecca Lent	IWC	Director
7. Robert Baldwin	Five Oceans Environmental Services	Director
8. Stephanie Lock	Shell HSE Australia	VP HSSE Australia
9. Dr. Hilario Murua	International Seafood Sustainability Foundation	Senior Scientist
10. Dr. Barry McGovern	Pacific Whale Foundation	Research Associate
11. Alex Hartnoll	Xpress Feeders	Head of Business Transformation and Sustainability
12. Alistair Graham	WWF International	Oceans Policy Advisor
13. Assad Al Aamri	MAFWWR	Director of Fisheries Wealth Department, Al Wusta
14. Al Naamani	Unknown	Unknown
15. Redmi9	Unknown	Unknown

Day 2 – Tuesday, 29th of November 2022 (In-person)

Name	Organisation	Job Description
1. Suaad Al Harthi	ESO	Executive Director
2. Maïa Sarrouf Willson	ESO	Research and Conservation Manager
3. Ali Al Rasbi	ESO	Field Conservation, Outreach and Advocacy Officer
4. Rabab Al Lawati	ESO	Conservation Outreach Coordinator
5. Ahmed Al Shukaili	EA	Director of Marine Environment Conservation Department
6. Aida Al Jabri	EA	Ecosystem Specialist, Marine Environment Conservation Department
7. Mohammed Al Qarni	EA	Environment Ecosystem Specialist, Coastal Zone Management, Marine Environment Conservation Department
8. Zahra Al Habsi	EA	Environmental Ecosystem Specialist, Biodiversity Department
9. Ahmed Al Busaidi	EA	Specialist in Marine Ecology
10. Dr. Hussain Al Muscati	MAFWWR	DG of Development and Management of Fisheries Resources
11. Khalid Khalfan Al Mahrouqi	MAFWWR	Fisheries Development Specialist
12. Ibrahim Al Anboori	MAFWWR	Marine Biologist
13. Dr. Andrew Willson	Future Seas Global SPC	Founding Director
14. Antonia Vegh	Future Seas Global SPC	Conservation Action Specialist
15. Ammar Al Aamri	Future Seas Global SPC	Internship Trainee
16. Dr. Gianna Minton	Megaptera Marine Conservation	Founding Director Arabian Sea Whale Network Coordinator IUCN Cetacean Specialist Group Deputy Chair

Name	Organisation	Job Description
17. Captain Wolfram Guntermann	WSC/Hapag-Lloyd AG	Director Regulatory Affairs
18. Dr. Iain Staniland	IWC	Head of Science, Conservation and Management
19. Dr. Miguel Iniguez	Fundación Cethus	President and Founder
20. Rouba Abou-Atieh	CMS, Abu Dhabi Office	Executive Coordinator
21. Gabriel Grimsditch	CMS, Abu Dhabi Office	Programme Management Officer
22. Huda Al Siyabi	Majlis Al Shura	Marine Science Researcher
23. Mohammed Hamed Al Mahruqi	SEZAD	Acting Manager of Sustainability Department
24. Salim Hamood Al Maamary	Ministry of Heritage and Tourism	Assistant Manager for Quality and Sustainability Section
25. Ayoub Naghmosh Al Busaidi	Ministry of Heritage and Tourism	Head of Section of Underwater Antiquities/Director of Maritime Archaeology
26. Captain (Naqib) Mohammed Al Muqbali	Royal Oman Police	Coast Guard Headquarters
27. First Lieutenant (Moulazim Awal) Salem Al Alawi	Royal Oman Police	Coast Guard Headquarters/Diving Centre
28. Fawzi Moosa Mansoor Al Tobi	Maritime Security Centre	Legal Department
29. Shadia Al Hadramae	Ministry of Housing and Urban Planning	Environmental Planner
30. Saif Nasser Al Batashi	Ministry of Energy and Minerals	Health and Safety Technician
31. Sajukumar Nair	Port of Duqm Company S.A.O.C	Technical Writer
32. Hatim Al Nuumani	Port of Duqm Company S.A.O.C	Health, Safety and Security (HSS)
33. Hamed Al Huseini	EA	Environmental Systems Technician

ANNEX 3: Key Ecological Attributes of Arabian Sea Humpback Whales

Table 1: Current status of Arabian Sea humpback whale Key Ecological Attributes/Indicators (R. Baldwin, Collins, Antonopoulou, & Willson, In prep).

KEA	Indicator	Current status	Rationale/Justification
Population size	Number of whales in study area	Fair	Population is likely Critically Endangered (currently listed by IUCN as Endangered) with fewer than 100 individuals in Oman and probably low hundreds regionally.
	# of whale encounters per day during dedicated surveys	Fair	Dedicated surveys are limited to Oman where whale hotspots are known, boosting encounter rates.
	# of dead whales per year	Poor	Recent strandings data indicate an unsustainable mortality rate.
Population stability	Population trend	Fair	(Tentative). A recent preliminary population estimate suggests no significant change from the first estimate made over 10 years previously. Detailed investigation of whaling records may reveal more information on longer-term population trend.
Population structure	Age class and sex ratios	Fair	Calving rates appear to be low, but longevity of individuals is considered good; sex ratio of encountered whales skewed towards males in certain studied areas, such as Dhofar (presumed to be related to singing behaviour).
Reproductive success	# of calves observed	Fair	Very few calves sighted.
Health	'Skinniness' (blubber thickness)	Fair	Skinny whales are occasionally recorded (post-monsoon). Baseline and scale not yet established.
	# of new scars from fisheries/vessel interaction	Fair	Baseline not yet established but assumed to be 'Fair' at best based on high % (~40%) of whales with fisheries scarring.
	Presence/absence of lesions (TSD)	Fair	Baseline established by Bressem *et al*. (2014) and suggests ~16-26% of adults affected. Is assumed to be 'Fair' at best given an apparent increase in prevalence of whales with lesions.
	Hormonal levels	Unknown	No data currently available.
Extent of critical habitat	% of effectively protected critical habitat	Poor	Critical habitat areas known in Oman (only) but these are all outside of Oman's two marine protected areas (Daymaniyat Islands Nature Reserve and Ras al Hadd Turtle Reserve).
Habitat condition	Abundance, quality and trend of food sources	Good	Stocks of small pelagic fishes in Oman thought to be relatively healthy (MAFW, unpublished data), though recent indication of declining sardine stocks in India are cause for concern.
	% of ports with vessel speed controls	Poor	Ports are known to be adjacent to important whale habitat throughout the region, but Duqm Port is the only port in the region with vessel speed guidance in place for whales; the level of adherence to this guidance is currently unknown. Salalah Port is the other main port adjacent to known habitat hotspots. There are further ports that require attention in the region.
	# of ship strikes	Unknown	No confirmed reports of ship strikes of ASHW available, though there are records of bryde's and blue whales being struck by ships in the region, including Oman and Sri Lanka.
	# of bycaught whales	Poor	Direct observations of entanglement, strandings and scarring indicate unsustainable bycatch.
Habitat connectivity	Ability to access critical habitats	Fair	Current movement of whales appears largely unhindered, but continued access to critical habitat may be under pressure due to the amount of vessel traffic and fishing activity that is increasing.

The EWS-WWF assessment report also describes in detail the research methods that can be used to measure the status of these KEAs, and defines and quantifies the current and future desired indicator ratings (Table 2).

Table 2: Summary of indicator ratings for Arabian Sea humpback whale KEAs (R. Baldwin et al., In prep)

KEA	Indicator	Indicator Rating				Current Rating	Desired Rating	Date of Current Rating
		Poor	Fair	Good	Very Good			
Population size	# of whales in study area	<60	60-150	>150	>250	Fair	Good	May 2017
	# of whale encounters per day during dedicated surveys	< 1 whale p/d (ave)	1-4 whales p/d (ave)	5-10 whales p/d (ave)	>10 whales p/d (ave)	Fair	Good	May 2017
	# of dead whales per year	Deaths > estimated recruitment	Deaths = estimated recruitment	Deaths < estimated recruitment	0	Poor	Good	May 2017
Population stability	Population trend	Any decline	≥0% (stable or increasing)	>1-5% increase per year	>5% increase per year	Fair	Good	May 2017
Population structure	Age class and sex ratios	tbc*	tbc*	tbc*	Age class /sex ratio even	Fair	Good	May 2017
Reproductive success	# of calves observed	0 per year	<5 per year	5-10 per year	>10 per year	Fair	Good	May 2017
Health	'Skinniness' (blubber thickness)	>50% of whales	25-50% of whales	<25% of whales	<10% of whales	Fair	Good	May 2017
	# of new scars from fisheries/vessel interaction	>10% of whales	5-10 %	<5%	0	Fair	Good	May 2017
	Presence/absence of lesions (TSD)	>30% of adults	15-25%	<25%	0	Fair	Good	May 2017
	Hormonal levels	Baseline tbc	Baseline tbc	Baseline tbc	Baseline tbc	Unknown	Good	May 2017
Extent of critical habitat	% of effectively protected critical habitat	0%	<25%	25-75%	>75%	Poor	Good	May 2017
Habitat condition	Abundance, quality and trend of food sources	>10% decline	5-10% decline	<5% decline	No Decline	Good	Good	May 2017
	% of ports with vessel speed controls	<10%	<40%	40-60%	>60%	Poor	Good	May 2017
	# of ship strikes	>2 per year	1-2 per year	≤1 per year	0 per year	Unknown	Good	May 2017
	# of bycaught whales	>2 per year	1-2 per year	≤1 per year	0 per year	Poor	Good	May 2017
Habitat connectivity	Ability to access critical habitats	tbc#	tbc#	tbc#	Unimpe-ed access	Fair	Good	May 2017

* Indicator Ratings to be measured in relation to % population in specified age brackets and % skew in sex ratio