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Regional update on Arabian Sea humpback whales: A brief progress report from the Arabian Sea Whale Network

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INTERNATIONAL
WHALING COMMISSION

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Abstract: Over the past year the Arabian Sea Whale Network (ASWN) has maintained communication between members and with external organisations through a website and an email group. Many ASWN members helped to identify Important Marine Mammal Areas (IMMAs) by writing proposals and participating in the IMMA workshop held in Oman in March 2019. The Network has launched a regional online data platform, that facilitates standardized data archiving in the region, and matching of photo-identification catalogues between research projects in the Arabian Sea. Members have started to use this platform to conduct data comparisons and analyses. The report also highlights national/project level work conducted by members in the UAE and Oman, and provides an overview of progress against the actions set forth in the CMS Concerted Action for Arabian Sea humpback whales.

1. Introduction and Background

The Arabian Sea Whale Network (ASWN) represents an informal collaboration of researchers and conservation bodies interested in the conservation of whale populations throughout the Northern Indian Ocean. The Arabian Sea humpback whale (ASHW) serves as the flagship species, but all large whale species are of interest to the network. Formed at the conclusion of a January 2015 workshop in Dubai, it does not have formal legal status or governmental recognition. A [website](#) and a logo create a sense of unified purpose and facilitate communication, fund-raising, collaborative research and data management and analysis. [Members](#) include independent researchers and consultants, researchers linked with academic institutions, and representatives of local, national and international NGOs, IGOs and government bodies. More information and background on the network are available through the website, [2015 inaugural workshop report](#), and other documents submitted to this and [past meetings](#) (see below). While the on-the-ground research and conservation work in the Arabian Sea region is conducted by individual members at a project or national level, the network helps to promote exchange of information and to place the knowledge and experience gained in local contexts into a regional framework. It also helps to ‘champion’ the work conducted by individual members.

2. Contributions to the IWC SC from Arabian Sea Range States

In 2018 the ASWN submitted a brief progress report to the IWC Scientific Committee meeting (SC_67B_CMP_10_rev1), and ASWN members submitted a range of papers to the CMP and other subcommittees. These contributions demonstrated considerable progress in data collection and

capacity building in relation to whale research and conservation throughout the Arabian Sea. This report represents an update on activities conducted since April 2018. A number of additional documents are being submitted to this year’s meeting that are relevant to whale conservation in the Arabian Sea. They include:

Document Number	Lead Author or ASWN representative in author list	Title
Oman		
SC/68A/CMP/08	Willson et al.	Oman research update; documenting cetacean diversity and blue whale feeding habitat in Dhofar, southern Oman
Pakistan		
SC/68A/CMP/07	Moazzam Khan and Nawaz	The distribution of whales in the northern Arabian Sea along the coast of Pakistan obtained through crew-based observer programme - results of the 2018 fishing season
SC/68A/HIM/12	Moazzam Khan et al.	Crew based observer programme of WWF-Pakistan – A source of data collection on cetacean bycatch
India		
SC/68A/CMP/10	Sutaria	A report on baleen whale records and recent developments in marine mammal research and conservation policy - update from India
Regional		
SC/68A/INFO/16	Minton	ASWN Newsletter, Issue 3, October 2018
SC/68A/SH/07	Holmberg et al.	Flukebook – A tool for cetacean photo identification, data archiving and automated fluke matching

3. Regional-level activities and developments

3.1 Network communication

ASWN members remain in fairly regular contact through an group email list, which is used to share news between members, as well as announcements of important meetings, funding opportunities, new publications and resources, etc.

The [ASWN website](#) is updated regularly (roughly once a month) with [news items](#), ranging from new publications, to results of workshops, and newsworthy developments in ASHW range states (declarations of new marine protected areas, unusual sightings of ASHW or other species, etc). A [newsletter](#) was produced in October 2018, summarizing activities of many ASWN members. It has been submitted as SC/68A/INFO/16.

This work is facilitated by a part-time coordinator, whose position has been funded alternately over the past 4 years by Emirates Wildlife/WWF UAE and WWF Pakistan.

3.2 Regional database

In January, the Arabian Sea Whale network was able to fully launch the **regional online database** developed using the [Flukebook](#) platform and funded in part by the IWC SC. This is accessible through a new [dedicated page](#) on the ASWN website:. This page includes instructions for obtaining an account, as well as links to videos demonstrating how to conduct data searches and matching

on the platform. To date, the following datasets have been imported to the platform and are fully searchable with access available only to the data owners and those with whom they choose to engage in data sharing agreements:

- The Oman Cetacean sightings database, with all live cetacean sightings documented by independent researchers and researchers affiliated with the Environment Society of Oman through 2017. This includes over 2,300 sightings and associated meta-data (location, date, time, species, group size, behaviour, water depth, etc.).
- The Oman humpback whale photo-ID catalogue, which is cross-linked to the sightings above. Also under the curation of the Environment Society of Oman, this dataset includes photos of a maximum of 133 individuals that were photographed between 1985 and 2017, of which 83 have been represented by a tail fluke photo of good or excellent quality at some point in their sighting history. This represents the most conservative measure of the number of individuals in the catalogue, as ‘individuals’ represented by poor quality tail fluke photographs or non-distinct dorsal fins could theoretically be duplicates of other individuals. The Computer Vision algorithms available on Flukebook have been used to cross-validate the manual matching that was conducted with tail fluke photos in the original catalogue, and no false negatives were detected.
- All of the cetacean sightings reported to the [Marine Mammals of India database](#).
- A handful of opportunistic humpback whale tail fluke and dorsal fin photographs from Sri Lanka, collated by Asha de Vos. The timing of most of the sightings represented in these photos was consistent with southern hemisphere populations, and none of the photos were found to match to any in the Oman catalogue.
- All of the large whale sightings compiled through the [WWF Pakistan crew-based observer programme](#).

The ASWN developments on Flukebook were closely coordinated with the Indian Ocean Network for Cetacean Research ([Indocet](#)), who have also collaborated with Flukebook to develop their regional database/matching platform for humpback whales. More details of the ASWN Flukebook data platform, can be found in [SC/68A/SH/07](#).

3.3 Systematic analysis of photographs for indications of health and threats

During IWC SC 67B, the CMP subcommittee supported a research proposal titled ‘A quantitative assessment of threats to Arabian Sea Humpback Whales using existing photographic and UAV data’. The project will assess the prevalence of anthropogenic and natural threats in Arabian Sea humpback whales through a robust and quantitative assessment of available photographic data. These data include the entire Oman photo-ID catalogue, imagery acquired using UAVs (drones) in 2017, and images provided by third parties. The latter include several images from elsewhere in the populations range. The project will provide an assessment of the relative prevalence of a suite of indices typically associated with major threats (fisheries entanglements, ship-strikes, other scars) as well as scars associated with natural sources (barnacles, cyamids, *Penella sp.*, killer whales).

Project outcomes will include assessment of the risks posed by each threat, as well as the development of a set of metrics with which further changes can be monitored.

Originally, it has been hoped that project results could be reported to this meeting. However, delays in contracting as well as unforeseen personal circumstances for key people involved in the project have delayed the transfer of data and the start of analyses, which will now begin on June 24-25, 2019, when the two principal investigators will meet in the Netherlands. Full results will be presented at SC68B, but will also be submitted to a peer reviewed journal by the first quarter of 2020. The results of the analysis will also inform future health and risk assessment studies, and contribute to the ASHW Conservation Management Plan.

3.4 Participation in regional conservation meetings and initiatives

On March 4-8, 2019, 15 ASWN members participated in the regional workshop to identify Important Marine Mammal Areas in the Western Indian Ocean and Arabian Seas. The workshop hosted 38 marine mammal scientists and observers from 15 countries. At the end of the meeting, a total of 55 candidate Important Marine Mammal Areas, or IMMAs, were identified, along with 13 Areas of Interest (AoI) which may be considered potential future IMMAs pending further research. Of these, a number were in the Arabian Sea and surrounding waters, focusing on important habitat for Arabian Sea humpback whales, as well as other endangered and vulnerable species such as Indian Ocean humpback dolphins and blue whales. Candidate IMMAs identified primarily for ASHW included areas off the coasts of Oman and Pakistan with documented concentrations of confirmed ASHW sightings (Dhofar, the Gulf of Masirah, and the area offshore from Karachi where fishing crews have been reporting sightings), as well as broader areas known to encompass areas important for humpbacks based on satellite telemetry, modelling and historical whaling data (a broader area of Oman's Arabian Sea coastline and stretches of the coastal waters of India and Pakistan). The candidate IMMAs have now been sent to an independent review panel, undergoing a process of peer review much like that used in scientific journals. Candidate IMMAs that pass review will be placed on the IMMA [e-Atlas](#), and can be used for conservation planning. Final results from the panel are expected to be posted online later in 2019. A brief summary report of the workshop can be found [here](#).

During the IMMA workshop, an opportunistic ASWN meeting was held to discuss progress on the CMS [Concerted Action for humpback whales of the Arabian Sea](#). Progress against the priority activities outlined in the Concerted Action is summarized in the table presented in Annex 1 of this report. This progress will be reported to the meeting of the CMS Scientific Council in October 2019, and further updates will be presented to the CMS COP in February, 2020.

Discussions are still ongoing regarding the objective of working toward an IWC Conservation and Management Plan jointly endorsed by IWC and CMS as a contribution to and a complement of the Concerted Action.

3.5 Assessment of progress at a regional level

A questionnaire was sent to ASWN members asking them to provide their perception of progress against the original objectives set forth in the founding meeting in Dubai in 2015. The relatively small number of responses and comments received indicated that respondents felt that the network and/or members of the network had entirely or mostly achieved the more general objectives of setting up a functioning network with coordination, active focal points in each range state, a website, communication tools, regular liaising with intergovernmental organisations and conservation frameworks, and the development of a regional data platform. The six specific objectives in these categories were all ranked with an average perceived level of attainment of 80% or higher (meaning that the majority of respondents chose 75-99% or 100% as their response to the level of attainment of these objectives). However, the following objectives were ranked with an average attainment rate of 60% or lower:

- *‘Implement regional research activities that include passive acoustic monitoring at strategic locations, dedicated boat surveys for genetic sampling, photo-identification and collecting data on distribution and numbers, and further analyses of acoustic and genetic data already obtained from Oman and other locations.’* Respondents felt that while good work is progressing at project and national level, ‘Regional scale fieldwork remains a challenge to address - politically and in terms of resources required to pull it off.’
- *‘Encourage Master’s and PhD candidates from range states to conduct research and conservation work on ASHWs.’* Respondents felt that while some research is taking place in ASHW range states, and work in India, in particular involves a number of young scientists working toward degrees, in some countries it has been difficult to attract young local students to this work, in part linked to the funding challenges above.
- *‘Execute a large-scale GIS exercise - mapping all known/confirmed ASHW sightings (with effort indices when available) and strandings for analysis of spatial/temporal trends, as well as overlap with known threats (e.g. shipping lanes, high-density fisheries that use gillnets or vertical lines, oil and gas exploration and development sites).’* While respondents suspected that this would form an important component of Andy Willson’s PhD thesis, not everyone was aware of the results yet, and members are looking forward to seeing more of this. Furthermore, data on current humpback whale occurrence outside of Oman has only become available in the past 2-4 years. This new data will make future large-scale analyses much more relevant and useful.

On the whole, respondents seemed to feel that things are moving in the right direction, but recognized that much of the meaningful research and conservation work will need to take place at project/national level, and requires continued efforts from individual researchers and conservation bodies in range states, and support for those efforts at governmental level.

Some of the more project-based/national level work that is not reflected in other papers presented to this meeting is summarized in the section below.

4 Project-based or national level progress

4.1 Fujairah Whale Project

The Fujairah Whale Research Project has conducted eight dedicated vessel surveys and one aerial survey for cetaceans since its start in February 2017. Boat surveys follow pre-designed survey transects that are covered over a period of 3-5 days approximately every 3–4 months. The aerial survey in March 2018 covered 2,414 kms. These yielded sightings of three new species for the UAE: pantropical spotted dolphin (*Stenella attenuata*), striped dolphin (*S. coeruleoalba*) and rough-toothed dolphin (*Steno bredanensis*). Additional species recorded included common bottlenose dolphin (*Tursiops truncatus*), Indo-Pacific common dolphin (*Delphinus delphis tropicalis*), Risso's dolphin (*Grampus griseus*) and spinner dolphin (*Stenella longirostris*). Additional third party observations reported to the project (with photographic evidence), include sperm whales (*Physeter macrocephalus*) and Bryde's whales (*Balaenoptera edeni*). The project is run in partnership between Five Oceans Environmental Services (5OES) and the Port of Fujairah, and is supported by His Highness Sheikh Mohammed bin Hamad bin Mohammed Al Sharqi, the Crown Prince of the Emirate of Fujairah, UAE

4.2 UAE Dolphin Project (United Arab Emirates)

The UAE Dolphin project is a personal initiative with no formal legal status, initiated with the aim of gathering scientific information on the cetacean populations inhabiting UAE and neighbouring waters to support their conservation. For the past seven years, volunteers and private stakeholders promoted the collection of cetacean records through a (social media) reporting network, and supported the costs and logistics of dedicated dolphin surveys. Vessel and land-based surveys and 1302 opportunistically reported sightings confirm the regular occurrence of three dolphin species (*Sousa plumbea*, *Tursiops aduncus*, and *Neophocaena phocaenoides*) in UAE coastal waters. The project now holds photo-identification catalogues of individual bottlenose and humpback dolphins. Large whales are rarely seen or reported and no information is available about how these species utilise the Gulf waters. From 2018 to date the project recorded five whale strandings in UAE waters, four of which were confirmed Bryde's whales and the remaining three unidentified to species level. An unofficial, but seemingly reliable report from an anonymous source, indicated the stranding of a humpback whale on the Arabian Gulf coast of Saudi Arabia in March 2019.

4.3 Environment Society of Oman: Social marketing for reduction of marine wildlife net entanglement

The Environment Society of Oman is conducting a behaviour change study with fishermen on Masirah Island, as a continuation of its Renaissance Whale & Dolphin research. The overall aim of the study is to reduce unregulated disposal of fishing nets by fishermen as a means of addressing mortalities from 'ghost fishing' of marine mammals and other marine taxa. Masirah Island hosts the second largest loggerhead turtle rookery in the world, and a diverse assemblage of endangered marine mammals associated with coastal and deep ocean environment, including Arabian Sea

Humpback Whales. The study uses Community-Based Social Marketing (CBSM) to encourage fishermen to discard old or damaged nets, fishing gear and other waste in designated skip bins rather than in the sea. Three skips were deployed in three fishing sites with accompanying signs written in the five most common languages spoken by the fishing community. To date, initial results from 11 weeks of observations showed a 25% behaviour adoption rate. Bins were empty during 40% of inspection visits (n=94). Contents documented in the bins included plastics (estimated at 25%), general rubbish from dhow fishing trips (17%), nets (10%) and fish discards (8%). The disposal of nets in the skip bins was first observed in the sixth week of monitoring, with a recurrence in weeks 9, 10 and 11, for an estimated total of 214 kg of nets disposed in the bins to date. Monitoring will continue through the end of June 2019. The delayed onset of proper use of the bins could imply that the visibility and presence of bins over time eventually motivated fishermen to engage in the desired behaviour. Additional analysis is required to better understand the barriers that are preventing fishermen from using the bins to dispose of their nets, to assess the potential benefits of this behaviour (e.g. e.g. demonstrating economic and ecologic impacts of ghost nets), and to increase the rate of use.

Annex 1 progress on the activities identified in the CMS Concerted Action for Arabian Sea humpback whales

Arabian Sea Humpback Whale Concerted Action: Priority Activities and Outcomes		
Activity	Expected Outcome	Progress as of April 2019
<i>Addressing knowledge gaps</i>		
The development of a marine mammal reporting smartphone App and citizen science tools, to allow the crews of fishing, coast guard and whale-watch vessels and ferries to record and report whale and dolphin observations.	Improved data and models of current humpback whale distribution throughout the Arabian Sea	ASWN members in Oman are testing apps that can be used by shipping companies, and other members are investigating and testing other Apps that can be used by tourism companies and members of the public, as well as for research (e.g. Spotter Pro , Whale Alert , Seafari). However, none are yet in regular use, or translated into the languages used by range states. Funding would be required to make these more widely accessible and in use, and may be ideal for the WWF-Pakistan-trained fisheries observers.
Collaborative boat-based research to continue photo-identification studies, collect genetic samples, and identify critical habitat. The involvement of local scientists in this research will build capacity for future conservation in the region.	Improved data on whale distribution, habitat use, population identity and connectivity between regions, and increased number of qualified cetacean researchers in the region.	Boat-based research has continued in Oman, and in some instances involves participants from other range states. However, funding has not yet been obtained for large-scale collaborative research efforts.
Use of passive acoustic recorders to detect the presence of whales and monitor human introduced noise in areas that are logistically difficult or dangerous to survey.	Improved understanding of whale distribution in Eastern Arabian Sea (e.g. Gujarat and Rann of Kutch)	Recordings made in Oman in 2012-13 have been analyzed and the valuable results have presented at the IWC (Cerchio et al., 2018; Cerchio et al., 2016). Opportunistic recordings have also been analyzed from India (Madhusudhana, Chakraborty, & Latha, 2018; Mahanty, Latha, & Thirunavukkarasu, 2015). Funding and logistics have not yet been in place to conduct larger scale passive acoustic surveys off of Pakistan or India. However, plans are under way to purchase and place units off the Southwest coast of India.
Genetic analysis of samples collected from strandings and during dedicated whale surveys to determine whether Arabian Sea humpback whales comprise a new sub-species.	Likely designation of ASHW as new species or sub-species, understanding of kinship and relatedness of sampled whales	This is still underway with Howard Rosenbaum and his lab, using samples collected in Oman through 2015.
		Although not listed as one of the targeted activities in the Concerted Action, the rationale refers to the need to study humpback whale health and threats, and the International Whaling Commission has provided a grant that will allow researchers to examine and score all photos of humpback whales from Oman for evidence of disease and human-induced scarring/injury. This work will commence in May 2019, and is expected to be completed by December 2019.
		Regional ASHW ecological niche modeling work previously presented to the IWC (Willson et al. 2017) has been updated with results of more recent satellite telemetry work and a refined method. The habitat suitability layers are currently being prepared for a ship strike risk assessment by looking at co-occurrence between identified whale habitat together with shipping traffic density mapping (derived from satellite based AIS data). Completion of this study is expected by late 2019.

Information sharing and awareness raising		
The development of a regional shared online data platform to promote standardization, comparability and timely analyses of data collected throughout the region. This will be used to facilitate the creation of sensitivity maps and assist stakeholders in the design of local, national and regional conservation strategies, including protected areas	Improved understanding of ASHW distribution and connectivity between study areas.	Two years of collaborative development between ASWN members, Flukebook , and Indocet , have resulted in the completion of an ASWN online database that uses the Flukebook Platform. This new data platform allows uploading, archiving, and analysis of cetacean sightings data, as well as use of ‘computer vision’ to conduct automated matching of humpback whale tail flukes within, and between research projects in the Arabian Sea and wider Western Indian Ocean.
An improved website that provides a portal to the shared database (see above), informs the general public of whale conservation needs, and provides members with a range of outreach tools to engage governments and other stakeholders in their region and involve them in Whale conservation efforts	Increased awareness of ASHW conservation needs among stakeholders	The Arabian Sea Whale Network website has undergone some improvements, and is maintained with updates and news items , as well as a page dedicated to the new data platform . The ASWN has produced an infographic to use in reaching out to stakeholders, as well as three issues of a newsletter . However, more could be done to create a wider variety of outreach tools, including power-point presentations, videos, or other tools in multiple languages.
Capacity building and development and implementation of mitigation strategies		
Organization of targeted regional workshops, meetings and training opportunities that will involve local and national government agencies as well as young scientists, build capacity and develop multi-stakeholder mitigation strategies and conservation measures in key range states.	More effective stranding/entanglement response leading to better survival of affected cetaceans, improved data on bycatch/entanglement rates throughout the region, increased government participation	A workshop was held in Oman, in January 2018, focusing on the final stages of development of the ASWN Flukebook data platform, as well as the issue of data collection from fisheries in the region. This workshop involved ASWN members and a number of representatives of Oman governmental agencies responsible for cetacean management and conservation. The full workshop report can be downloaded here . Many of the researchers working with Arabian Sea humpback whales were also involved in the IUCN Important Marine Mammal Areas workshop for the Western Indian Ocean and Arabian Seas . While organized with different aims, it also involved opportunities for regional capacity building and stakeholder engagement particularly with the Oman government representatives who were present.
Replication of ship strike mitigation strategies from Oman, and by-catch mitigation from Pakistan to other parts of the Arabian Sea.	Reduced risk of ship strike throughout region, improved chance of survival of entanglement	Two of the main proponents of the Pakistan crew-based bycatch observer programme will be presenting their work at an IWC-hosted workshop on bycatch mitigation in the Indian Ocean in May 2019. The workshop is designed to encourage exchange of experience and techniques, and will result in the selection of pilot and affiliated projects where methods from Pakistan can hopefully be trialed in other Indian Ocean locations. Three representatives of the Indian Ocean Tuna Commission, as well as a representative of the FAO Common Oceans Project will be participating in this workshop, and should be in a good position to support/facilitate the amplification of the Pakistan work in the region. Development of a region- wide approach to ship strike mitigation is expected to be partly informed by the ship strike risk assessment currently in progress (and discussed in the section on addressing knowledge gaps above).
Development of a range-state endorsed regional ASHW Conservation and Management Plan	Regional Conservation and Management Plan to promote long-term coordinated and collaborative conservation and management across the ASHW range participation	Discussions have been under way between the CMS Appointed Councilor for Aquatic Mammals, the regional representative of CMS Office - Abu Dhabi, and the various representatives of the International Whaling Commission and its member states focused on initiating development of an IWC ASHW Conservation Management Plan that if finalized would be jointly endorsed by IWC and CMS. Government-level endorsement from both India and Oman, the only two ASHW range states that are IWC members, remains to be confirmed and discussions are still ongoing.