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PROPOSAL FOR A CONCERTED ACTION FOR THE ARABIAN SEA HUMPBACK WHALE (*Megaptera novaeangliae*) ALREADY LISTED ON APPENDIX I OF THE CONVENTION

Summary:

The Appointed Councillor for Aquatic Mammals has submitted the attached proposal* for a Concerted Action for the Arabian Sea Humpback Whale (*Megaptera novaeangliae*) in accordance with the process elaborated in paragraph 4 and Annex 3 of Resolution 11.13.

*The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CMS Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

Proposal for a CMS Concerted Action for Arabian Sea Humpback Whales (*Megaptera novaeangliae*)

within the existing global concerted action for the species

A. Target species/population(s), and their status in CMS Appendices

Target Species/Population:

Humpback whale (*Megaptera novaeangliae*) Arabian Sea (sub)population

CMS Appendix:

CMS Appendix I lists 15 cetacean species, including the Humpback Whale. The Humpback Whale was designated for Concerted Action by the CMS Conference of Parties in 2002. There is currently no separate listing or Concerted Action for the Arabian Sea population. However, in the CMS Scientific Council's 2014 review of Concerted Action aquatic mammal species, the Arabian Sea Humpback Whale population was highlighted for special attention, given that its conservation status is markedly different from the species as a whole. Specific actions within the existing Concerted Action are therefore proposed at the population level, starting with the Arabian Sea population. This population-level approach may be a model to be applied in the future to other humpback whale populations in need of special attention, and populations of other species in a similar situation.

Range description:

The Humpback Whale is a cosmopolitan species found in all of the major oceans (Clapham & Mead, 1999). All known subpopulations, with the exception of the Arabian Sea subpopulation, migrate between breeding grounds in tropical waters and feeding grounds in productive temperate or polar waters.

Nineteenth century whalers and observers on 20th century merchant vessels documented the presence of Humpback Whales in the Arabian Sea (e.g. Brown, 1957; Reeves, Leatherwood, & Papastavrou, 1991; Slijper, Van Utrecht, & Naaktgeboren, 1964; Wray & Martin, 1980). Data from illegal Soviet whaling operations (Mikhalev, 1997, 2000b; Yukhov, 1969) include records of sightings or whales captured off the coasts of Yemen, Southern Oman, Iran, Pakistan and India. These locations are at the northern limit of the Indian Ocean and there are no plausible migration routes from there to any of the North Atlantic or North Pacific Humpback Whale feeding grounds. More recent genetic and demographic information (see below), make it clear that Arabian Sea Humpback Whales are an isolated population with a historical, but no ongoing connection to the southern hemisphere (e.g. Kershaw et al., 2017; Minton et al., 2010; Minton et al., 2011; Pomilla et al., 2014).

Research efforts during the past thirty years have confirmed the continued presence of Humpback Whales off the Gulf of Oman and Arabian Sea coasts of Oman (e.g. R. M. Baldwin, 2000; Minton et al., 2011), but only limited incidental observations of the species have been recorded for the rest of the reported range. At least five Humpback Whale records, all strandings, are known from the Persian/Arabian Gulf (Al-Robaae, 1974; Dakteh et al., 2017; Gervais, 1883). Two strandings and one sighting of a mother-calf pair have been recorded for the Gulf of Oman coast of Iran (Braulik et al., 2010). A number of strandings have been documented from the west coast of India and from Pakistan (Ahmed, 1988; Lal Mohan, 1992; Mathew, 1948; Sathasivam, 2000; Mörzer Bruyns cited in Slijper et al., 1964; Sutaria et al., 2017). Twelve live sightings and one disentanglement of a live Humpback (confirmed through video and photographs) were reported by fishing vessels operating in waters south

of Karachi in October-December 2016 (M Moazzam & Nawaz, 2017). Recently acoustic recordings have detected the presence of humpback whales on the East coast of India (Mahanty, Latha, & Thirunavukkarasu, 2015; Sutaria et al., 2017). Records of strandings and sightings from Sri Lanka are all from the western and north-western side of the island (Alling, Gordon, Rotton, & Whitehead, 1982; Ilangakoon, 2002, 2006; Whitehead, 1985; Winn et al., 1980). In the Maldives, direct observations and reports received from third parties fall into two seasonal groups: (1) June-October in the central and southern Maldives, believed to be visitors from the Southern Ocean; and (2) December-January (plus one record in April) in the central and northern Maldives, believed to be Arabian Sea animals (R.C. Anderson, 2005 and Anderson pers. comm.). Various sightings have been reported from the west coast of Saudi Arabia and Egypt up to the mouth of the Gulf of Suez, but whether these whales originate from the resident Arabian Sea population or breeding stocks in the South-west Indian Ocean is currently unknown (R. Baldwin, Gallagher, & Van Waerebeek, 1999; Notarbartolo di Sciara, Kerem, & Smeenk, In press).

Confirmed range states: India; Islamic Republic of Iran; Iraq; Kuwait; Sultanate of Oman; Pakistan; Qatar; Sri Lanka; United Arab Emirates; Yemen

Possible additional range states: Bahrain, Maldives, Somalia, The Kingdom of Saudi Arabia

B. The case for action

(i) Conservation priority

Mark recapture estimates based on photo identification of Arabian Sea Humpback Whales (ASHW) suggest that fewer than 100 individuals remain in Oman's coastal waters (Minton et al., 2011), but no estimates are available from other parts of the population's known and suspected range. Genetic data indicate that the total effective population size is likely less than 250 individuals, that the population is isolated and discrete, and has survived at least one, and maybe several population bottlenecks after diverging from southern Indian Ocean populations approximately 70,000 years ago (Pomilla, Amaral et al. 2014).

Threats to whales in the region are well documented, and include accidental entanglement in fishing gear (R Charles Anderson, 2014; Minton et al., 2011; M Moazzam & Nawaz, 2017; Sutaria et al., 2017), ship strike and disturbance from underwater noise created by the shipping and transport industries, as well as coastal and offshore construction, seismic exploration and offshore oil and gas production (IWC, 2016b). Thirty to forty per cent of Humpback Whales off of the coast of Oman displayed scars consistent with fishing gear interaction (Minton et al., 2011) and fishing effort, particularly with gillnets, the gear known to cause the greatest risk to Humpback Whales (Johnson et al., 2005) is on the rise in many Range States (Oman Department of R Charles Anderson, 2014; FAO, 2016; Statistics, 2013). After the Fin Whale, globally Humpback Whales are the cetacean species second most at risk from ship strike (Van Waerebeek & Leaper, 2008; Vanderlaan & Taggart, 2007), and the ASHW range hosts some of the busiest shipping lanes in the world. A 2016 study using AIS data revealed a threefold increase of container shipping traffic in the Arabian Sea between 2004 and 2014 (Willson, Kowalik, et al., 2016). Confirmed cases of ship strikes to whales are documented from Oman (R. Baldwin, Willson, & Collins, 2015), the Persian/Arabian Gulf (Dakteh et al., 2017) and the coast of India (Sutaria et al., 2017). ASHW may also be more susceptible to disease: nearly 70 per cent of examined whales from the Soviet catches in the Arabian Sea in the 1960's showed liver anomalies (Mikhalev, 2000b) and over 20 per cent of examined whales from Oman displayed signs of Tattoo-like skin disease (Van Bressem et al., 2014). This population of whales may also be more vulnerable to climate change, if shifts in oceanographic conditions affect productivity or prey distribution in their restricted Northern Indian Ocean range (Thomas, Reeves, & Brownell, 2015).

The IUCN Red List of threatened species recognizes this population as Endangered (Minton et al., 2008) and the United States' Endangered Species Act determined the Arabian Sea population as one of only four populations to retain "Endangered" status following the down listing of Humpback Whales globally (Bettridge et al., 2015; NOAA, 2016). The International Whaling Commission's Scientific Committee has repeatedly reiterated that the population is at great risk and requires significant collaborative conservation efforts to both prevent further decline and to promote recovery of the population (e.g. IWC, 2016b). Despite these designations and recommendations, conservation efforts to date have been minimal, piecemeal and lacking a concerted and coordinated approach from governmental and non-governmental sectors across the ASHW's range.

(ii) Relevance

The available scientific data clearly indicate that ASHWs remain within the Northern Indian Ocean year-round and are isolated from Southern Indian Ocean populations (Minton et al., 2011; Pomilla et al., 2014). However, their movements within the Arabian Sea remain poorly understood, due to a lack of recent dedicated research effort in any range state other than Oman. Humpback Whales in all other populations migrate between distinct feeding and breeding grounds that are typically separated by thousands of kilometres (Clapham & Mead, 1999), and it is reasonable to assume that ASHWs engage in at least some level of trans-boundary movement between the waters of the range states where they have been documented to occur. The positions of Soviet whaling catches in the 1960's indicate that whales were present off the coasts of Oman, India and Pakistan (Mikhalev, 2000b) and Whitehead (1985) detected song in both Southern Oman and Sri Lanka within the same season in February-March 1981. The research conducted to date in Oman has revealed movement between Oman and Yemen (Willson, Baldwin, et al., 2016), and recent habitat modelling based on vessel-based surveys and satellite telemetry data from Oman predict likely humpback whale habitat off the coasts of Pakistan and India, coinciding with the locations of humpback whale catches by the Soviets in the 1960's (Mikhalev, 2000a; Willson et al., 2017). A fishing vessel-based observer programme is leading to an increasing number of humpback whale observations from Pakistan (M Moazzam & Nawaz, 2017). While further collaborative research is required to investigate the full extent of trans-boundary movement within the region, the restricted "cul-de-sac" nature of this population's range and its vulnerability to climate change (Thomas et al., 2015) dictates a precautionary approach that promotes treating the entire Arabian Sea as critical habitat for feeding and breeding.

The listing of Humpback Whales on Appendix I of CMS requires CMS Contracting Parties that are ASHW Range States to endeavour:

a) to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction;

b) to prevent, remove, compensate for or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and

c) *to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species.* (CMS Article III.4)

As such, conservation of ASHWs and their habitat is clearly of relevance to the Convention.

(iii) Absence of better remedies

ASHWs have been a focus of discussions in the Scientific Committee of the International Whaling Commission since the revelation that 242 Humpback Whales were illegally taken by Soviet whaling ships in the 1960's (IWC, 1998; Mikhalev, 1997). Arabian Sea humpback whales were formally evaluated along with Southern Hemisphere populations during the IWC Comprehensive Assessment of Southern Hemisphere Humpback Whales (IWC, 2006). In 2008, the IWC introduced the Comprehensive Management Plan (CMP) framework, under which the IWC can "consolidate the best available science and management expertise….to protect and rebuild vulnerable cetacean populations" such as Western North Pacific Gray Whales (e.g.: https://iwc.int/western-gray-whale-cmp). An intersessional group was formed by the IWC Scientific Committee in 2011 to explore whether a CMP could be proposed for the ASHW population. Only two ASHW Range States (Oman and India) are IWC members, and obtaining the necessary government support for the CMP proposal has thus far not been possible. Despite this, the IWC Scientific and Conservation Committees recently reiterated their recommendation that the Arabian Sea should be proposed for a dedicated CMP for Humpback Whales (IWC, 2016a). In the absence of this envisaged formal, government-backed regional conservation plan, conservation efforts of researchers and conservation bodies in the various ASHW Range States can only have limited effectiveness.

In contrast to the limited ASHW range state membership to the IWC, almost all ASHW Range States, with the exception of Kuwait and Oman, are Contracting Parties to the Convention on Migratory Species. The Sultanate of Oman is however a signatory of the CMS Indian Ocean and South East Asia (IOSEA) Marine Turtle Memorandum of Understanding. Given the support extended by the Government of Oman to Humpback Whale research and conservation, and the leading role that Oman-based groups play in the Arabian Sea Whale Network (see below), it seems reasonable to expect that support would be extended to this Concerted Action.

With anticipated support from CMS Parties, non-Party Range States, other intergovernmental organisations such as IWC, and civil society, an ASHW Concerted Action would be the most feasible and realistic means in the near term to expeditiously tailor a coordinated and collaborative approach by governmental and non-governmental sectors to help prevent the extinction of this unique and highly endangered population of whales.

(iv) Readiness and feasibility

While government level engagement in ASHW conservation has been limited to date, researchers and conservation bodies in the region have been highly active in forming the Arabian Sea Whale Network as an informal mechanism to promote regional coordination, collaboration and exchange. The network, which has chosen the ASHW as its flagship species to address large whale conservation issues, fosters communication and collaboration between nearly 50 researchers from nine ASHW Range States (as well as experts from outside the region). Its work has been supported financially by the US Marine Mammal Commission, WWF Pakistan, EWS-WWF UAE, WWF International, the Wildlife Conservation Society, the IWC and the Environment Society of Oman. Current funding is modest, but supports a part-time coordinator (from October 2015 to at least December 2017), the maintenance of a website (arabianseawhalenetwork.org), the production of an infographic to raise awareness of the unique nature and conservation challenges facing ASHW, and the design of a regional online data platform to archive and analyze whale sightings, strandings and photo-identification data on a regional scale (a project in its initial phases). In addition to centrally funded initiatives, members in Oman, Pakistan, India, and Iran are highly active with independent research and conservation initiatives including, for example:

- The Environment Society of Oman and Five Oceans Environmental Services are leading on-going research on ASHWs in Oman including photo-identification, genetic, acoustic, and satellite tagging studies (IWC, 2016b), and are using results to inform mitigation strategies and

engage the public in whale conservation. They are working with government and industry stakeholders to address the risk of ship strike and to ensure that offshore seismic surveys adhere to measures to minimize disturbance to whales (R. Baldwin et al., 2015; Willson, Kowalik, et al., 2016).

- Members in India, Iran, Oman and Pakistan are engaged in community outreach and education programmes to collect data from fishermen, form effective stranding networks, free live-stranded animals and acquire data and biological samples from stranded whales all over the country (e.g. M Moazzam & Nawaz, 2017; Sutaria et al., 2017).

With active participation and contributions from nearly 50 individuals representing intergovernmental organizations, international and national NGOs, grassroots conservation organizations, independent consultants, private sector corporations and industry and academic institutes, the existing network provides a solid foundation through which conservation and management measures can be developed and coordinated throughout the ASHW range. But the effectiveness of the Arabian Sea Whale Network (ASWN) could be significantly enhanced with better coordinated government collaboration and support, something which the CMS ASHW Concerted Action could provide.

(v) Likelihood of success

The intended outcome the CMS ASHW Concerted Action is ultimately to improve the conservation status of Arabian Sea humpback whales. In order to measure the likelihood of its success, it is important to identify key ecological attributes (KEAs) that can be used to measure the health and conservation status of the population. An assessment conducted by the Emirates Wildlife Society (EWS-WWF) identified KEAs for the Arabian Sea humpback whale population and used them to assess the current population status (Table 1). These indicators, which are still in draft form and will be refined through further consultation with regional experts, can be used to guide the CMS ASHW Concerted Action, monitor its progress, and measure its success.

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

KEA	Indicator	Indicator Rating				Current Rating	Desired Rating	Date of Current Rating
		Poor	Fair	Good	Very Good			
	# 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

The tables above highlight the significant gaps in baseline data that prevent an accurate assessment of the population status throughout its range, but also give a good indication of the progress that has been made regionally on assessing and addressing the ASHW's conservation status. The commissioning of the assessment report as part of its 2015-2020 Marine strategy demonstrates a

considerable investment from EWS-WWF, and a desire to catalyse appropriate research and mitigation actions in the region.

Risk factors associated with this approach include the cost and logistic support required to design and implement research to inform progress on indicators. Obtaining robust data on population numbers and trends will be particularly challenging: most estimates are imprecise (have wide variance) and most cetaceans have reproductive rates that are generally low. As such, accurately detecting increases or declines in population abundance requires that data be collected over substantial time periods, with estimates considered at multi-year year intervals (Carroll et al., 2015; Taylor, Martinez, Gerrodette, Barlow, & Hrovat, 2007; Wilson, Hammond, & Thompson, 1999). Nonetheless, these indicators will need to be prioritised to ensure monitoring of the population in relation to ongoing threats and to understand the effectiveness of any mitigation measures that are put in place.

Another risk factor is the low level of government participation in ASHW conservation efforts to date. The only way to ensure a conservation outcome for this Concerted Action is to ensure that governments throughout the region participate in the design, implementation and enforcement of mitigation measures that will improve the population's chance of survival. The Sultanate of Oman, although not a CMS Contracting Party, provides one example of the process through which government participation and support can be achieved through collaboration over time. There, a multi-pronged approach, involving independent researchers, environmental consultants, industry, the formation of a national environment NGO, and carefully planned and invited support from international NGOs and IGOs has resulted in impressive progress toward understanding humpback whale distribution and conservation needs (e.g. R. Baldwin et al., 2015; Willson et al., 2017; Willson, Kowalik, et al., 2016) and increasing government support for conservation and mitigation of threats. While through 2004, cetacean conservation in Oman was conducted almost exclusively by volunteer scientists, today, the Environment Society of Oman works closely with government agencies to promote cetacean conservation and raise public awareness throughout the country. The Ministry of Environment and Climate Affairs (MECA) has formed the Oman Strandings Committee, and has recently hosted capacity building workshops on cetacean stranding and entanglement response, as well as bycatch reporting.

Through the CMS ASHW Concerted Action, it is reasonable to expect that similar trajectories can be followed in other ASHW Range States, where researchers and conservation organisations are already active and making progress on raising awareness among all the stakeholders that need to be involved in conservation efforts. For example, WWF Pakistan is helping to reduce mortality from bycatch by working directly with the fishing community to educate vessel captains in appropriate reporting and release protocols. This is resulting in the successful release of several cetaceans, as well as valuable records of ASHW (M Moazzam & Nawaz, 2017). The Emirates Wildlife Society-WWF has prioritized Humpback Whale conservation measures in their 2015-2020 Marine Strategy, and commissioned a Viability Assessment of Marine Biodiversity Targets (Five Oceans Environmental R. Baldwin et al., In prep). Both EWS-WWF and WWF Pakistan have invested financial and human resources into the formation of the Arabian Sea Whale Network. In Iran, a small grassroots NGO is engaged in cetacean research, outreach and education in coastal areas. In India, an expanding team of researchers is working (with funding from the International Whaling Commission, among other sources) to collect data on cetacean distribution and strandings throughout the whole country (Sutaria et al., 2017). A CMS ASHW Concerted Action will help to ensure that these and other conservation initiatives in the region lead to more coordinated and collaborative governmental engagement across the ASHW's range, as they have in Oman.

(vi) Magnitude of likely impact

The ASHW serves as a flagship species for all cetaceans in the Northern Indian Ocean, and conservation measures that mitigate threats to ASHW will benefit a wide range of marine migratory species from multiple taxa. Measures to reduce ASHW entanglement in fishing gear will reduce levels of injury and mortality for other large whales and small cetaceans, of which more than 60,000 are thought to die each year as a result of fisheries bycatch in the Northern, Central and Western Indian Ocean (R Charles Anderson, 2014). Raising awareness of the risks of bycatch and training fishermen in techniques for reporting and successfully releasing bycaught species is also likely to benefit marine turtles which are known to be at particular risk of bycatch in the region (Wallace et al., 2013) and sharks (Muhammad Moazzam & Nawaz, 2014). In fact, turtles and small cetaceans are already being successfully released through a successful fisheries observer and training programme run by WWF Pakistan (WWF Pakistan unpublished data) – a programme that with proper training and investment can potentially be replicated in other ASHW range states.

Similarly, any mitigation measures put in place to reduce the likelihood of ship strike for Humpback Whales, as has been achieved at Port of Duqm, Oman (IWC 2015), will benefit all large whale species, and measures that reduce disturbance from underwater noise (e.g. seismic exploration, shipping), pollution, or the risk of habitat degradation will benefit a wide range of taxa using those habitats, from planktonic larvae through to top predators. Furthermore, the CMS ASHW Concerted Action can act as the catalyst to promote the replication of successful mitigation measures from one range state to another, until the benefits of the measures are experienced by marine species in the waters of all Arabian Sea Range States.

(vii) Cost-effectiveness

The Arabian Sea Whale Network (ASWN) has identified a plan of work for the ASHW Concerted Action and the costs that would be associated with implementing regionally coordinated collaborative research, capacity building, outreach, and conservation (see https://arabianseawhalenetwork.org/aswn-aims-and-needs/ and the proposed activities, outcomes and timeline below for more detail). Over a three-year period, close to US$1 million would be required to implement this plan in full. To date, US$175,000 has been secured for work at a regional level, with financial support from the International Whaling Commission, the United States Marine Mammal Commission, WWF Pakistan, EWS-WWF, WWF International and the Environment Society of Oman.

While this amount falls short of the full target, it is an important start, and these initial investments are likely to have a snowball effect as the ASHW Concerted Action develops more fully and the ASWN begins to implement the workplan. Once again, the example of Oman is useful. In the year 2000, a single grant from the Ford Motor Company for US$5000 provided the necessary funding to allow volunteer researchers to conduct the first dedicated humpback whale surveys in Oman. Supplemented by numerous donations in kind (ranging from food for surveys to the provision of transportation services and the loan of satellite phones for use in the field), this modest grant served as the catalyst for what is now a fully developed and internationally respected research programme conducted through the Environment Society of Oman (see http://www.eso.org.om/index/list3.php?categoryId=339), running with a budget of approximately US$ 150,000 per year and generating large volumes of data critical for the conservation management of humpback whales (R. Baldwin et al., 2015; Willson, Baldwin, et al., 2016; Willson et al., 2017; Willson, Kowalik, et al., 2016).

A similar trajectory may be expected on a regional level with the ASHW Concerted Action, where currently financial investment in research and conservation efforts is modest, but investments in kind far outweigh the monetary donations to date. Among the roughly 50 individual ASWN members, many are working on the ground (sometimes on a volunteer basis) in ASHW Range States to collect, archive, and disseminate data on humpback whales. Others, such as those representing large international

NGO's like the Wildlife Conservation Society (WCS) and WWF, are helping to source funding and providing administrative and logistic support for research and conservation initiatives. Several WWF offices are providing funding for ASWN coordination and communication, and WCS has provided technical expertise in the form of a Scientific Coordinator and lab analysis for ASWH genetic samples in the region. The International Whaling Commission is providing financial support for the development of a regional online data platform and some continued funding for one genetic component, but also provides technical support and guidance through ASWN member participation in its Scientific Committee, and provision of capacity building workshops for stranding and entanglement response. The IUCN also provides advice and helps to raise awareness of ASHW through its Cetacean Specialist Group, which has designated conservation of the Arabian Sea Humpback Whale as one of its Special Conservation Projects (http://www.iucn-csg.org/index.php/csg-special-projects/arabian-sea-humpback-whales/). The network also appreciates in kind support from CMS Office - Abu Dhabi for staff time underwritten via core funding provided by Environment Agency – Abu Dhabi on behalf of the Government of the United Arab Emirates.

The modest funding and successes achieved for ASWH conservation in the region to date have been extremely cost effective due to the vast "in kind" contributions of all those involved. While relying on volunteer contributions is not sustainable in the long-run, it is reasonable to assume that the CMS ASHW Concerted Action will help to generate further momentum for the ASWN, which only formally began in 2015, and could lead to a significant increase in financial support for the research and conservation of ASHWs, as occurred in Oman. These efforts should culminate in the drafting and implementation of a regional conservation management plan.

C. Activities and expected outcomes

The proposed CMS ASHW Concerted Action is defined by a list of priority activities that over an initial three-year period would result in an enhanced understanding of the ASHW population and its conservation needs and the development of a regional conservation and management plan with support and participation from governments of ASHW Range States. These actions fall under three main categories: 1) addressing knowledge gaps; 2) information sharing and awareness; and 3) capacity building and development and implementation of mitigation strategies. These activities and their associated expected outcomes are specified in the table below. The anticipated timeline to implement these activities their indicators of attainment is specified in Section **E** below.

Arabian Sea Humpback Whale Concerted Action: Priority Activities and Outcomes		
Activity	**Expected Outcome**	**Indicators**
Addressing knowledge gaps		
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	Increased number and geographical range of ASHW sightings in regional database
Collaborative **boat-based research** to continue photo-identification studies, collects 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.	Increased number and wider geographical range ASHW of genetic samples, photos suitable for individual identification, and distribution data. At least two new trained local scientists.

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 that indicate year-round presence/ absence of Humpback Whales in areas where boat surveys not conducted.
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	Publications in peer-reviewed journals and likely designation of new species/ sub-species. May impact status listings and under-standing of connectivity range-wide eventually
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.	Regional maps of ASHW sightings and strandings with improved and integrated input from ASHW Range States
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	Number of visits to website, increased participation of stakeholders in mitigation and management plans.
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	Number of workshops held, and participants trained
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	Number of Ports developing mitigation plans, number of fishing vessels participating in crew-based observer programmes.
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	Fully drafted plan with participation by range state governments and civil society for endorsement by CMS and IWC

ANTICIPATED OUTPUTS

- A fully functional, active regional network with multi-stakeholder participation and the capacity to exchange information and collaborate on measures to improve the conservation status and mitigate of threats affecting Arabian Sea humpback whales across their range.
- An innovative, open-access online data platform tailor-made to facilitate regional analysis of whale stranding, sighting, genetic, acoustic and photo-identification data.
- New insight into Humpback Whale distribution in the Arabian Sea through passive acoustic detection and noise exposure in areas where boat surveys have not yet, or cannot be conducted.
- Improved understanding of the stock identity and status of Arabian Sea Humpback Whales throughout their range.
- Improved research capacity in ASWN member states through training workshops and cross-country collaboration on acoustic and boat surveys.
- Scientific publications as well as popular media coverage of all that is learned about the Arabian Sea Whale population through the collaborative data analysis and new research initiatives.
- Increased awareness in coastal fishing communities and fishing captains who know how to report and mitigate accidental entanglement of whales or dolphins in fishing gear.
- A Range State endorsed regional ASHW Conservation and Management Plan.

D. Associated benefits

An Arabian Sea Humpback Whale initiative under a CMS Concerted Action could have multiple associated benefits including improved conservations status for a wider range of marine taxa throughout the region, and the encouragement of new party accessions. Classified as “charismatic megafauna”, Humpback Whales have the potential to act as a flagship species that catalyses conservation actions to benefit entire ecosystems, a wide range of taxa and the people of the region.

Section B(vi) above briefly discusses the additional marine species that could benefit from actions that protect ASHW habitat and reduce bycatch in fishing gear. The Gulf of Masirah, one of the core ASHW habitats identified off the coast of Oman, (Corkeron, Collins, Findlay, Willson, & Baldwin, 2011; Minton et al., 2011), also comprises core habitat for Loggerhead Turtles that nest on Masirah Island (Rees et al., 2010; James P Ross, 1998) and Green and Hawksbill Turtles that forage in the seagrass beds and coral assemblages in the Gulf (Pilcher et al., 2014; J.P. Ross & Barwani, 1982). These turtle species are also susceptible to bycatch in gillnets (Lewison et al., 2014; Wallace et al., 2013; Willson et al., 2015) and would benefit from bycatch mitigation measures. Sharks, rays and seabirds in the region can also benefit from bycatch reduction efforts and improved awareness and training for fishing crews on appropriate release techniques.

An ASHW Concerted Action under CMS is almost certain to involve the Sultanate of Oman, which is thus far not a party to CMS, but which is a current member of an existing CMS regional conservation effort: the Indian Ocean and South East Asia (IOSEA) Marine Turtle MOU. Successful participation in these two efforts may serve as a catalyst for the Sultanate of Oman to join other CMS-led initiatives or to become a contracting party to the Convention itself.

Finally, the ASHW Concerted Action may also have the potential to lend weight to complementary regional efforts to protect Arabian Sea marine habitats, such as the forthcoming assessment of Important Marine Mammal Areas in the Indian Ocean (https://www.marinemammalhabitat.org/activities/immas/), an initiative under the IUCN, and the outcomes of the process in 2015 to describe areas meeting the Convention on Biological Diversity's Criteria for Ecologically or Biologically Significant Marine Areas in the North-West Indian Ocean and Adjacent Gulf Areas. Ultimately people throughout the region will benefit from the increased learning, knowledge and attention that this effort will bring, as well as the spin-off activities that will inevitably result.

E. Timeframe

The Timelines for the development of an Arabian Sea Humpback Whale Concerted Action Plan are tabled below. Reporting points have been built into the timelines, to ensure that the CMS Scientific Council remains appraised of the Arabian Sea Humpback Whale Initiative's progress.

Arabian Sea Humpback Whale Concerted Action Plan: Timeline

Activity	Year 1 (2018)	2019	2020	Expected milestone achieved	CMS reporting points
Addressing knowledge gaps					
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.	Development	Testing in 2-3 range states	Use throughout range states and further - collected data contributes to Conservation Plan	December -19	Progress reported to CMS Scientific Council Sessional Committee 4 (likely mid 2020)
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.	Research in Oman and India	Research in Oman and India and Iran	Research continues- data used to draft Action Plan	December -19	
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.	Units placed off coasts of Pakistan and India	Units continue to collect data, analysis begins	Acoustic data used to identify areas of focus for mitigation measures in Action plan	December -19	
Genetic analysis of samples collected from strandings and during dedicated whale surveys to determine Arabian Sea Humpback Whales' taxonomic identity and evaluate connectivity range-wide	Sample Collection	Sample analysis	Results of genetic analysis	December -19	

			applied to Action Plan		
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	Development and upload of data from Oman, Pakistan and India	Testing and upload and analysis of data from other range states	continual contribution of data from Range States and results of analysis used in development of Action Plan	December -19	Progress reported to CMS Scientific Council Sessional Committee 4 (likely mid 2020)
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	Linking of website to Online data platform, dissemination of infographic	Development of outreach tools for fishing communities	Continual update of website and translation and dissemination of tools as part of Action Plan communication strategy	December -19	
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.	IWC disentanglement workshop in Pakistan, India	Meeting of ASWN team in conjunction with Indian Ocean meeting in Maldives	Meetings to draft and launch Action Plan	December -20	Progress reported to CMS Scientific Council Sessional Committe
Replication of ship strike mitigation strategies from Oman, and by-catch mitigation from Pakistan to other parts of the Arabian Sea.	Workshops in Oman Pakistan	Implementation of	Evaluation of programme	July-20	

	to demonstrate and train other range states	programme in other range states and data contributions	effectiveness and use of data to draft plan		e 5 (likely mid 2022)
Development of a range state endorsed regional ASHW Conservation and Management Plan	Identification of drafting team	Collaborators correspond regularly	Draft completed by July 2020 , refined and endorsed by range states December 2020	December -20	

F. Relationship to other CMS actions

The ASHW Concerted Action will support implementation of a number of recent CMS initiatives including:

- Strategic Plan for Migratory Species 2015-2023 (eg, Targets 5-10, 12 and 15)
- Resolution 10.03 (The Role of Ecological Networks in the Conservation of Migratory Species) and Resolution 11.25 (Advancing Ecological Networks to Address the Needs of Migratory Species)
- Resolution 10.04 (Marine Debris) and Resolution 11.30 (Management of Marine Debris)
- Resolution 10.14 (Bycatch of CMS-listed Species in Gillnet Fisheries)
- Resolution 10.15 (Global Programme of Work for Cetaceans)
- Resolution 10.19 (Migratory Species Conservation in the Light of Climate Change) and Resolution 11.26 (Programme of Work on Climate Change and Migratory Species)
- Resolution 10.24 (Further Steps to Abate Underwater Noise Pollution for the Protection of Cetaceans and Other Migratory Species)
- Resolution 11.10 (Synergies and Partnerships).

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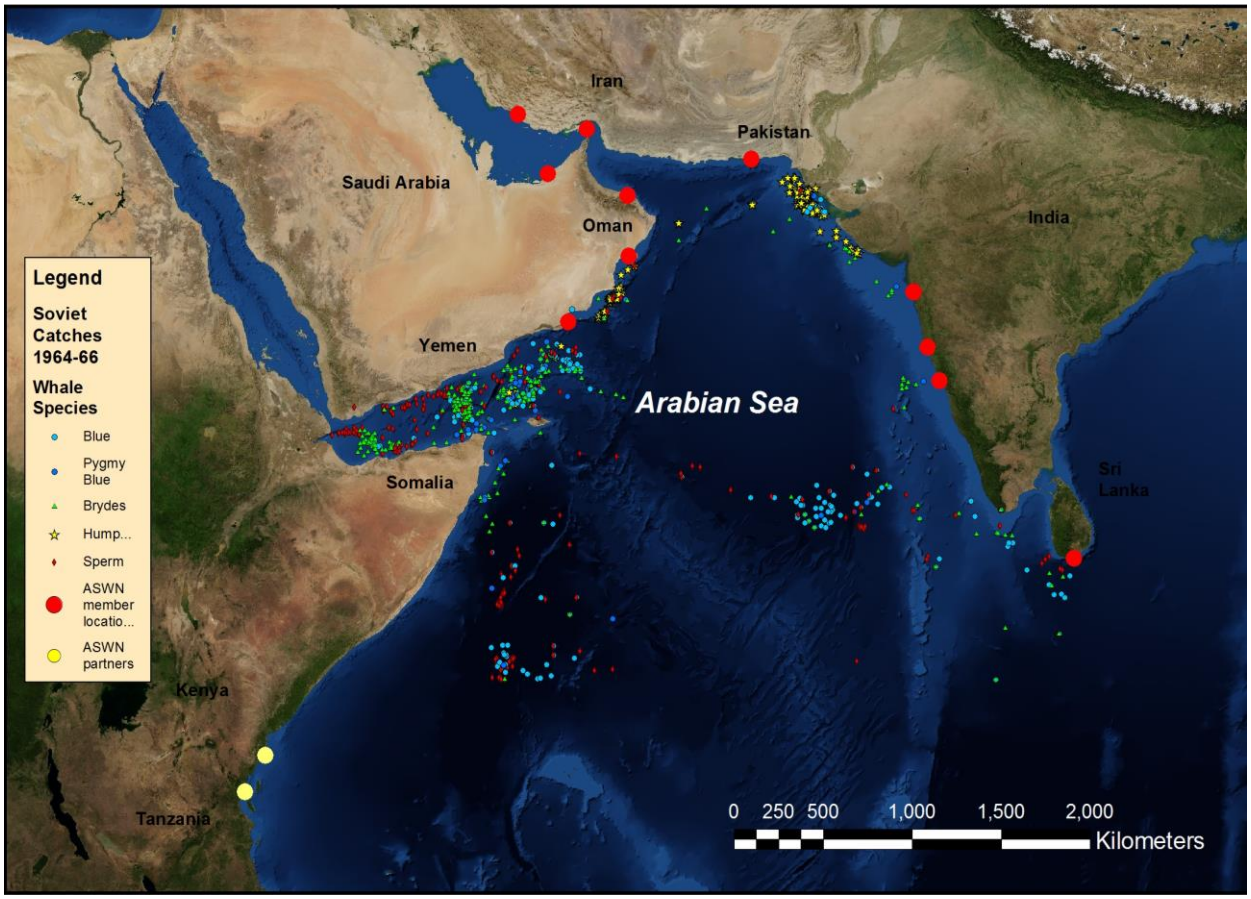
Appendix 1:

ASHW Infographic developed by the Arabian Sea Whale Network with support from Emirates Wildlife Society-WWF:



The Arabian Sea region, with locations of members and collaborators of the Arabian Sea Whale Network, and the thousands of whales killed during illegal, clandestine Soviet whaling operations in the 1960's. Due to a lack of dedicated research anywhere other than the coast of Oman, it is not known whether whales are still present in significant numbers as they were then (Data on Soviet catch positions provided by the International Whaling Commission).