

# SC/67b/RP13

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## CMP - Proposal to sample the holotype specimen of *Megaptera indica*



INTERNATIONAL  
WHALING COMMISSION



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## PROJECT PROPOSAL REQUEST

### 1. PROPOSAL TITLE

*Please provide the title of the project or the name of the workshop/meeting.*

**Proposal to sample the holotype specimen of *Megaptera indica* (Gervais, 1883) at the Muséum National d'Histoire Naturelle (Paris)**

### 2. BRIEF OVERVIEW OF THE PROPOSAL AND ITS EXPECTED OUTCOME

*Give a very brief overview (max 150 words) on your proposal and its expected outcomes. Use bullet point to list outcomes. Be succinct and clear as this may be used to summarise your project for the report.*

Several lines of evidence suggest that humpback whales in the Arabian Sea/Northern Indian Ocean comprise a discrete, isolated and non-migratory population that merits a taxonomic revision. An IWC grant is supporting current genetic analyses of available samples now underway in order to determine whether sub-species/species designation is merited. The resultant nomenclature will necessarily draw on a description of the type specimen of *Megaptera indica*, which is held at the Muséum National d'Histoire Naturelle in Paris. This proposal describes an approach for examining and sampling this specimen so that the taxonomy of Arabian Sea humpback whales can be accurately defined, better informing regional conservation efforts, highly relevant to the IWC's stated interest in the establishment of a Conservation Management Plan for Arabian Sea humpback whales (IWC, 2016).

### 3. RELEVANT IWC SCIENTIFIC COMMITTEE GROUPS OR SUB-GROUPS

*List all the IWC Scientific Committee groups or sub-groups that the outcomes of this work would be relevant to and provide a brief (1-2 lines) explanation of how it would contribute more widely to their ongoing programmes of work. Where possible, do not simply list only the sub-committee within which or for which the project proposal was generated.*

CMP: The proposed activity will help to clarify the taxonomic status of a population that is being proposed for an IWC Conservation Management Plan.

SH and SD: The proposed project would clarify the relationship between humpback whales occurring in the Arabian Sea/Northern Indian Ocean and the other stocks occurring in the Indian Ocean.

### 4. TYPE OF PROJECT (PLEASE TICK)

Research project	X
Modelling	
Workshop/meeting	

Database creation/maintenance	
Compilation work/editing (e.g. on whalewatching regulations, SOCER, etc.)	
Other (please specify below)	

**5. BRIEF DESCRIPTION OF THE PROPOSAL AND ITS CONNECTION WITH SCIENTIFIC COMMITTEE RECOMMENDATIONS (DO NOT EXCEED 1500 WORDS)**

**(A) BACKGROUND, RATIONALE, AND RELEVANCE TO THE PRIORITIES IDENTIFIED BY THE IWC SCIENTIFIC COMMITTEE:**

*Provide a clear explanation of the background and rationale for the proposal and its relevance to Scientific Committee identified priorities. Clearly identify the most relevant and recent Scientific Committee recommendations.*

In 1883 H.P. Gervais described the beach-weathered skull and skeleton of a humpback whale recovered from Basra Bay in the Arabian/Persian Gulf (the Gulf) and deposited it at the *Laboratoire d'Anatomie Comparée du Muséum National d'Histoire Naturelle* in Paris<sup>1</sup>. A more formal description of the specimen followed in 1888. Gervais concluded that the specimen differed from *Megaptera boops* (the only recognized humpback whale species at that time), and proposed that the specimen be recognized as a new species '*Megaptera indica*'<sup>1</sup>. This holotype was re-examined by Prof. Daniel Robineau in 1989 who reported finding only the calvarium (#JAC 1883-2255)<sup>2</sup>. Recent genetic work has since differentiated at least three subspecies of humpback whale: *Megaptera novaeangliae kuzira*<sup>3</sup> in the North Pacific, *M. n. novaeangliae*<sup>4</sup> in the North Atlantic and *M. n. australis*<sup>5</sup> in the Southern Hemisphere<sup>6</sup>. These studies did not include samples from the Arabian Sea humpback whale population<sup>7</sup>.

Several lines of evidence suggest that humpback whales in the Arabian Sea/Northern Indian Ocean comprise a discrete, isolated and non-migratory population that merits a taxonomic revision<sup>9,11,12,13,14</sup>. Analysis of genetic samples collected off Oman indicates that Arabian Sea humpback whales (ASHW) are genetically distinct and have been isolated from their conspecifics for *circa* 70,000 years<sup>11</sup>. Recent sightings of humpback whales off the coast of Pakistan indicate that whales are still present in areas where they were hunted in the 1960s<sup>12</sup> and in December 2017 a satellite tagged female from Oman crossed the NIO to southern India. A review of authenticated sightings in the Gulf provides evidence that

humpback whales are habitually distributed throughout this region<sup>13</sup>. Threats to whales are widespread in the Arabian Sea and Gulf, particularly in preferred coastal habitats<sup>14</sup>. These include fisheries entanglements<sup>13,15,16</sup>, ship strikes<sup>17</sup>, and pollution<sup>13,18</sup>. These threats, and the small size of the population (estimated <100 individuals), led to an Endangered designation on the IUCN Red List<sup>19</sup>. A recent worldwide review conducted by NOAA also concluded that ASHW are one of only four humpback whale populations still considered Endangered under US Endangered Species Act<sup>20,21</sup>. These designations lend some urgency to a need to more accurately define ASHW's taxonomic status, identified as a high priority by regional scientists during a MMC funded workshop in 2015<sup>22</sup>. Genetic analyses of available samples are now underway in order to determine whether sub-species/species designation is merited. The resultant nomenclature will necessarily draw on a description of the Paris type specimen. This proposal describes an approach for examining and sampling this specimen so that the taxonomy of Arabian Sea humpback whales can be accurately defined, better informing regional conservation efforts, highly relevant to the IWC's stated interest in the establishment of a Conservation Management Plan for Arabian Sea humpback whales (IWC, 2016).

#### (B) SPECIFIC OBJECTIVES OR TOR AND DELIVERABLES/OUTCOMES:

*Provide the specific objectives and the expected deliverables. In the case of workshops and meetings, include the Terms of Reference (ToR) and expected outcomes.*

The analysis of the Paris museum specimen combined with the results of genetic analyses should allow for a conclusive resolution on the taxonomic status of Arabian Sea humpback whales. This description will be published in a peer-reviewed scientific journal and reviewed by the Society for Marine Mammalogy's [Taxonomy Committee](#). A new taxonomic designation will encourage greater awareness of Arabian Sea humpback whales and enable a clearer understanding of the conservation needs for this species/subspecies (including its future in the face of climate change). This information would provide justification for intensified conservation efforts at national, regional and global levels.

#### (C) METHODOLOGICAL APPROACH/WORK PLAN/ADMINISTRATIVE DETAILS

*Specify the methods to be applied (novel methods require more explanation than standard ones) and the broad workplan – the detailed timetable appears under Item 5 below.*

*In the case of workshops and meetings, include the broad work plan including any pre-requisites for the workshop/meeting to take place (apart from funding, e.g. completed analyses, papers etc.) and administrative details (e.g. location, dates, number of participants).*

An independent researcher with extensive experience in identification, measurement and taxonomic description of cetaceans (Koen Van Waerebeek) will

visit the Paris Natural History Museum to examine, photograph, measure and sample the specimen described by Gervais.

*Morphometric analyses:* The available skull and any other skeletal remains of the holotype will be examined and measured and then compared to measurements of other museum humpback whale specimens. Until the holotype is examined it will be impossible to judge if any diagnostic characters can separate this nominal subspecies from other subspecies or populations of humpback whales.

*Bone sampling for DNA:* A bone sample will be extracted (with permissions) from the specimen for the purpose of DNA analysis. The sampling location will be considerate of bone quality (density, degradation) and post sampling aesthetics (taken from an internal/hidden surface). The sampling procedure will follow previously established and successful methods for extracting ancient DNA<sup>23</sup>, including appropriate consideration of potential sources of contamination.

*DNA analyses of bone samples:* Details of DNA release, purification and amplification, including the extraction method chosen (ethanol/isopropanol precipitation, binding DNA to silica) will be clarified once the condition of the specimen has been assessed. If suitable, attempts will be made to extract mtDNA and nuclear DNA for comparison to an extensive database maintained by WCS, as well as published sequences. Funding for analysis has already been provided by the International Whaling Commission and is therefore excluded from this proposal.

#### (D) SUGGESTIONS FOR OUTREACH

*Please, note that successful proponents will be requested to produce ad hoc material that will be used by the IWC Secretariat for dissemination and outreach.*

The project would result in a full report to the IWC, and would contribute to a peer-reviewed journal article submission.

## 6. TIMETABLE FOR ACTIVITIES AND OUTPUTS

*Specify the timetable for project activities and expected outputs separately. For projects with multiple distinct elements please indicate interim goals and timeframes. Add as many rows as you need to the tables below. If publications are an expected output please note whether you will submit the manuscript to the IWC's Journal of Cetacean Research and Management.*

Activity to be undertaken	Key person(s)	Start(mm/yy)	Finish (mm/yy)
Visit to Paris museum	Dr. Koen Van Waerebeek	Between 02 and 03/2019	Between 02 and 04/2019
Presentation of results of analysis of biopsy samples at the IWC Scientific Committee	Dr. Howard Rosenbaum, Dr Rita Amaral (WCS) and others	04 or 05/2019	04 or 05/2019
Preliminary presentation of morphometric analysis of Paris specimen to the IWC Scientific Committee	Dr. Koen van Waerebeek	04 or 05/2019	04 or 05/2019
Genetic analysis of bone sample from specimen	Dr. Howard Rosenbaum (WCS)	07/2019	08/2019
Write- up and submission of results of combined analysis	All partners	12/2019	04/2020
Full report to IWC SC	All partners	04 or 05/2020	

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Expected outputs	Completion date (mm/yy)
Morphometric description of Paris specimen	04 or 05/2019
Presentation of findings of combined genetic and morphometric analysis of Paris Specimen and its implications for the taxonomic status of Megaptera indica	04 or 05/2020

## 7. RESEARCHERS' (OR STEERING GROUP) NAME(S) AND AFFILIATION

Please, also specify if the project team has any direct connection (e.g. same research group or institute, collaborator on common project) with people involved or likely to be involved in taking the funding decision (e.g. IWC SC heads of delegations, SC convenors, etc.). Add as many rows as you need to the table below.

Name	Affiliation	Connection with decision
Robert Baldwin	Five Oceans Environmental Services	None
Koen Van Waerebeek, PhD	Independent Researcher	None
Robert Brownell, PhD	NOAA	None
Howard Rosenbaum, PhD	Wildlife Conservation Society	None
Ana Rita Amaral, PhD	Faculty of Sciences, University of Lisbon	None
Gianna Minton, PhD	Independent Researcher	None
Andy Willson	Five Oceans Environmental Services	None
Tim Collins	Wildlife Conservation Society	None

## 8. TOTAL BUDGET

Breakdown into: (1) salaries/wages (include name/position of each individual and breakdown of time and duties i; (2) travel/subsistence expenses (breakdown by person and justification) unless for IPs for workshops where a total estimate based on an average for the total number of IPs is acceptable; (3) services (e.g. aircraft/vessel time, consultancy fees, ARGOS fees, etc.); (4) reusable capital equipment (e.g. reusable equipment such as a hydrophone, cameras, etc. Note that this equipment will have to be registered at the IWC Secretariat and will remain property of the IWC at the end of the project), (5) expendable capital equipment (e.g. consumables, tags, stationery), (6) shipping costs, (7) insurance costs, (8) in kind co-funding (specify whether other funding is available for personnel/name, equipment, venues, etc.). Note that "Overheads" are not admissible. Add as many rows as you need to the table below.

Type	Detailed description	Cost in GB pounds
(1) Salaries (by person)	Three days of consulting fees for K. van Waerebeek	1,200.00
(2) Travel/subsistence (by person or est. total for IPs)	Travel (by train) and accommodation for researcher from Gent, Belgium to Paris for two days to examine specimen	600.00
(3) Services (by item)		
(4) Reusable equipment		
(5) Consumables	Sampling equipment	100.00
(6) Shipping (by item)	Courier of sample from Paris to New York	75.00
(7) Insurance (by item)		
(8) Co-funding		
(9) Other		
<b>Total</b>		<b>1,975.00</b>

## 9. DATA ARCHIVING/SHARING

Please state your plans for data archiving and sharing. Note that data collected primarily under IWC grants are considered publicly available after an agreed period of time for publication of papers, usually about two years. The work of the IWC depends on the voluntary contribution of data to the various databases and catalogues IWC supports. Please consult the Secretariat ([secretariat@iwc.int](mailto:secretariat@iwc.int)).

The results of the analysis will be reported to the IWC and measurements etc, can be stored in their data repositories.

## 10. PERMITS (PLEASE TICK)

Do you have the necessary permits to carry out the field work and have animal welfare considerations been appropriately considered?	N/A
Do you have the appropriate permits (e.g. CITES) for the import/export of any samples?	Yes

If 'Yes' please provide further details and enclose copies where appropriate:

## REFERENCES

### References

- IWC. 2016. *Report of the Scientific Committee of the International Whaling Commission 2016: Annex H: Report of the Sub-Committee on Other Southern Hemisphere Whale Stocks*. 66b International Whaling Commission.
- 1 Gervais, H. P. Sur une Nouvelle Espèce de Mégaptère (*Megaptera indica*) Provenant du Golfe Persique. *Nouvelles archives du Muséum d'Histoire Naturelle, Paris* 10, p199-218 (1888).
  - 2 Robineau, D. Les types de cétacés actuels du Muséum national d'Histoire naturelle. I: Balaenopteridae, Kogiidae, Ziphiidae, Iniidae, Pontoporiidae. *Bulletin du Muséum national d'histoire naturelle. Section A, Zoologie, biologie et écologie animales* 11, p271-289 (1989).
  - 3 Gray, J. E. Catalogue of the specimens of Mammalia in the collection of the British Museum. Part 1. Cetacea. p1-153, pls I-VIII (Trustees of the British Museum, London, 1850).
  - 4 Borowski, G. H. *Gemeinnützige Naturgeschichte des Thierreichs*. (Gottlieb August Lange, 1781).
  - 5 Clapham, P. J. & Mead, J. G. *Megaptera novaeangliae*. *Mammalian Species* 604, 1-9 (1999).
  - 6 Jackson, J. A. *et al.* Global diversity and oceanic divergence of humpback whales (*Megaptera novaeangliae*). *Proceedings of the Royal Society B: Biological Sciences* 281, doi:10.1098/rspb.2013.3222 (2014).
  - 7 Minton, G. *et al.* Seasonal distribution, abundance, habitat use and population identity of humpback whales in Oman. *Journal of Cetacean Research and Management Special Issue on Southern Hemisphere Humpback Whales*, p185–198 (2011).
  - 9 Mikhalev, Y. A. Humpback whales *Megaptera novaeangliae* in the Arabian Sea. *Marine Ecology Progress Series* 149, p13-21 (1997).
  - 11 Pomilla, C. *et al.* The World's Most Isolated and Distinct Whale Population? Humpback Whales of the Arabian Sea. *PLoS ONE* 9, e114162, doi:10.1371/journal.pone.0114162 (2014).
  - 12 Moazzam, M. & Nawaz, R. Arabian Humpback and Baleen Whale sightings along the Pakistan Coast: Information Generated Through WWF Pakistan's Fishing Crew Observer Programme. Report No. SC/67A/CMP/05, 16p (Bled, Slovenia, 2017).
  - 13 Dakteh, S. M. H. *et al.* The Persian Gulf is Part of the Habitual Range of the Arabian Sea Humpback Whale Population. *Journal of Marine Biology and Oceanography* 6, p1-6, doi:10.4172/2324-8661.1000178 (2017).
  - 14 Clapham, P. in *Encyclopedia of Marine Mammals* (eds W. Perrin, B. Wursig, & J.G.M. Thewissen) p582-584 (Elsevier, 2009).



- 15 Anderson, R. C. Cetaceans and tuna fisheries in the Western and Central Indian Ocean. *International Pole and Line Federation Technical Report 2*, 133p (2014).
- 16 Moazzam, M. & Nawaz, R. By-catch of tuna gillnet fisheries of Pakistan: A serious threat to non-target, endangered and threatened species. *Ecosystem Approaches to the Management and Conservation of Fisheries and Marine Biodiversity in the Asia Region 56*, 85 (2014).
- 17 Willson, A. *et al.* Priorities for addressing whale and ship co-occurrence off the coast of Oman and the wider North Indian Ocean., 13p (IWC, Bled, 2016).
- 18 Baldwin, R. *et al.* Arabian Sea Humpback Whales: Canaries for the Northern Indian Ocean? *Document presented to the 62nd meeting of the International Whaling Commission. SC/62/SH20*, 1-5 (2010).
- 19 Minton, G. *et al.* *Megaptera novaeangliae*, Arabian Sea subpopulation. *IUCN Red List of Threatened Species* <http://www.iucnredlist.org/details/132835> (2008).
- 20 Bettridge, S. *et al.* Status review of the humpback whale (*Megaptera novaeangliae*) under the Endangered Species Act. US Dep. Commer. *NOAA Technical Memorandum NMFS-SWFSC 540*, 263p (2015).
- 21 NOAA. Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*) and Revision of Species-wide Listing. NOAA: 247 (Department of Commerce, Washington DC, USA, 2016).
- 22 Minton, G., Reeves, R. R., Collins, T. J. Q. & Willson, A. Report on the Arabian Sea Humpback Whale Workshop: Developing a collaborative research and conservation strategy. 50p (Dubai, 2015).
- 23 Rosenbaum, H. C. *et al.* Utility of North Atlantic right whale museum specimens for assessing changes in genetic diversity. *Conservation Biology 14*, 1837-1842 (2000)

**Appendix 2 – DRAFT SCORING SHEET**

If a project presents multiple primary objectives which are achieved using sub-projects, a sheet should be used to evaluate each single sub-project. Note that not all criteria are equally applicable depending on the nature of the project (e.g. field work versus workshops).

IWC SCIENTIFIC COMMITTEE PROPOSALS FOR FUNDING - REVIEW CRITERIA - TEST			
TITLE OF THE PROJECT/sub-projects:			
PRINCIPAL INVESTIGATOR:			
Key criteria	Explanation of scoring	Score	Supporting Remarks
<i>Relevance to Scientific Committee priorities</i>			
1	How well aligned are the scientific outcomes of the project/activity with the current SC priority areas?	1 - Not aligned/poorly aligned (e.g. too vague or generic reference to general SC priorities) 2 - Reasonably aligned (e.g. some aspects may be vague or links are not clear) 3 - Well aligned (e.g. outcomes clearly deliver in the most part on priority areas, may also address longer term or potential future issues). 4 - Closely aligned (e.g. of interest for multiple sub-groups or delivers on specific SC high priority topics/recommendations in the immediate or short term).	
2	To what extent will the outcomes of the project/activity contribute to improvements in the conservation and management of cetaceans?	1 - Not at all 2 - Poorly 3 - Reasonably or over the longer term 4 - Well or over the medium term 5 - Excellently or to almost immediate effect	
<b>Note:</b> if in each of the two above key criteria under this section the project does not score singularly at least 2 points, do not proceed in further evaluation. Of course, proposals within a sub-group would only be developed if in their estimation scores were of 4 or above.			
<i>Approach and methodology</i>			
3	What degree of scientific merit/value is there in carrying out the work?	1 - Not demonstrated or of low scientific value 2 - Useful/basic scientific value 3 - Very good scientific value 4 - Excellent/innovative scientific value	
4	Is the proposed methodology scientifically sound and feasible in terms of field and analytical methods?	1 - Feasibility unrealistic & poor methodology or not properly addressed 2 - Feasibility & methodology acceptable but would benefit from some substantial amendments	

CMP WP13

		3 - Feasibility & methodology good, some small changes beneficial 4 - Feasibility & methodology excellent or a highly promising innovative approach to an important question facing the Committee		
5	What is the likelihood of success based on the proposed overall approach and methodology?	1 - No chance of success 2 - Low chance of success/better approaches available 3 - Medium chance of success/some changes to the approach necessary 4 - High chance of success/little or no changes to the approach necessary		
5a	Are objectives of the research likely to be achieved within the proposed time-frame?	1 - No or unlikely 2 - Partially or potentially ambitious 3 - Yes with some minor suggestions 4 - Yes		
5b	Are any proposed intermediary targets timely and achievable?	1 - No or unlikely 2 - Partially 3 - Probably 4 - Yes		
5c	Is the proposed time-frame/work necessary (e.g. can the project produce results in a shorter time period)?	1 - No or unlikely 2 - Partially 3 - Probably 4 - Yes		
5d	Is the sample size adequate to achieve the stated objectives?	1 - Not demonstrated/not properly addressed 2 - No or unlikely (too low/too high) 3 - Probably (additional analysis needed) 4 - Yes		
6	Is the project likely to affect adversely the population(s) involved?	1 - Not properly addressed/ unknown 2 - Yes severely 3 - Possibly at a low level 4 - No		
6a	<b>IF YES</b> , are analyses provided on simulations of the effects using different time-frames for the project if applicable?	1 - No 2 - Partially 3 - Yes		
<p><b>Note:</b> if in each of the above key criteria under this section the project does not score singularly at least 2 points, do not proceed in further evaluation. Of course, proposals within a sub-group would only be developed if in their estimation scores were of 3 or above.</p>				
<p><b>Project team and Project management</b></p>				

CMP WP13

7	To what extent does the team have the relevant expertise, experience, and balance?	1 – Poor or not demonstrated 2 – Sufficient 3 - Very good 4 - Excellent		
8	Contingency plan: To what extent have potential problems/risks been considered and appropriate mitigation proposed?	1 – Poor or not demonstrated 2 – Sufficient but could be improved 3 - Fully or requiring only minor suggestions or not applicable		
<b><i>Value for Money</i></b>				
10	Does the project represent good value for money?	1 – No or significant amendments would be needed 2 – Yes but with some minor amendments 3 – Yes		
11	Have sufficient links been made to the wider research community/other organisations/capacity building.	1 – No 2 – Some but significant amendments needed 3 – Yes but with some minor additions 4 – Yes or not applicable		