FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Terms of Reference

TERMS OF REFERENCE FOR THE DEVELOPMENT OF AN IDENTIFICATION GUIDE FOR MARINE MAMMALS IN THE INDIAN OCEAN

There are a variety of potential interactions that may occur between marine mammals and fisheries for tuna and tuna-like species in the Indian Ocean but these are poorly documented and quantified. Indeed, the need to quantify interactions between marine mammals and fishing gear (including depredation) and evaluate the impacts has been expressed on numerous occasions (Romanov, Bach, 2009, Romanov et al., 2009, Anderson, 2014; Escalle et al., 2014). Nevertheless, this is hindered by the difficulties with correctly identifying the species involved (Moazzam, 2013). While numerous marine mammal identification guides are available globally and regionally (e.g. Jefferson et al., 1993; Berggren, 2009; SPC, 2016) none have been developed specifically for use in Indian Ocean fisheries, for those who are less experienced in marine mammal identification such as fishers or scientific observers, and to be able to withstand extreme field conditions such as onboard fishing vessels. Therefore the IOTC Scientific Committee has recommended the development a set of ID guides for the Indian Ocean fisheries[1].

SCIENTIFIC SERVICES TO BE PROVIDED:

A set of cetacean guides will be designed that are consistent with and based on the format of the existing IOTC species identification guides (www.iotc.org/science/species-identification-cards). These will be of A6 size, in colour format and designed for printing on waterproof plastic card with a spiral binding. Appropriate software shall be used, such as Adobe InDesign, and the setup will be undertaken in a format that will facilitate future translation into multiple languages. An example of the expected content of the guide for each species is provided in Figure 1.

According to Jefferson et al. (1993, 2008) among ~55 species of marine mammals a total of 42 occur in the IOTC area of competence, however, some, such as sirene and pinnipeds, are coastal species that are likely to have very limited interactions with tuna fisheries. The guide should encompass all species that are potentially exposed to interaction with the principal fishing gears used in the Indian Ocean tuna fisheries (purse seines, longlines, gillnets, pole and line and troll fisheries) following the most up-to-date taxonomy (Jefferson et al., 2008; Committee on Taxonomy, 2014; Perrin, 2014). A literature review will be conducted to incorporate the most recent information on taxonomy and interactions with fishing gear in the Indian Ocean and will be used to update the list of species provided in Table 1 of the Annex.

The Pacific Community (SPC) has recently developed a set of identification guides for mammals and seabirds for use in the tuna fisheries of the western and central Pacific Ocean (SPC, 2016). The guides developed for the Indian Ocean will draw on these as far as possible with the notable addition of several species relevant for the Indian Ocean fisheries, including, but not limited to, the Irrawaddy dolphin (*Orcaella brevirostris*), the Indo-Pacific hump-backed dolphin (*Sousa chinensis*), the Finless porpoise (*Neophocaena phocaenoides*), the southern right whale (*Eubalaena australis*), Longman's beaked whale/tropical bottlenose whale/ Indo-Pacific beaked whale (*Indopacetus (Mesoplodon) pacificus*), True's beaked whale (*Mesoplodon mirus*) and the Ginkgo-toothed beaked whale (*Mesoplodon ginkgodens*). Features of the Arabian sea humpback whale *(Megaptera novaeanglia)* and the blue pygmy whale *(Balaenoptera musculus brevicauda)* sub-populations will also be included.

An initial plan will be developed which will outline the proposed:

1. species for inclusion
2. information to be provided for each
3. structure/organisation of the cards
4. example of the layout for one or two species

[1] IOTC-2015-SC18-R para. 102.

The plan will include a full set of references used and appropriate rationale for the species selected. This plan will be provided to the IOTC Secretariat to circulate to a panel of reviewers from the IOTC Working Party on Ecosystem and Bycatch for comment. Following this, the first draft set of ID cards will be developed. This will be subject to another round of review and feedback before the final version is produced.

QUALIFICATIONS AND PRE-REQUISITES

- Good knowledge of marine mammal taxonomy
- Knowledge of the types of interactions between tuna fisheries and marine mammals
- Experience with relevant publishing software (Adobe InDesign preferred)
- A degree in zoology/biology/fisheries or related field
- Knowledge of the Indian Ocean tuna fisheries

CONDITIONS AND PAYMENT

In total this service will require 10 days of work.

Honorarium is determined by FAO based on previous earnings and pre-approved consultant daily rates in Category B.

KEY PERFORMANCE INDICATORS	
Expected Outputs:	Required Completion Date:
Initial plan developed and circulated to reviewers	25 August 2017
Draft set of cetacean identification guides developed for the Indian Ocean	15 September 2017
Final set of cetacean guides produced in Adobe InDesign	29 September 2017

ANNEX

Table 1. Marine mammals of the Indian Ocean and their potential interactions with IOTC managed fisheries (list of species is based on Jefferson et al., 1993, 2008, Kiszka et al., 2009)

	FAO code	Species	Common name	Gear, interaction (**observed**, **observed mortality**, *potential)*	Conservation status[2] (IUCN score)[3]	References
		Balaenidae				
1.	EUA	*Eubalaena australis*	Southern right whale	*PS, LL, GILL*	LC	
		Balaenopteridae				
2.	BLW	*Balaenoptera musculus (brevicauda)*	Blue whale (including pygmy whale subpopulation)	**PS (disturbance)**, *LL, GILL*	EN	2,
3.	FIW	*Balaenoptera physalus*	Fin whale	**PS (disturbance)**, *LL, GILL*	EN	2,
4.	SIW	*Balaenoptera borealis*	Sei whale	**PS (disturbance, entanglement)**, *LL, GILL*	EN	2,
5.	BRW	*Balaenoptera edeni (brydei)*	Bryde's whale	**PS (disturbance)**, *LL, GILL*	DD	2,
6.	BFW	*Balaenoptera bonaerensis (acutorostrata)*	Antarctic minke whale	**PS (disturbance)**, *LL, GILL*	DD (LC)	2,
7.	HUW	*Megaptera novaeanglia*	Humpback whale (including Arabian sea humpback subpopulation)	*PS*, **LL (entanglement)**, **GILL (entanglement)**	LC (EN, Arabian Sea)	This note, 1,
		Physeteridae				
8.	SPW	*Physeter macrocephalus*	Sperm whale	*PS, LL*, **GILL (entanglement)**	VU	3,
		Kogidae				
9.	PYW	*Kogia breviceps*	Pygmy sperm whale	*PS, LL*, **GILL (entanglement)**	DD	1,
10.	DWW	*Kogia sima*	Dwarf sperm whale	*PS, LL*, **GILL (entanglement)**	DD	1,
		Ziphiidae				
11.	BCW	*Ziphius cavirostris*	Cuvier's beaked whale	*PS, LL, GILL (entanglement)*	LC	
12.	BBW	*Mesoplodon densirostris*	Blainville's beaked whale	*PS, LL, GILL (entanglement)*	DD	
13.	TGW	*Mesoplodon ginkgodens*	Ginkgo-toothed beaked whale	*PS, LL, GILL (entanglement)*	DD	
14.	BTW	Mesoplodon mirus	True's beaked whale	*PS, LL*, **GILL (entanglement)**	DD	1,
15.	BNW	? *Indopacetus (Mesoplodon) pacificus*	Longman's beaked whale	*PS, LL*, **GILL (entanglement)**	DD	1,
		Delphinidae				

[2] IUCN, 2014.

[3] EX –extinct, EW – extinct in the wild, CR – critically endangered, EN – endangered, VU – vulnerable, NT – near threatened, LC – least concern, DD – data deficient, NE – not evaluated (IUCN, 2012).

16.	IRD	*Orcaella brevirostris*	Irrawaddy dolphin	*LL, GILL (entanglement)*	VU	
17.	KIW	*Orcinus orca*	Killer whale	*LL (depredation), GILL (entanglement)*	DD	9,
18.	SHW	*Globicephala macrorhynchus*	Short-finned pilot whale	**LL (depredation)**, **GILL (entanglement)**	DD	1, 9,
19.	FAW	*Pseudorca crassidens*	False killer whale	**LL (depredation)**, **GILL (entanglement)**	DD	1, 7, 8
20.	KPW	*Feresa attenuata*	Pygmy killer whale	*LL (depredation),* **GILL (entanglement)**	DD	1, 7
21.	MEW	*Peponocephala electra*	Melon-headed whale	*LL (depredation),* **GILL (entanglement)**	LC	1, 7
22.	DHI	*Sousa chinensis*	Indo-Pacific hump-backed dolphin	*LL (depredation), GILL (entanglement)*	NT	7
23.	RTD	*Steno bredanensis*	Rough-toothed dolphin	PS (disturbance), *LL*, **GILL (entanglement)**	LC	1, 4, 7
24.	DRR	*Grampus griseus*	Risso's dolphin	**LL (depredation)**, *GILL (entanglement)*	LC	
25.	DBO	*Tursiops truncatus*	Bottlenose dolphin	PS (disturbance), **LL (depredation)**, **GILL (entanglement)**	LC	1, 4, 7, 10
26.	DBZ	*Tursiops aduncus*	Indo-Pacif. bottlenose dolphin	PS (disturbance), *LL, GILL*	DD	4, 7
27.	DPN	*Stenella attenuata*	Pantropical spotted dolphin	PS (disturbance), *LL*, **GILL (entanglement)**	LC	1, 4, 7
28.	DSI	*Stenella longirostris*	Spinner dolphin	PS (disturbance) , **LL (depredation), GILL (entanglement)**	DD	1, 4, 7, 10
29.	DST	*Stenella coeruleoalba*	Striped dolphin	PS (disturbance), *LL*, **GILL (entanglement)**	LC	1, 4, 7
30.	DCO/DCZ	*Delphinus delphis/capensis*	Common dolphin	*PS (disturbance), LL (depredation),* **GILL** *(depredation,* **(entanglement)***)*	LC/DD	1, 4, 7
31.	FRD	*Lagenodelphis hosei*	Fraser's dolphin	*PS, LL (depredation),* **GILL (entanglement)**	LC	1, 7
32.	PFI	*Neophocaena phocaenoides*	Finless porpoise	*PS, LL (depredation), GILL (entanglement)*	VU	7

References for Table 1

1. **Anderson RC, 2014.** Cetaceans and tuna fisheries in the Western and Central Indian Ocean. International Pole-and-line Foundation, London. 139 pages.
2. **Romanov EV, 2002.** Bycatch in the tuna purse-seine fisheries of the western Indian Ocean. Fishery Bulletin, 100:90-105.
3. **Fonteneau A, 2011.** Potential impact of Gillnets fisheries on Indian Ocean ecosystems? Slide presentation at IOTC Working Party on Ecosystems and Bycatch, Lankanfinolhu, North Malé Atoll, Republic of Maldives, 24-27 October 2011.

4. **Escalle L, Capietto A, Chavance P, Dubroca L, Delgado de Molina A, Murua H, Gaertner D, Romanov E, Spitz J, Kiszka J, Floch L, Damiano A, Merigot B, 2014 in press.** Marine mammals and tuna fishery in the Atlantic and Indian Oceans: interaction but few mortalities. Submitted: Marine Ecology Progress Series.
5. **IUCN, 2012.** IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.
6. **IUCN 2014.** The IUCN Red List of Threatened Species. Version 2014.2. <http://www.iucnredlist.org>. Downloaded on 24 September 2014.
7. **Kiszka J, Muir C, Poonian C, Cox TM, Amir OA, Bourjea J, Razafindrakoto Y, Wambitji N, Bristol N, 2009.** Marine mammal bycatch in the Southwest Indian Ocean: review and need for a comprehensive status assessment. Western Indian Ocean Journal of Marine Science, 7: 119-136.
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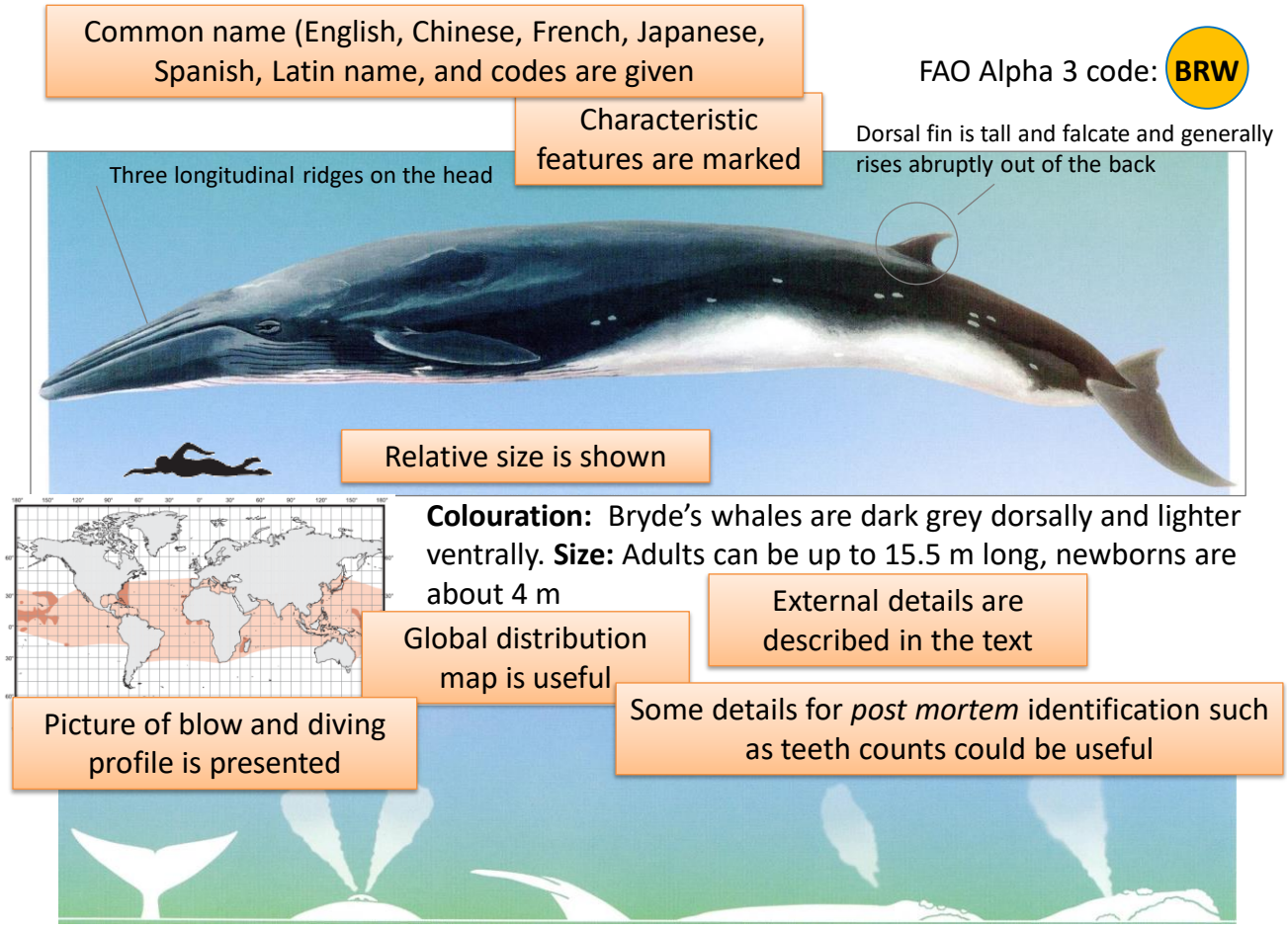

Figure. 1. An example of the type of information to be displayed on the cards.

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