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Activities of the South-western Indian Ocean Cetacean network for research and conservation (IndoCet)

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Activities of the South-western Indian Ocean Cetacean network for research and conservation (IndoCet)

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Background and general objectives.

The Indian Ocean Cetacean Network (IndoCet) Consortium is dedicated to the research and conservation of all cetacean species that occur in the south-western Indian Ocean (SWIO). The general aim of the network is to improve knowledge on and promote the conservation of cetaceans in the SWIO. Initiated in 2014 and officially launched in 2017, IndoCet works as a network of individual researchers and/or people actively involved in cetacean conservation in the SWIO. The network currently comprises 45 members, all of whom are actively involved in cetacean research in seven countries (Kenya, Tanzania, Mozambique, South Africa, Madagascar, Reunion/Mayotte, Mauritius) and 10 associate members who support regional research in other ways. The structure and operating rules of the Consortium are described in a Memorandum of Understanding which encourages members to share the same general goals and ambitions and to work together under a common understanding. The primary goals of the network are to:

1. Advance the understanding of the biology of cetaceans that occur in the SWIO, and more specifically to:
 - Foster research on the biology of cetaceans in the SWIO
 - Promote exchanges of expertise
 - Facilitate/encourage publication of peer-reviewed papers
 - Develop online platforms for reporting information/archiving/data exchange
2. Foster collaboration between research groups
 - Collate existing datasets and share metadata

- Facilitate sharing of data, experience and tools
 - Facilitate prioritization and development of future common research projects
3. Develop capacity in SWIO range states for cetacean research and conservation, through workshops, conferences, training internships, staff exchanges, etc...
 4. Promote conservation of cetaceans and mitigation of anthropogenic impacts in the SWIO
 5. Facilitate communication regarding research activities:
 - a. Within the consortium, among members
 - b. As a common voice on cetacean conservation, research, and management across the SWIO
 6. Promote the use of internationally recognized guidelines on research ethics and professional conduct in the SWIO.

Several regional activities and projects have been implemented since the creation of the network, some of which were described in SC69a/SAN/02 and are updated below.

1. Fostering collaboration through workshops and meetings.

The IndoCet Consortium has managed to meet in person six times during the eight years since 2014 (See Annexe 1). The reports of these meetings are available on the IndoCet [Website](#).

An online IndoCet meeting will be organized in 2024. Opportunities for a mixed (online/in person) IndoCet meeting will be explored for the next conference of the Society of Marine Mammalogy. A regional in-person meeting will be planned for the next WIOMSA Scientific Symposium in 2025.

2. Network communication.

IndoCet website

The [IndoCet website](#) is intended to be an interactive platform and a source of information for IndoCet members, and, more broadly, for the scientific community. IndoCet members have their own user account/login through which they can update their metadata, report strandings (see section below), up/download publications, etc. The ambition for the website is to provide a living and useful repository that allows centralization and visualization of the cetacean data available from the region and to foster collaboration. The site includes the following pages:

- [Publication depository](#)

The publication page of the website centralizes existing literature (published and unpublished) on cetaceans from the SWIO region and is regularly updated by the members. The aim is to increase accessibility of literature to all members and researchers from outside the region. To date, 132 publications have been up-loaded, most of them peer-reviewed, but also IWC papers and other reports. IndoCet members have direct access to papers when logged in to their account, whereas the public can only see the list of publications and the link to journals.

- [Metadata](#)

The IndoCet website centralizes information on existing datasets on a “metadata” page. Metadata are organized by data type, including telemetry, photo-identification, biopsy, and acoustic recordings.

- “Report a Stranding”

The IndoCet website includes a page dedicated to strandings, where IndoCet members can report stranding events. This aims to provide a platform to centralize stranding data from the region (see *Stranding network* below) and better facilitate reviews of regional strandings patterns and characteristics.

Communication tools

An IndoCet [Newsletter](#) is routinely produced enabling members to share information about current and future projects being developed in the region. Articles also inform the [News](#) section of the website. A WhatsApp group and mailing list are used to share instant news, while a Facebook page has been created for external communications. A dedicated WhatsApp group (with a wider membership) is used to provide guidance for strandings response and species identification and to share information quickly and effectively on regional stranding events.

3. Network activities and cooperative initiatives.

Stranding network

A multi-author partner publication (Plön *et al.*, 2023) compiled data on stranding events between 2000–2020 from the SWIO region. This work highlighted the utility of a platform that collates stranding data from the region and provided guidance for more systematic data collection and reporting.

From 2020 onwards, IndoCet members have been encouraged to report cetacean stranding events on the IndoCet website using the [“report a stranding” link](#). This provides a way to report and centralize information on stranding events, and fields include the stranding location, the species concerned, contact person and other relevant information. An interactive map allows visualization of the locations of regional strandings, with an option to filter the data by family. The map is currently created using Google Maps, which limits the number of layers to 10, so strandings are currently grouped by family and not by species. Currently the map does not update automatically and is updated once a year.

Guidance regarding species identification and stranding response has been provided via a stranding WhatsApp group. Existing protocols for responding to both dead and live animals are available, together with a hands-on manual that provides basic guidance and instructions for sampling. These are publications from different sources, and it has been proposed that a simplified standardized spreadsheet and protocol to collect samples (tissue, teeth, etc.) on stranded animals should also be made available.

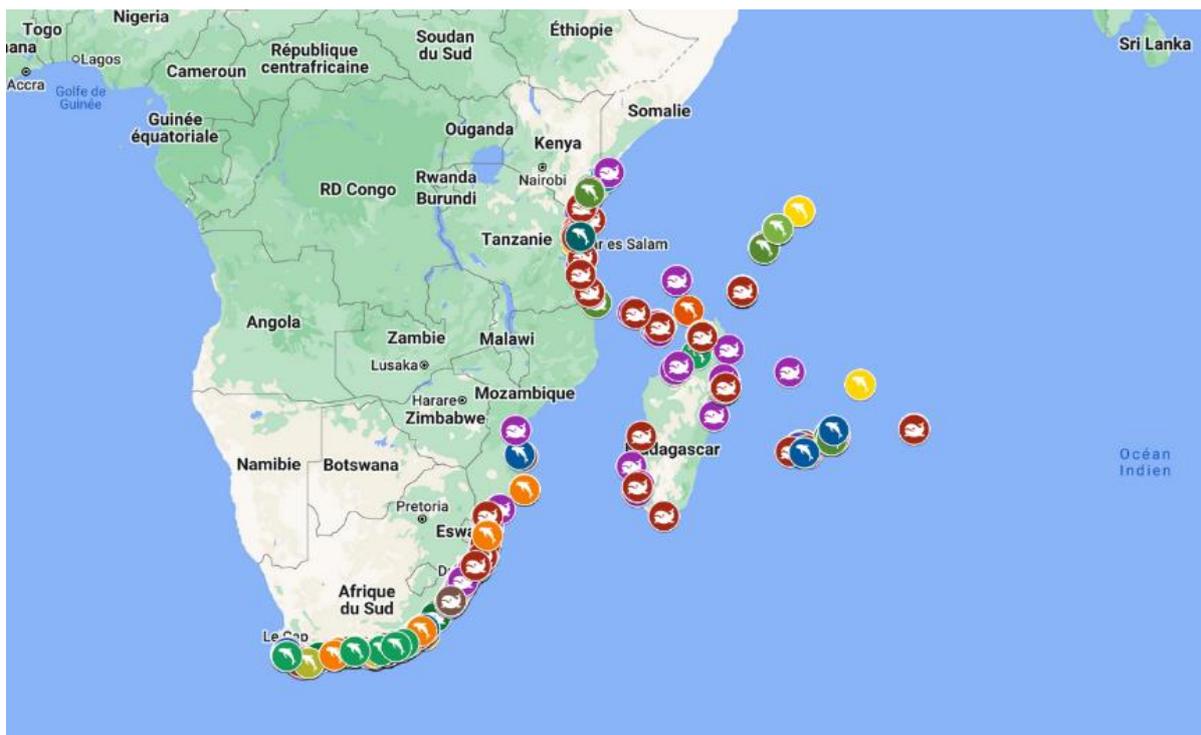


Figure 1: Interactive map showing stranding data collated in the SWIO between 2000-2020 (from Plön et al., 2023) available on the IndoCet website.

Whale disentanglement workshops

Disentanglement training workshops in partnership with the IWC were held in Reunion and Mayotte in June 2023. These were led by Globice, the Mayotte Marine Natural Park and Michael Meyer (IWC expert panel). Thirty people were trained in disentangling techniques during a theoretical and practical workshop. Another refresher workshop was held in Watamu in Kenya in March 2024, led by WMA/KMMREC with the support of IFAW, following an initial training after the 2019 IWC SC meeting. Michael Meyer is the designated point-of-contact within IndoCet who should be contacted when entanglements occur. A dedicated page will be set up on the IndoCet website to report entanglement events from the region.

NeMMO -Network of Marine Mammal Observers

The "Network of Marine Mammal Observers" (NeMMO) is an IndoCet initiative with the primary aim of enhancing the collection of marine mammal data during opportunistic vessel-based work in the oceanic waters of the south-western Indian Ocean. The goal of NeMMO is to significantly increase the quality, quantity, and availability of useful and standardized data on cetaceans in the oceanic waters of the region through a network of MMO's working onboard platforms of opportunity. The specific objectives are to:

- Identify suitable vessels and partnerships that maximize the geographic coverage and frequency of cetacean observations from platforms of opportunity in the SWIO,
- Develop a network of experienced, regional MMOs that can embark on identified platforms to collect systematic data on cetaceans, provide training opportunities, and foster collaboration among researchers and organizations,

- Centralize data on cetacean distribution into a regional database, to ensure such data are standardized, referenced, safely stored, and readily available for research and conservation initiatives.

Several researchers and institutions from the region have developed partnerships with platforms of opportunity. Data are centralized into a GIS database curated by Globice and currently includes 1,139 cetacean sightings (Fig. 1) of 24 different species recorded from the following surveys (Annex 2):

- RESILIENCE ¹ (fRonts, EddieS and marIne LIfe in the wEstern iNdiAN oCEan) oceanographic survey (South Africa–Reunion), aboard the French Government’s research vessel *Marion Dufresne II*, with MMOs from Nelson Mandela University and Globice (April–May 2022);
- Monaco IO Exploration (Seychelles–Saya de Malha–Mauritius), aboard the South African Government’s oceanographic research vessel *SA Agulhas II*, with one MMO from Globice (Nov. 2022);
- 10 surveys aboard the French patrol vessel *Osiris II* (Eparses Islands, Mauritius, Seychelles, Tanzania, Comoros, Madagascar, St Paul & Amsterdam), with MMOs from the Marine Megafauna Conservation Organization (MMCO, Mauritius), Watamu Marine Association (Kenya), Cetamada (Madagascar), CetaMaore (Mayotte), and Globice (Reunion), in 2021–2024.
- MayObs (Sept 2023), aboard the *Marion Dufresne II*, led by BRGM (Bureau de Recherches Géologiques et Minières) in partnership with Globice.

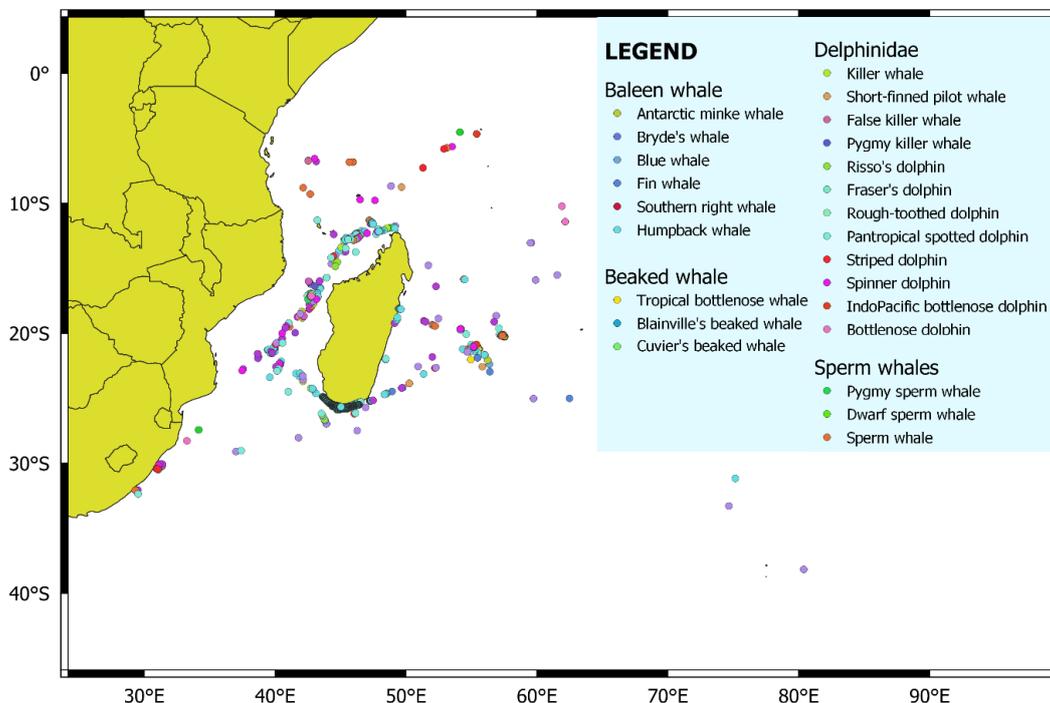


Figure 2: Map showing cetacean sightings collected by Marine Mammal Observers on-board platforms of opportunity in 2021-2023 and centralized into the IndoCet GIS database (RESILIENCE survey, OSIRIS surveys, Monaco Expedition WIO).

¹ <https://indocet.org/en/resilience/>

The data are archived on the [Sextant/SIMM-OI portal](#) (Système d'Information Milieu Marin Océans Indien et Austral), implemented by Ifremer for visualization on the IndoCet website.

Humpback whale photo-identification data in HappyWhale

Several IndoCet members have been working closely with HappyWhale² to upload and match regional SWIO humpback whale photo-identification data on the HappyWhale platform (Cheeseman *et al.*, 2022). These researchers have worked together to develop a common strategy (in the form of a concept note) for the analysis of humpback whale photo-identification data and gain a better understanding of the interchange among sub-stocks of Breeding stock (BS) C and linkages to adjacent IWC breeding regions. Other researchers and organizations working on Indian Ocean and African sub-stocks have been invited to contribute to this initiative by uploading humpback whale fluke images to the HappyWhale platform, while HappyWhale is also gathering images from citizen science. The goal is to increase data availability for IWC BS-B and BS-C, with the aim of conducting a regional assessment of connectivity within and between BS-B and BS-C. As several recaptures have been identified between BS-C and BS-A or BS-D, collaborations with researchers across the broader region are planned. Ultimately, the aim is to use these data to produce estimates of population abundance and exchange rates, which will be relevant to the next IWC Southern hemisphere humpback whale in-depth assessment.

The number of identification photographs from the region uploaded to HappyWhale has substantially increased over the last six years, and consequently the number of confirmed matches has also increased. In 2018 there were 89 encounters, representing 73 individuals from BS-B and BS-C uploaded to HappyWhale. Currently (March 2024) the number of encounters has increased to 14,017, representing 8,172 individuals (Figure 1). BS-C data includes a total of 4,503 individuals (6,669 encounters), with contributions from Kwa-Zulu Natal (South Africa), Mozambique, Tanzania, Comoros/Mayotte, Madagascar, and Reunion. The contribution from Reunion includes 2,359 individuals, representing the entire Globice dataset (2001–2023). The dataset from Madagascar currently only includes the Wildlife Conservation Society's (WCS) data from 1996, but their historical data is currently being uploaded (Table 1). Some data from Cetamada have also been uploaded but metadata are missing. BS-B data includes a total of 3,669 individuals (7,348 encounters), with contributions from western South Africa (taking KwaZulu Natal as the boundary between BS-B and BS-C in South Africa), Namibia, Angola, and Gabon (Annex 3).

A total of 57 matches were found among sub-stocks of BS-C and are reported in Table 1 and Figure 3.

Matches between BS-C and other breeding stocks were also reported as follow (Figure 4):

- Matches between BS-C and BS-B, which include:
 - between Gabon (WCS) and Reunion (Globice), Madagascar (WCS), eastern South Africa (Advantage Tours St. Lucia).

² <https://happywhale.com/home>

- between Reunion (Globice) and western South Africa (Dani Abras/“Captain Jacks”; Mdu Seakamela - Department of Forestry Fisheries and the Environment (DFFE); Simon Elwen - Sea Search; David Hurwitz - Simon’s Town Boat Company; Elisa Seyboth - Cape Peninsula University of Technology; Pamela Le Noury).
- Matches between BS-C and BS-D or BS-E, which include:
 - Reunion (Globice) and both western and eastern Australia
 - Kenya (WCS) and eastern Australia
- Matches between BS-C and BS-A, which include:
 - Eastern South Africa (A. Vogel) and Brazil (Instituto Baleia Jubarte, Adriano Adamson Paiva, Ecosul Turismo, Baleia à Vista Ecoturismo)
 - Madagascar (WCS) and Brazil

For a broader review of the status of data collections in Happywhale, see SC/69B/PH/04

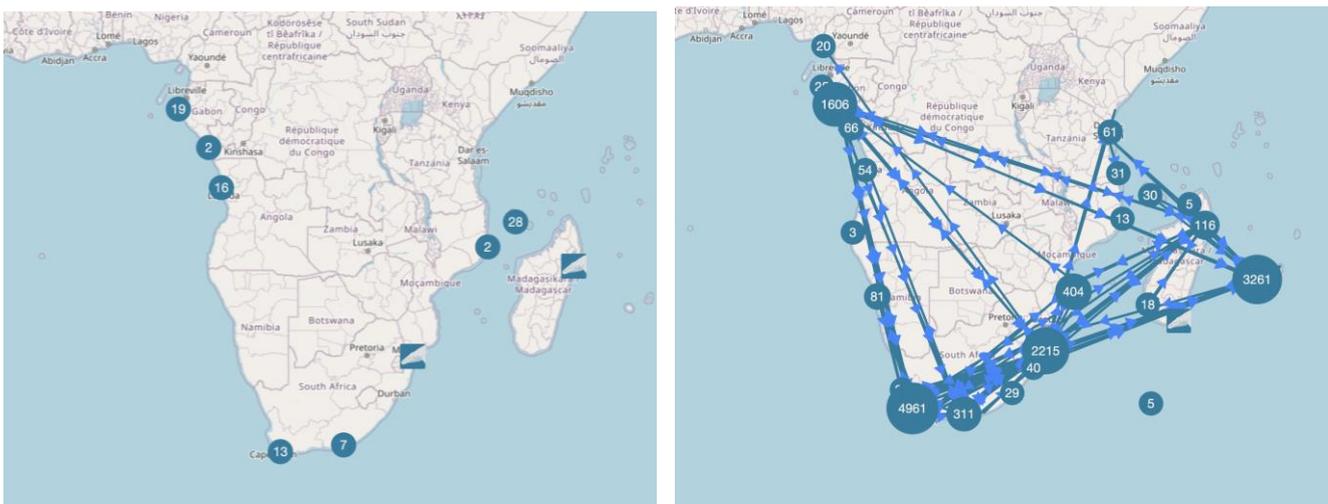


Figure 3: Maps representing the total number of humpback whale images uploaded to HappyWhale from BS-B and BS-C in March 2018 (on the left) and March 2024 (on the right).

Table 1. Summary of the number of matches between sub-stocks of Breeding Stock C

		C1				C2	C3	C4
		KZN	Moz.	Tanzania	Kenya	Mayotte Comoros	Madagascar	Reunion
C1	South Africa (Kwa-Zulu Natal)	-	9	1	0	0	8	6
	Mozambique	9	-	0	1	0	4	1
	Tanzania	1		-			1	1
	Kenya	0	1	0	-	0	0	0
C2	Mayotte/Comoros	0	0	0	0	-	2	1
C3	Madagascar	8	4	0	0	2	-	23
C4	Reunion	6	1		1	1	23	-

4. Regional research programs

Several collaborative initiatives have been established in the SWIO region. These regional research programs are not led by IndoCet but are based on partnerships and contributions among several IndoCet members and their institutions. These include:

1. COMBAVA (COoperation régionale pour l'étude des Mouvements des Baleines à bosse et VALorsation des résultats): led by GLOBICE in collaboration with Salvatore Cerchio of the African Aquatic Conservation Fund (AACF), with the contribution of several partners from the region: Cetamada, Institut Haliéuthique et des Sciences Marines (IHSM), Watamu Marine Association, Zavora Marine Lab, Shanan Atkins, Gill Braulik, Parc Naturel Marin de Mayotte, Marine Discovery Center, WCS). The project aims to assess temporal distribution and humpback whale song structure and provide insights into population structure and connectivity in the region. Autonomous recorders were deployed at several breeding sites, including Réunion Island, Madagascar, Tanzania, Kenya, Mozambique, South Africa, Mayotte, Mauritius, and Western Australia during the austral winters 2016–2022.
2. QWIO (Quieter Western Indian Ocean): led by WCS and funded principally by FFEM (Fond Français pour l'Environnement Mondial) as well as matching contributions from several project partners. The project aims to carry out a scientific assessment of threats associated with shipping in the Western Indian Ocean, including underwater radiated noise and ship strikes and to assess their effects on a suite of focal species, including large whales (baleen whales and sperm whales), whale sharks, and sea turtles.
3. Indian Ocean Humpback Dolphin Conservation Network (HuDoNet): a dedicated consortium for the protection of the Indian Ocean humpback dolphin (*Sousa plumbea*) has been created by several researchers and institutions from the western Indian Ocean (see IWC paper SC/69B/SM/05). The primary goal of the consortium is to coordinate

and galvanize action to improve the conservation of the species throughout its range, and thus this effort extends beyond the boundaries of IndoCet.

4. Humpback whale tagging: Satellite-tagging datasets from the SWIO have been collated in 2014 during a regional tagging workshop and an [animation](#) of their combined movements is currently available on the IndoCet website (Fossette *et al.*, 2014; Cerchio *et al.*, 2016; Dulau *et al.*, 2017). New tracking data have since been collected in the SWIO; in Reunion in 2019–2022 by Globice and in Tanzania in 2023 by WCS. The goal is to create an interactive map where users can select particular tracks in order to see additional information about the owners of the dataset and other metadata. This would allow existing and new satellite tracking data from the region to be visualized on a single platform.

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ANNEXE 1.

List of Indocet Meetings since 2015. These meetings were funded as part of regional programs, including MIROMEN, Et.Cet.R.A³., COMBAVA⁴ (led by Globice and funded by European funding), the Quieter Western Indian Ocean Project⁵ (QWIO, led by the Wildlife Conservation Society and funded by FFEM), MiMUNOPS (Mise en valeur et MUtualisation des connaissances de la biodiversité marine et terrestre Indian Océanique, Patrimoine à Sauvegarder), led by the University of Reunion (EU funding), and in conjunction with Scientific conferences, such as the Humpback Whale World Conference, conferences of the Society for Marine Mammalogy (SMM), the Island Biology Conference and the WIOMSA (Western Indian Ocean Marine Science Association) Scientific Symposium.

Meeting	Date	Location	Associated meeting
In-person Founding meeting	2014	Reunion	Miromen Tagging workshop
In-person Steering group	2015	Sainte Marie, Madagascar	Humpback Whale World Conference (HWWC)
In-person Inception meeting	2017	Reunion	HWWC
In-person	2019	Reunion	Island Biology Conference
In-person	2019	Barcelona, Spain	SMM
In-person/online	2022	Gqeberha/Port Elizabeth	WIOMSA

³ <https://www.globice.org/campagne/programme-et-cet-r-a/>

⁴ <https://www.globice.org/campagne/programme-combava/>

⁵ <https://programs.wcs.org/qwio/About>

ANNEXE 2.

Details of surveys conducted by Marine Mammal Observers onboard platforms of opportunity in the south-western Indian Ocean and included in NeMMO

Survey	Vessel	Date	Leading organisation	MMO	Duration (days)	N Cetacean sightings	N Cetacean species
NeMMO_OSIRIS_1	OSIRIS II	Jul/Aug 2021	GLOBICE	Globice, University Reunion	31	117	8
NeMMO_OSIRIS_2	OSIRIS II	Sep/Oct 2021	GLOBICE	Globice, MMCO	21	55	5
NeMMO_OSIRIS_3	OSIRIS II	Jan 2022	GLOBICE	Globice	14	4	3
NeMMO_OSIRIS_4	OSIRIS II	May/Jun 2022	GLOBICE	Globice, WMA-KMMREC	19	8	5
NeMMO_OSIRIS_5	OSIRIS II	Jul/Aug 2022	GLOBICE	Globice	39	91	11
NeMMO_OSIRIS_6	OSIRIS II	Oct 2022	GLOBICE	Globice	28	199	11
NeMMO_OSIRIS_7	OSIRIS II	Jan 2023	GLOBICE	Globice, MMCO	25	29	6
NeMMO_OSIRIS_8	OSIRIS II	Mar/Apr 2023	GLOBICE	Globice, Cetamada, CetaMaore	34	36	8
NeMMO_OSIRIS_9	OSIRIS II	Jul/Aug 2023	GLOBICE	Globice, GAF	34	517	14
NeMMO_OSIRIS_10	OSIRIS II	Jan 2024	GLOBICE	Globice	22	24	8
NeMMO_RESILIENCE	MARION DUFRESNE II	Apr/May 2022	NELSON MANDELA UNIVERSITY (NMU)	NMU, Globice	34	36	8
NeMMO_MONACO_EXPLORATIONS	S A AGHULAS II	Nov 2022	EXPEDITIONS DE MONACO	Globice	21	3	1
NeMMO_PONANT	JACQUES CARTIER	Feb/Mar 2023	GLOBICE	Globice	6	9	5
NeMMO_MAYOBS	MARION DUFRESNE	Sep 2023	GLOBICE	Globice, University of Reunion	14	20	5

ANNEXE 3. Summary of the data available from IWC breeding stocks B and C in HappyWhale in March 2024. WW; Whale watching company, AI; academic institute, Pr.: private Individual, NGO; Non-governmental organization, Gov; government research department

Breeding Stock	Country	Contributor	Number of encounters	Number of ind.	Comments
B	Congo	1. Fabio (Pr.) 2. Marijke Nita de Boer (Pr.)	43	27	
B	Gabon	1. WCS (NGO) 2. Moidjio CRCAD (NGO)	1631	984	
B	Angola	1. MRI Whale Unit (AI) 2. Sergio Cipolotti (Pr) 3. Mark Cornish (Pr)	95	78	
B	Namibia	1. The Namibian Dolphin Project (NGO) 2. Laramon Tours (WW) 3. SeaSearch (NGO)	85	67	
B/C	South-Africa	1. A.Vogel (Pr) 2. MRI Whale Unit (AI) 3. DFFE (Gov) 4. SeaSearch (NGO) 5. other contributors	7452	4051	This includes: 1515 ind. (1908 enc.) from A. Vogel; 223 ind. (329 enc.) from MRI WU
C1	Mozambique	1. Centre for Dolphin Studies (NGO) 2. DFFE (Gov) 3. Cape Peninsula University of Technology (CPUT, AI) 4. All Out Africa (WW) 5. other contributors	681	438	
C1	Tanzania	1. Nyangumi Zanzibar (Katya Kalashnikova) 2. Gill Braulik	182	110	
C1	Kenya	WCS/WMA (NGO)	10	9	
C2	Mayotte/Comoros	1. Ceta'Maore (NGO) 2. Moidjio CRCAD (NGO)	30	22	
C3	Madagascar	1. WCS (NGO)	254	166	1996, upload of historical data in process + Cetamada's data with missing metadata
C4	Reunion	GLOBICE (NGO)	3,036	2,359	2001-2023 (2023 still in process)

