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Seafari A global and free app to report marine mammal sightings and access citizen science data

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INTERNATIONAL
WHALING COMMISSION

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A global and free app to report marine mammal sightings and access citizen science data

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Introduction

Built by Dreamweave Digital in 2017, Seafari is a privately funded and free software application (app) which allows individual users to report marine animal sightings from anywhere in the world, log their search effort and view sightings recorded by other users via a simple and user friendly menu system. Seafari's main aim is to be a "whale-watching" app, where users can obtain real time information on "who has been seeing what, where and when", while ensuring sightings and search effort becoming part of the "scientific record". All data collected become rapidly available for free download from the Seafari website (all personal information from users is removed before being made available on the website) or sent upon request, and can be used as "citizen science" data in any research project. Additionally, maps showing the sightings logged in the app are posted on the website and on social media on a monthly to bi-monthly basis. The general philosophy is that all data gathered is shared equally by all users, and that they may be used in any research project, with no rights of data ownership to any specific person or research group.

Currently, there are 34 marine mammal species listed in the app (see Table 1). While seeming to be somewhat Southern Africa centric at the moment (due to its origin in South Africa), the use of the app in other places in the world is possible and highly recommended. The addition of new species is still in progress with the ultimate goal of having all marine mammal species represented in the app, with full background information and availability from a simple scroll down menu.

Although "rare" and "unusual" sightings always raise the most interest, the report of "common" animals is strongly encouraged (e.g. over social media) as to ensure that the data generated is as balanced as possible, and can function as a useful whale-watching aid as well as a reliable source of citizen science data for scientific research.

Table 1. Marine mammal species currently included in the Seafari App, with full information on their physical description, distribution, habits and IUCN red list status.

Cetacea	Toothed whales	Common bottlenose dolphin	*Tursiops truncatus*
		Indo-pacific bottlenose dolphin	*Tursiops aduncus*
		Indian Ocean humpback dolphin	*Sousa plumbea*
		Common dolphin	*Delphinus delphis*
		Dusky dolphin	*Lagenorhynchus obscurus*
		Heaviside's dolphin	*Cephalorhynchus heavisidii*
		Spinner dolphin	*Stenella longirostris*
		Pantropical spotted dolphin	*Stenella attenuata*
		Killer whale	*Orcinus orca*
		Risso's dolphin	*Grampus griseus*
		Sperm whale	*Physeter macrocephalus*

		Rough-toothed dolphin	*Steno bredanensis*
		Harbour porpoise	*Phocoena phocoena*
		Short-finned pilot whale	*Globicephala macrorhynchus*
		Long-finned pilot whale	*Globicephala melas*
		Southern right whale dolphin	*Lissodelphis peronii*
		Striped dolphin	*Stenella coeruleoalba*
		Atlantic humpback dolphin	*Sousa teuszii*
		Fraser's dolphin	*Lagenodelphis hosei*
		False killer whale	*Pseudorca crassidens*
		Cuvier's beaked whale	*Ziphius cavirostris*
		Amazon river dolphin	*Inia geoffrensis*
		Tucuxi	*Sotalia fluviatilis*
	Baleen whales	Minke whale	*Balaenoptera acutorostrata*
		Fin whale	*Balaenoptera physalus*
		Sei whale	*Balaenoptera borealis*
		Blue whale	*Balaenoptera musculus*
		Southern right whale	*Eubalaena australis*
		Humpback whale	*Megaptera novaeangliae*
		Bryde's whale	*Balaenoptera brydei*
		Sperm whale	*Physeter macrocephalus*
		Gray whale	*Eschrichtius robustus*
Sirenia		Dugong	*Dugong dugon*
		African manatee	*Trichechus senegalensis*

How it works

The Seafari app is freely downloadable for both iOS and Android devices. Alternatively (and in order to access the excel spreadsheet of all reported sightings), an account can be freely created directly through the website www.seafariapp.org. Besides English, the app is currently available in Portuguese and Swahili to aid the local communities of Mozambique, Tanzania and Kenya (due to its initial aim to aid in Dugong Conservation). More languages could be added if so required.

In order to proceed with its use, an account needs to be made. Once logged into your personal account, several menu options become available (Figure 1):

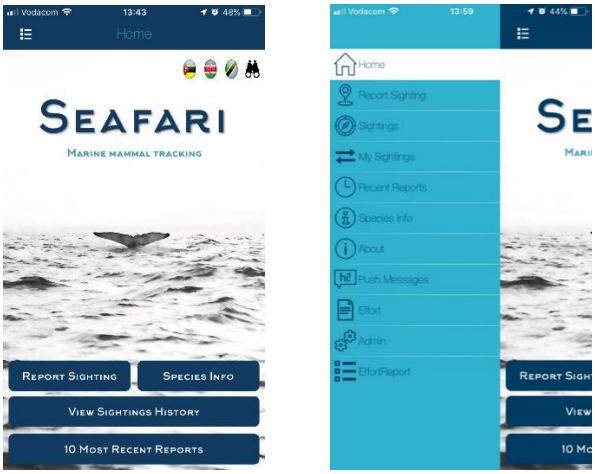


Figure 1. Home screen of the Seafari application once logged into the account (left) and menu options (right)

1. Report your sighting: Through this menu option, a marine animal sighting can be reported using drop down menus which include species sighted, level of certainty, date and time, group size, presence of juveniles and/or calves, behaviour observed, sighted from land or boat, and any other additional information. An interactive map is available to indicate the precise location of the sighting (if connected to the internet, the map will automatically indicate where you are standing), and photographs can easily be uploaded to confirm the sighting.

   As the initiation of this project was South African based, the species listed in the drop down menu, with the exception of the critically endangered dugong, represented the species most likely to be encountered when out and about along the Southern African coast. However, the use of the app is not limited to any geographical location. Although more species are included continuously, species not listed in the drop-down menu can be reported as “other”, specifying the species name manually.

2. Record your search effort (binocular icon on top right corner; Figure 1): This menu option allows you to log your search effort if you wish to do so. You will be required to fill in your location, date, start and end time, sea state (calm, some white caps, lots of white caps) and cloud cover (0-8).

3. Species info: The app currently contains information of 36 marine species, of which 32 cetacean species, 2 sirenia, one shark species and the African penguin (see Figure 2 as example). The information on each species includes physical descriptions, distribution, habits, "where to view" and the IUCN red list status.

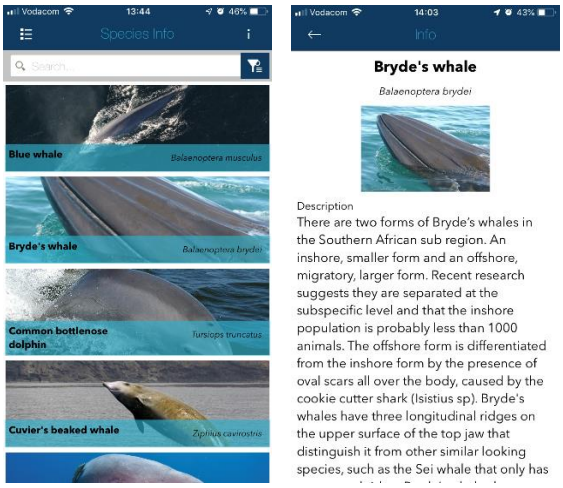


Figure 2. Screenshot of the Species Info menu option (left) and, as an example, the given information on Bryde’s whales (right)

4. View sighting history: Through this menu option, all past sightings which have been reported through the app (whether reported by you or another user) are displayed from new to old. Each sighting report

can be clicked to view the details of the report. After receiving log-in details from the admin, these data are also downloadable in an excel spreadsheet.

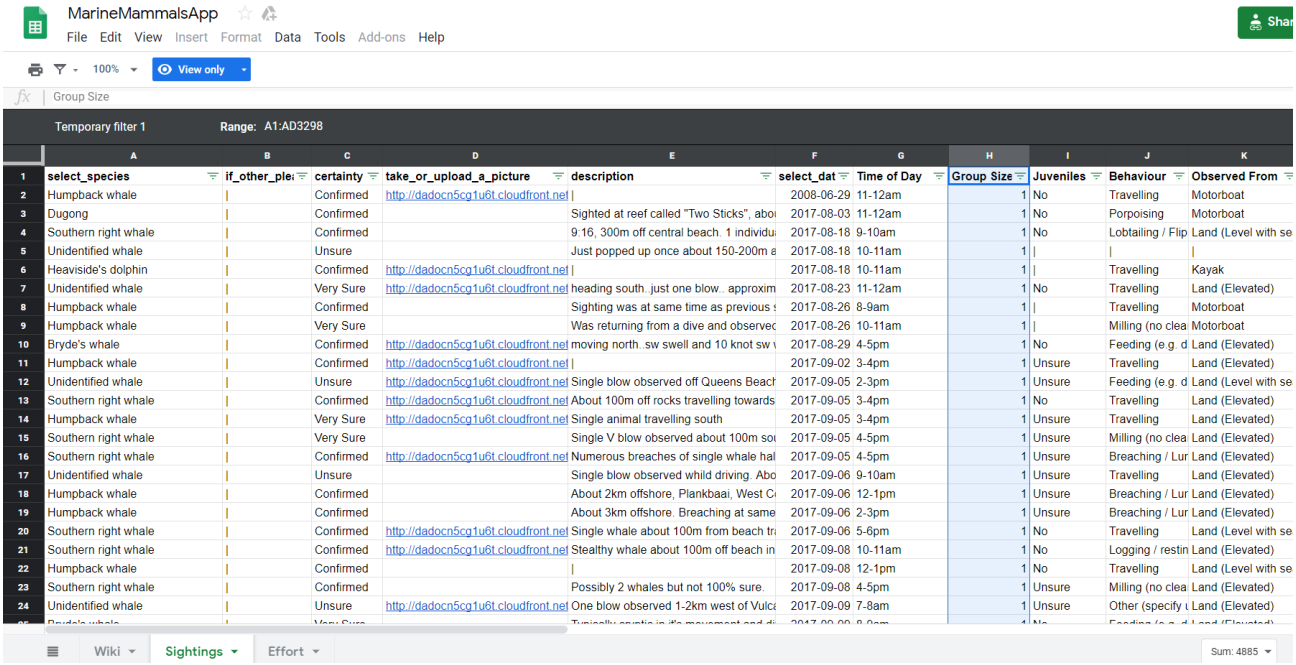
5. 10 most recent reports: This menu option shows only the 10 latest sightings regardless of the date the report was made (see Figure 3)

Figure 3. Screenshot of the Recent Reports menu option. Each report can be accessed, by simply selecting it, for more information

6. My Sightings: Through this menu option, all your sightings can be viewed in detail.

7. Sighting Maps: This menu option allows you to access an overview map of locations of reported sightings by clicking on the icon at the bottom left corner of the screen in Figure 3.

8. Excel sheet (only available once logged into the website): An excel database is available for download with all sightings and search effort recorded in the app (see Figure 4 as an example).



	A	B	C	D	E	F	G	H	I	J	K
1	select_species	if_other_ple	certainty	take_or_upload_a_picture	description	select_dat	Time of Day	Group Size	Juveniles	Behaviour	Observed From
2	Humpback whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net		2008-06-29	11-12am	1	No	Travelling	Motorboat
3	Dugong		Confirmed		Sighted at reef called "Two Sticks", abo	2017-08-03	11-12am	1	No	Porpoising	Motorboat
4	Southern right whale		Confirmed		9:16, 300m off central beach. 1 individu	2017-08-18	9-10am	1	No	Lobtailing / Flip	Land (Level with se
5	Unidentified whale		Unsure		Just popped up once about 150-200m a	2017-08-18	10-11am	1			
6	Heaviside's dolphin		Confirmed	http://dadocn5cg1u6t.cloudfront.net		2017-08-18	10-11am	1		Travelling	Kayak
7	Unidentified whale		Very Sure	http://dadocn5cg1u6t.cloudfront.net	heading south. just one blow.. approxim	2017-08-23	11-12am	1	No	Travelling	Land (Elevated)
8	Humpback whale		Confirmed		Sighting was at same time as previous s	2017-08-26	8-9am	1		Travelling	Motorboat
9	Humpback whale		Very Sure		Was returning from a dive and observed	2017-08-26	10-11am	1		Milling (no clea	Motorboat
10	Bryde's whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net	moving north..sw swell and 10 knot sw v	2017-08-29	4-5pm	1	No	Feeding (e.g. d	Land (Elevated)
11	Humpback whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net		2017-09-02	3-4pm	1	Unsure	Travelling	Land (Elevated)
12	Unidentified whale		Unsure	http://dadocn5cg1u6t.cloudfront.net	Single blow observed off Queens Beach	2017-09-05	2-3pm	1	Unsure	Feeding (e.g. d	Land (Level with se
13	Southern right whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net	About 100m off rocks travelling towards	2017-09-05	3-4pm	1	No	Travelling	Land (Elevated)
14	Humpback whale		Very Sure	http://dadocn5cg1u6t.cloudfront.net	Single animal travelling south	2017-09-05	3-4pm	1	Unsure	Travelling	Land (Elevated)
15	Southern right whale		Very Sure		Single V blow observed about 100m sou	2017-09-05	4-5pm	1	Unsure	Milling (no clea	Land (Elevated)
16	Southern right whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net	Numerous breaches of single whale hal	2017-09-05	4-5pm	1	Unsure	Breaching / Lur	Land (Elevated)
17	Unidentified whale		Unsure		Single blow observed whild driving. Abo	2017-09-06	9-10am	1	Unsure	Travelling	Land (Elevated)
18	Humpback whale		Confirmed		About 2km offshore, Plankbaai, West C	2017-09-06	12-1pm	1	Unsure	Breaching / Lur	Land (Elevated)
19	Humpback whale		Confirmed		About 3km offshore. Breaching at same	2017-09-06	2-3pm	1	Unsure	Breaching / Lur	Land (Elevated)
20	Southern right whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net	Single whale about 100m from beach tri	2017-09-06	5-6pm	1	No	Travelling	Land (Level with se
21	Southern right whale		Confirmed	http://dadocn5cg1u6t.cloudfront.net	Stealthy whale about 100m off beach in	2017-09-08	10-11am	1	No	Logging / restin	Land (Elevated)
22	Humpback whale		Confirmed			2017-09-08	12-1pm	1	No	Travelling	Land (Level with se
23	Southern right whale		Confirmed		Possibly 2 whales but not 100% sure.	2017-09-08	4-5pm	1	Unsure	Milling (no clea	Land (Elevated)
24	Unidentified whale		Unsure	http://dadocn5cg1u6t.cloudfront.net	One blow observed 1-2km west of Vulca	2017-09-09	7-8am	1	Unsure	Other (specify	Land (Elevated)

Figure 4. Screenshot of the available excel spreadsheet with all the sighting reports and effort data

Additionally to these menu options, the app is currently being adjusted to include the possibility to report strandings of marine animals, whether dead or alive. Within South Africa, the option will be available to be put

directly in contact with the correct stranding coordinator and response team in the area. Once this is ready, similar options for elsewhere in the world could be included at a relatively low cost.

All reported sightings are immediately checked by the app's admin for accuracy of the report. If so desired, the settings of the app can enable direct push messages on your phone if a new sighting is reported. Regardless, all reports are directly shared on social media via Seafari's Facebook page https://web.facebook.com/SeafariApp/

Data

Between its launch in March 2017 and March 2019, the Seafari app has been downloaded 1,200 times, with an average of 4 downloads per day. So far, Seafari has received over 2,200 sighting reports, at an average of 92 sightings per month, from 19 different countries including USA, Ireland, UK, Italy, Spain (La Gomera), Panama, Mexico, Brazil, St Helena, Kenya, Mozambique, Tanzania, Madagascar, France (Reunion Island), Namibia, South Africa, United Emirates, Australia and Solomon Islands (Figure 5).

Figure 5. Map providing a general overview of the location of marine mammal sightings reported to the Seafari app since its launch in March 2017. (When zooming into the map, more detailed information becomes available per country).

As the app finds its origin in South Africa and its use is most promoted in this country, so far most reports relate to southern right and humpback whales, followed by Heaviside's dolphins, Bryde's whales, Indo-pacific bottlenose dolphins and Indian Ocean humpback dolphins (Figure 6). However, the app is gaining popularity in other places in the world, leading to an increased diversity of species being reported.

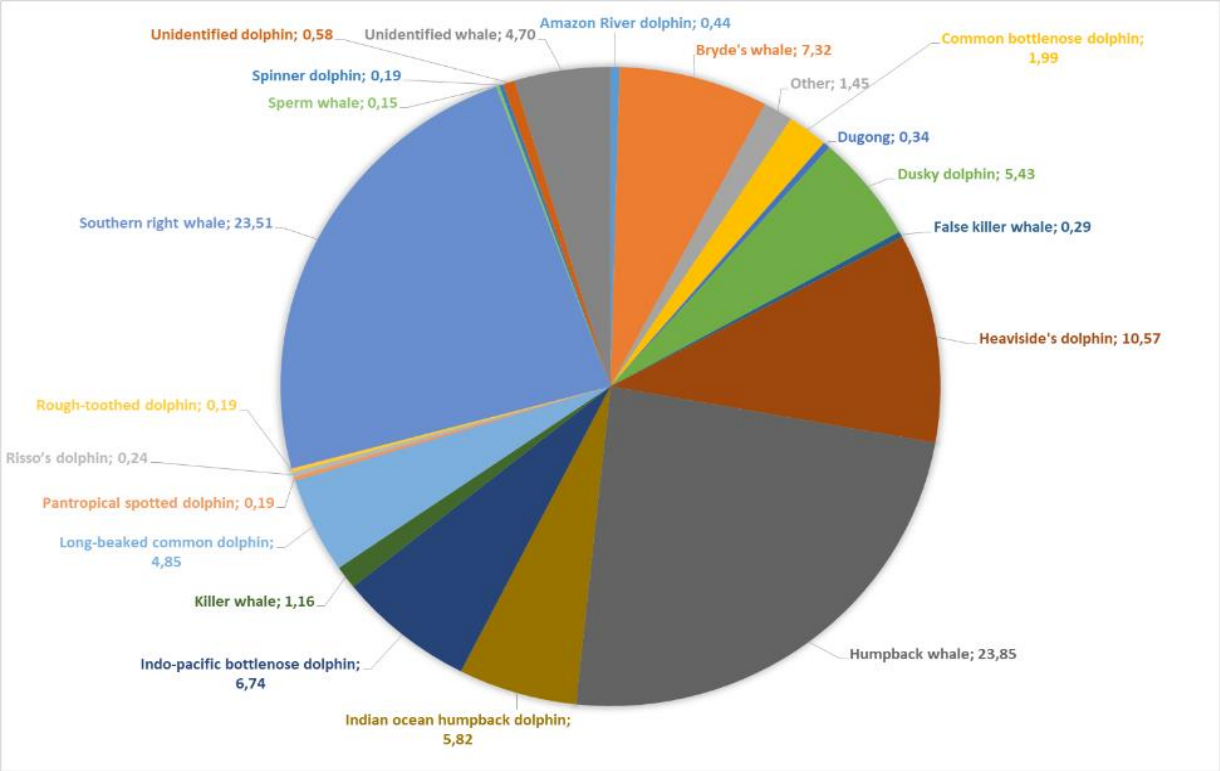


Figure 6. Percentage of sightings reported per marine mammal species

All these data are recorded into a spreadsheet, which is freely downloadable from the Seafari website (see figure 4 for a screenshot as example), to be used in any research project that may require citizen science data (e.g. Lotriet 2018). These data include species, level of certainty, data and time, location, an estimate of group size, behaviour (if known) and from where the species was observed (from land or from a boat). Additionally, search effort data can be accessed to enhance the information on "presence vs absence" of certain species in specific areas.

Conclusion

Seafari is a free and user friendly application to report marine mammal sightings, search effort and strandings (soon to come) from anywhere in the world. Its uniqueness is found in the open and easy access to the collected data, making the app not only useful as a whale-watching app for local users to find out "what has been seen, where and when" or to keep record of their own sightings, but also as a valuable collector of citizen science data for relevant research projects. Its global use is strongly encouraged, with the aim to generate extensive data on the spatial and temporal distribution of marine mammal species. With this application, the creators anticipate that the widespread use of mobile technology can aid significantly in the data collection of marine mammals, especially of elusive species and in remote locations (e.g. offshore, remote islands, etc.).

References

Lotriet, T. (2018) Mapping cetacean distribution using citizen science in the Western Cape, South Africa. Thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in Zoology. Mammal Research Institute, University of Pretoria. 149 pp.