
**SRI LANKA
MARINE MAMMAL
RESEARCH AND CONSERVATION
1560-2019**

VOLUME I

Technical Report

Illustrated by maps, graphs, drawings and photographs.

By

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Preface

With the arrival of *SRV Tulip*¹ into Sri Lanka's waters in 1981, the country soon became aware of the many marine mammal species in its waters, and the need for better understanding, as well as their protection and conservation. Dr. Hiran W. Jayewardene, the founder and chairman of National Aquatic Resources Research and Development Agency (NARA), established the National Marine Mammal Programme (NMMP) and the Centre for Research on Indian Ocean Marine Mammals (CRIOMM), having convened the first International Symposium on the Marine Mammals of the Indian Ocean in February 1983. The United Nations Environment Programme (UNEP) provided initial support for the programme in respect of research and capacity-building. This was later followed by a detailed technical report on marine mammal conservation in Sri Lanka including the NMMP programme (Leatherwood & Reeves, 1989; 1991).

CRIOMM was set up in 1983 with a field station at Clappenburg Bay in Trincomalee. Here, young researchers were trained by two internationally acclaimed cetalogists, Dr. Roger Payne and Dr. Stephen Leatherwood. It is a semi-governmental agency focused on marine-mammal-research-related activities in the Indian Ocean. Given CRIOMM's regional mandate and the migratory character of marine mammals, the initial focus is on waters adjacent to Sri Lanka, gradually widening to include compilations of records from around the region.

Sri Lanka was first represented at the 36th annual meeting of the IWC in June 1984. Dr. Hiran Jayewardene and Cedric Martenstyn/NARA were government observers at the meeting (IWC, 1985).

The Organisation for Indian Ocean Marine Affairs Co-operation (IOMAC), established in 1985 through the first Conference on Economic, Scientific and Technical Co-operation in the Indian Ocean in the field of marine affairs in the context of the new ocean regime in Colombo, Sri Lanka. IOMAC is an inter-governmental agency bringing coastal and hinterland states of the Indian Ocean together in co-operation to manage the ocean and its resources. It is founded on the concept of integrated ocean management.

The IOMAC process had attracted the participation of over 35 States and 25 international organisations. IOMAC has within its mandate: marine sciences and ocean services, living resources, ocean law policy and management, marine transport and communications and the marine environment. It is the standing conference secretariat for various marine-related conferences and is located in the Bandaranaike Memorial International Conference Hall (BMICH), Colombo.

1 See "Tulip Expeditions (1982-84)" on page 51

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My thanks go out to the many people that spent time to review various parts of this manuscript and offered advice and improvements. A special thanks to Thomas A. Jefferson for his invaluable suggestions. Thank you Joshua Barton for taking valuable time to edit this manuscript. Any errors or omissions that remain are, of course, entirely my responsibility.

Closer to home, thanks are due to my brother Dallas Martenstyn, who most generously provided me with unlimited support at his Kalpitiya boutique hotels. I must thank my wife Laila who has, patiently if not entirely without protest, consented to share her husband with a mistress of a different kind.

It has been a privilege to meet and work with so many people during my voyages and studies for this manuscript over the last 10 years. Any and all income arising from my work including my own has gone into marine research and education in the hope of a better future for the environment and the animals that live in it and that this work will benefit generations to come.

From the beginning of the twentieth century to 1979, there are still few records and these relate to the study and collection of shore based marine mammal records. The main activities in this period included:

- Dugong fisheries survey in the 1950's by Department of Fisheries and Government Agents.
- Stranding records and specimen examinations by Deraniyagala, Pearson and others.
- Specimens collected for museums and institutions (Beaumont, Bertram, Cruz, Deraniyagala, Hart, Nevill, Osman Hill, Pearson, Philips, Wait, Willey and others).
- Live sighting records from British and Dutch merchant ships in the 1950's (Brown, 1957; Slijper *et al.*, 1964).

Records of live sightings by scientists really began after the Indian Ocean was declared a whale sanctuary in 1979 by the IWC. During the 1980's, the bulk of these sighting records were drawn from the following sources:

- Voyages of SRV *Tulip* around Sri Lanka, Maldives, and Laccadive Sea from February 1982 to May 1984. Study of sperm whales, blue whales and opportunist sightings of other cetaceans (Alling, Gordon, Whitehead and others).
- Cetacean vessel surveys, NMMP May 1985 to April 1986 (NARA, 1987b; Leatherwood & Reeves, 1991).
- Stranding examinations (CRIOMM, NARA and others).
- Fisheries landing sites from Kalpitiya to Kirinda on the western and southern coasts and at Trincomalee in the northeast (Alling, Joseph & Siddeek, Leatherwood & Reeves, NARA, and others).

From mid-1986 onwards research voyages and whale-watching activities came to a halt due to the civil war. As such, there appears to have been a dip in reporting marine mammal sightings. During the 1990's most of the records were drawn from the following sources:

- Fisheries landings at Kalpitiya, Kandakuliya, Negombo, Colombo, Beruwala, Galle to Hambantota and Kalmunai to Trincomalee (Dayaratne & Joseph, Ilangakoon, and others).
- Stranding examinations (NARA and others).
- Voyages of RV *Malcolm Baldrige* in the Indian Ocean, including southwestern and western Sri Lankan waters, in April and June 1995 (Ballance *et al.*, 1996.).

From 2000 to 2006, most records were drawn from the following sources:

- Voyages of SRV *Odyssey* around the Basses and Gulf of Mannar, 2003. Study of sperm whales and opportunistic cetacean sightings' (Johnson, 2003a-j; Madsen, 2003; Ocean Alliance, 2003; Madsen *et al.*, 2004a; 2004b; de Vos *et al.*, 2012).
- Monthly survey around Bar Reef Marine Sanctuary, April 2004 to March 2005 (Bröker & Ilangakoon, 2008).
- Voyages of FORV *Sagar Sampada* around the Arabian Sea and Bay of Bengal October 2003 to February 2007. Opportunist cetacean surveys conducted over 35 cruises (Afsal *et al.*, 2008; CMFRI, 200?).

From 2007 onwards and following the end of the civil war most records are derived from:

- The resurgence of commercial whale watching in 2007. Records from commercial whale and dolphin watching operators make up the bulk of records for the period from 2008 onwards - Kalpitiya, Mirissa and Trincomalee whale and dolphin watching logs (some unpublished): (C. Anderson, Dayaratne, G. de Silva Wijeyeratne, P. Dykstra, M. Goonewardena, Jetwing Eco Holidays, Little Adventures, Makara Dolphin Beach Resort, Mirissa Water Sports (MWS), Ruwala Resort, Sri Lanka Navy (SLN) and several others).
- The author's personal researches and sighting observations round Sri Lanka (Martenstyn, 2019).
- Marine mammal observers' records from seismic surveys in the Gulf of Mannar and southern Sri Lanka (Alexandria, Cairn Lanka, Goonewardena).
- Cetacean survey in the Trincomalee area (Nanayakkara *et al.*).

- Dolphin surveys in Dutch Bay and Puttalam Lagoon, Kalpitiya (Nanayakkara *et al.*, SLN).
- Cetacean surveys and studies in southern Sri Lanka out of Mirissa (de Vos, Ilangakoon, University of Ruhuna and others).
- Voyages of *srV Mir* in Sri Lanka's waters, December 2012 and January 2013 (Alling, Ilangakoon and Martenstyn).

Overall there are a fairly large number of opportunistic sighting records available, but comparatively few reports from dedicated surveys or studies.

Area Considerations

As evidenced by the above list of activities, many areas in Sri Lanka's waters have hardly or are yet to be explored or surveyed. These include areas such as submarine canyons between Trincomalee and Dondra Head, the northern part of the Gulf of Mannar, Bay of Bengal Inlet, the seaboard off Jaffna to Mullaitivu, and much of the western seaboard. Seasonal sighting data are severely lacking from the northern and eastern seaboard during the northeast monsoon and similarly from the southern and western seaboard during the southwest monsoon. Rough seas in these areas hinder researchers and whale-watchers from locating and accurately identifying marine mammals. From 1985 to 2008 the northern and eastern seaboard were not accessible by researchers due to the long civil conflict in the country.

The area beyond the contiguous zone (24nm) extending to the EEZ (200nm) has also hardly been surveyed for marine mammals except for opportunist sightings during sea voyages by *srV Tulip*, *srV Odyssey*, *FORV Sagar Sampada* and others. In 1995, *rv Malcolm Baldrige* recorded valuable cetacean sighting data during a survey in April and June in the southwest and west of Sri Lanka that extended to the EEZ and beyond the Maldives. In July 2017, *rv Sonne* while conducting seismic surveys gathered valuable information about whales from Dondra to the Little Basses and extending a little beyond the equator. In addition, a whale survey was conducted in the south across the shipping lanes from south of Kirinda to Weligama and beyond (Priyadarshana *et al.*, 2016a).

As a result of the recent resurgence in commercial whale watching operations in 2008, a significant number of records have become available from Mirissa, Trincomalee and Kalpitiya. Most of the recording effort has been related to the area between Dondra Head and Mirissa-Weligama. It will be evident from this report that the uneven distribution of sighting records as shown in Figure 4 largely reflects the distribution of sighting effort rather than any significant pattern of marine mammal abundance off any maritime province.

A selective set of records from the rest of the NIO are included in this publication (Figure 5). These have mainly been included on the basis that they may be relevant to the study in Sri Lanka's waters and may be of interest to the reader wanting to broaden their knowledge base. Two-thirds of these records are from India, Maldives and nearby NIO waters since more emphasis was placed on gathering records from adjoining seas with Sri Lanka. The number of sighting records elsewhere in the Indian Ocean beyond Sri Lanka shown in Figure 5 is therefore not an indicator of abundance of marine mammals.

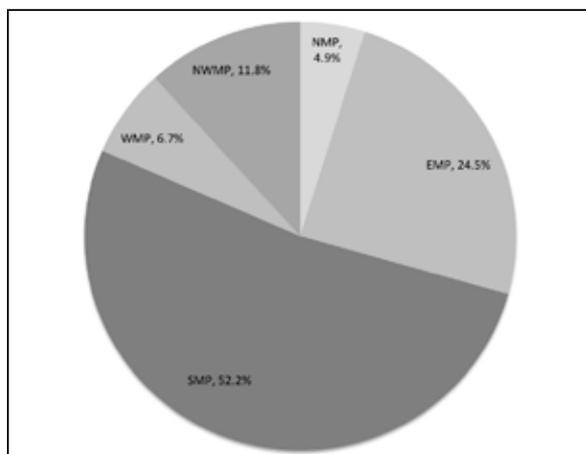


Figure 4: Percentage composition of sighting records from SL maritime provinces (n=6,682)

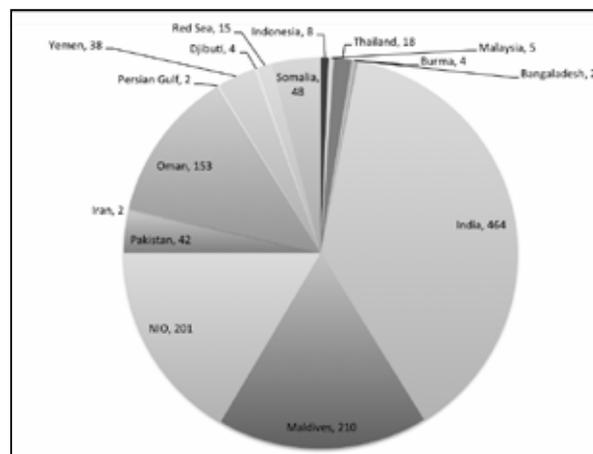


Figure 5: Sighting records from other countries and NIO (n=1,216)

Analysis

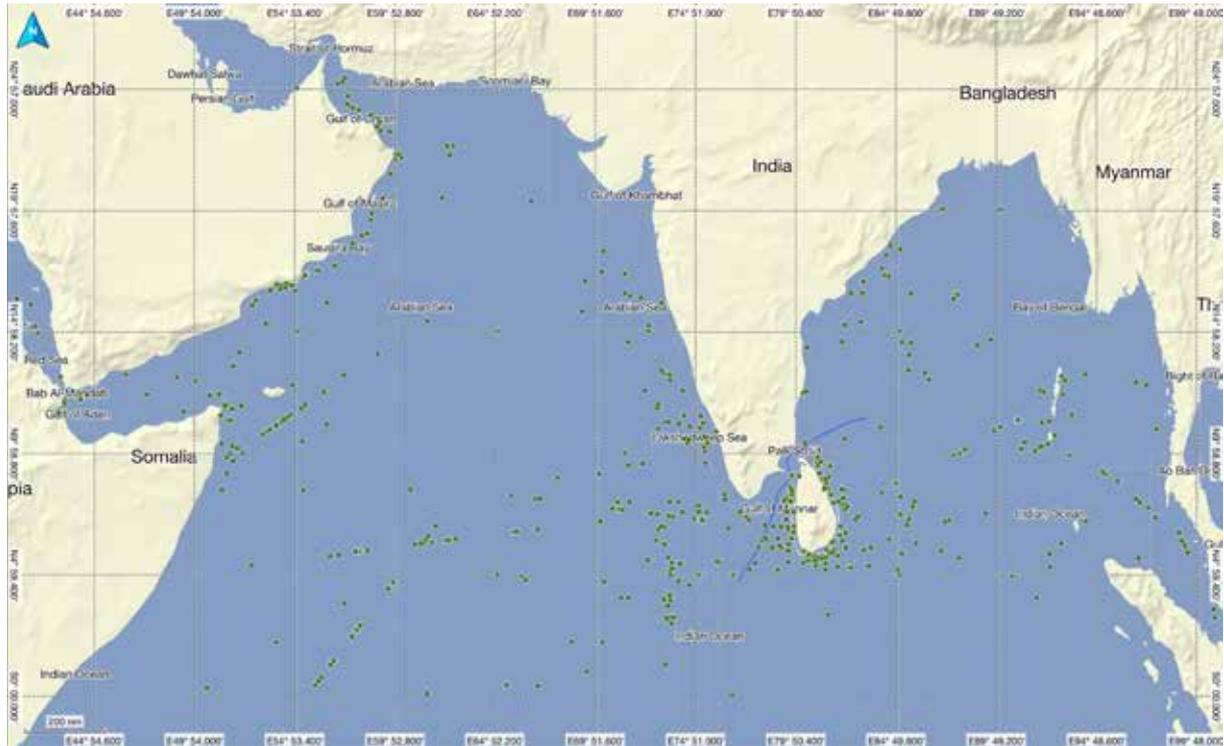


Figure 7: Marine mammal live sighting locations in NIO (n=3,038 poi)

Marine mammals are not evenly or randomly distributed in the ocean. Some species are found exclusively or mostly in waters of a particular bathymetric range, oceanographic terrain and to some extent temperature and salinity ranges. Amongst other attributes, some species are found seasonally in some areas depending on food availability, currents and other oceanic influences and inherent species behaviour. As such, marine mammals are less likely to be found to different degrees in areas lacking one or more of these attributes.

Cetacean habitat studies have found that the bathymetry is related to cetacean distribution, but unfortunately only a percentage of the records contain depth or Global Positioning System (GPS) data. In some records the depths are not given but GPS data are available. In these cases, the depths have largely been derived from the GPS location using Garmin Blue Chart mapping (Garmin, 2011).

Sighting records were analysed for each species and information provided on observations, distribution and status in Sri Lanka's waters. Distribution data that includes GPS mapping for each species is presented along with charts on its distribution in Sri Lanka's waters by maritime province, month and bathymetry. Observations recorded on species appearances, behaviours, movements, associations, group sizes, lengths, weights, specimen measurements, environment parameters, acoustics and presence in adjacent waters of the NIO are also provided and studied.

As common names vary by country and even region, the recognised scientific names for each species and subspecies are used in this document (Committee on Taxonomy, 2018). These names are recognised worldwide and using them helps us accurately identify and describe our sightings for others. It should be noted, however, that taxonomic classification of cetacean species is not perfect, and there are arguments over whether some cetaceans sighted in these waters should be classified as separate species or grouped together as one. Other species may have subspecies associated with them. It is hoped that this publication will help resolve some of these controversies by making it possible to identify marine mammal sightings more accurately or to carry out further scientific work on specimens.

Differences between closely related species and recently discovered species in Sri Lanka's waters are described. Arguments are provided for why a species may or may not be present in Sri Lanka's waters. The most up to date taxonomic notes were studied and included for each species. This sometimes resulted in species sighting records being reclassified.

Cetacean migratory behaviour or movements are also studied and discussed but it is presently difficult to conclude from the many historical sighting records and publications. Further research such as continuously monitoring species or individuals, photo identification and the components of their habitats are required to better determine such movements.

Table 3: Sri Lanka marine mammal sighting records by period and category

<i>Period</i>	<i>Strandings</i>	<i>Fisheries</i>	<i>Specimens</i>	<i>Live</i>	<i>Total</i>
1560-1979	0.9%	2.0%	0.7%	0.7%	4.3%
1980's	0.2%	11.4%	0.4%	8.8%	20.8%
1990's	0.2%	1.9%	0.4%	1.1%	3.6%
2000's	0.2%	0%	0%	9.4%	9.6%
2010's	1.2%	0.1%	0%	60.3%	61.6%
Total %	2.7%	15.5%	1.5%	80.3%	100%
No. of records	181	1,052	101	5,448	6,782

Note: Number of records excludes 799 no sighting records

The Sri Lankan component of the distribution records have been consolidated from 10,055 to 7,581 sighting records. These records (excluding the no sighting records) are shown by period and category in Table 3. Records of days with no sightings (n= 799) were also examined in studying animal distributions and the best times of year for sightings at different locations around Sri Lanka.

Most of the consolidation involved identifying duplicated records of the same sighting referenced by different sources. These duplicated records are shown as multiple references at the end of each sighting record in Volume II Appendix VI. In some cases, this numbered up to 12 sources reporting or referring to the same sighting. Due to space limitations, only the earliest 6 reference sources found are listed at the end of each sighting record in Volume II.

There are an additional 1,723 sighting records from the rest of the NIO that have been consolidated to 1,216 sighting records after identifying duplicates (Figure 5). These records are from other parts of NIO waters from Somalia to Indonesia and are also included in Volume II Appendix VI. All of the NIO live sighting records with GPS information (longitude and latitude) have been plotted in Figure 5. Forty-five percent of all marine mammal live sighting records within Sri Lanka's waters contain GPS information on sighting location. These points of interest (POI) that include the initial sighting location and where available the last sighting location have been plotted on all marine mammal distribution maps. Intermediate live sighting locations although available in the author's records are excluded in any of the maps but used in studies. Stranding and fisheries GPS locations are not plotted on any of the distribution maps in this report. Thus, all mammal distribution maps represent live sightings only.

Inter-annual variability of species distributions based on total sighting records could not be studied largely due to variations of sighting recording effort.

Sighting Record Categories

Each sighting record has been assigned to one of 4 categories as follows:

1. Stranding.
2. Fisheries catch or by-catch.
3. Specimen (from fisheries or strandings).
4. Live sighting.

The percentage composition of the Sri Lankan sighting records by each of these categories is shown in Figure 8. The percentage of live sightings is largely from whale watching operations.

A sighting record that could not be identified as being from either a stranding or from fisheries has been categorised as a specimen.

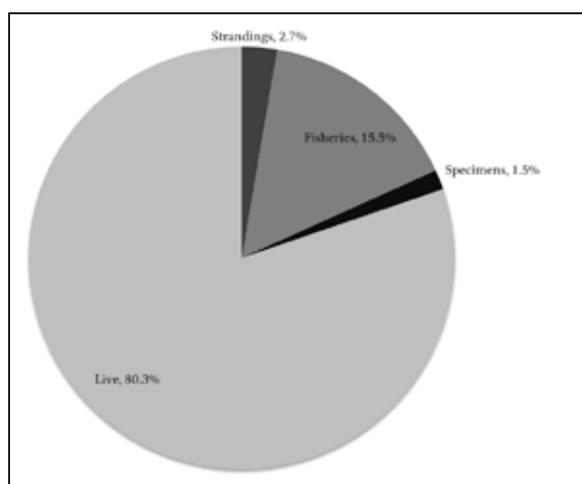


Figure 8: Percentage composition of Sri Lanka sighting records by categories (n=6,782)

Table 9: Salinity readings in NIO based on cetacean sighting record locations

Sea Area	Vessel	Dates	n	Salinity (ppt)
Sri Lanka EEZ	RV <i>Malcolm Baldrige</i>	June 1995	21	34.66-34.67
Sri Lanka EEZ	FORV <i>Sagar Sampada</i>	Oct 2003 - Feb 2007	83	29.45-36.0
Arabian Sea	RV <i>Malcolm Baldrige</i>	April - July 1995	139	34.39-37.09
Arabian Sea	FORV <i>Sagar Sampada</i>	Oct 2003 - Feb 2007	52	29.98-36.0
Bay of Bengal	FORV <i>Sagar Sampada</i>	Oct 2003 - Feb 2007	48	29.32-34.25
NIO Total			343	29.32-37.09

Note: n = number of salinity records related to marine mammal sighting locations. Includes salinity readings of unidentified cetaceans.

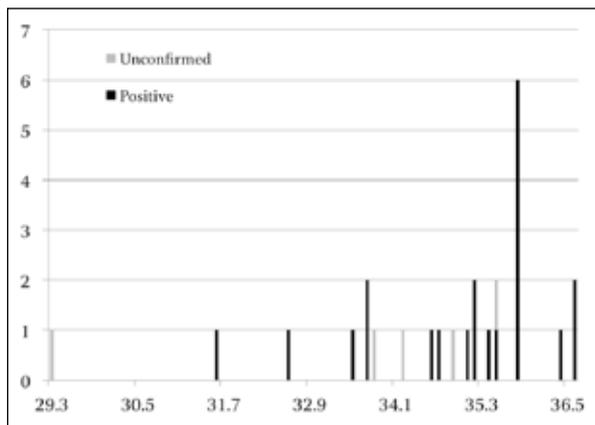


Figure 15: NIO sperm whale distribution sighting records by salinity (n=26)

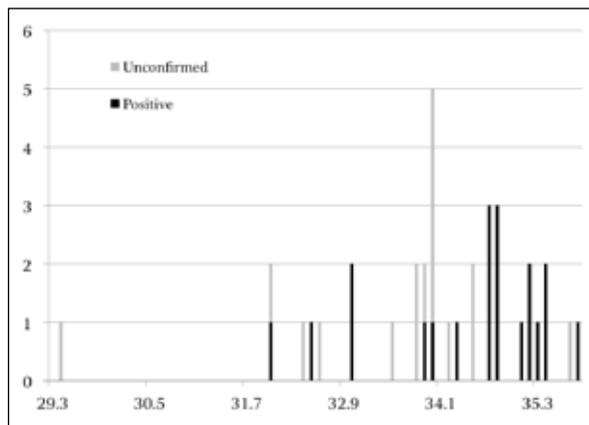


Figure 16: NIO spinner dolphin distribution sighting records by salinity (n=48)

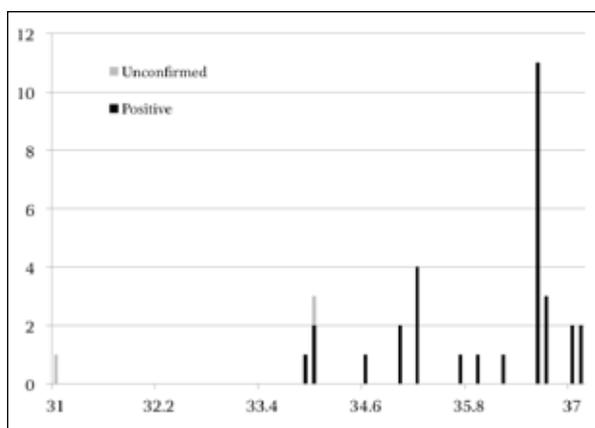


Figure 17: NIO Risso's dolphin distribution sighting records by salinity (n=33)

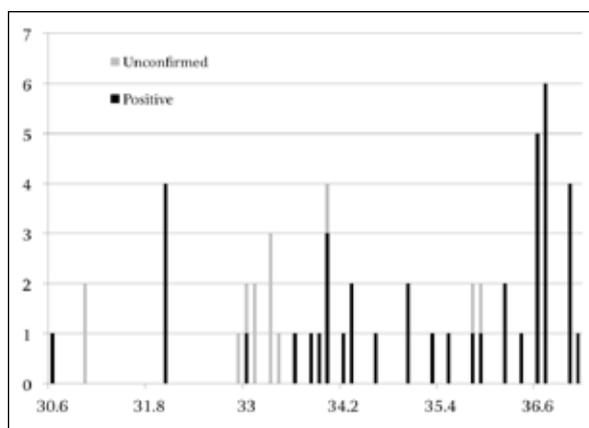


Figure 18: NIO bottlenose dolphin, *Tursiops* sp., distribution sighting records by salinity (n=54)

Sea Temperature

Besides salinity, cetaceans are known to be sensitive to sea water temperatures and most cetacean species distributions throughout the world's oceans are often related to temperature regimes. The average sea surface temperature (SST) of sea water around Sri Lanka rises during the months from January to May with a peak in April - May, after which it gradually becomes cooler (Table 10). This period coincides with the southern hemisphere seasons of fall and winter. Perhaps these climatic conditions influence cetacean movements around Sri Lanka. It is well understood that the latter half of IM-1 (April to about the beginning of May) till the monsoon starts is the best time of all for cetacean sightings around Sri Lanka. This is a period for recording the greatest diversity of cetaceans.

The average monthly SST recorded at cetacean sightings in Sri Lanka's waters are provided in Table 11. There is a fairly good correlation between the monthly average SST around Sri Lanka (Table 10) and those taken at cetacean sightings (Table 11). Interestingly, in June 1995 there are several cetacean sightings (n=21) by RV *Malcolm Baldrige* where the SST dropped well below the average.

The SST at cetacean sightings taken in Sri Lanka's waters are compared with readings taken elsewhere in the NIO in Table 12. The SST for a probable sighting record of 30 long-beaked common dolphins off Kerala was recorded as 22°C (CMFRI, 200?). This record is likely a typo or abnormality and is excluded in Table 12.

Table 10: Sri Lanka, average sst by month based on several years

Locality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NMP	26.8	27.5	28.6	30.1	30.0	29.4	29.3	28.7	29.0	29.3	28.4	27.2
EMP	27.1	27.7	28.7	29.8	30.1	29.9	29.4	28.9	29.1	29.3	28.6	27.7
SMP	27.6	28.3	28.9	29.6	29.1	28.3	27.7	27.8	28.2	28.6	28.8	28.1
WMP	27.7	28.3	29.1	29.6	29.2	28.2	27.2	27.1	27.7	28.5	28.7	28.0
NWMP	27.4	28.0	28.8	29.6	29.4	28.3	27.3	26.9	27.6	28.5	28.6	27.8
SL Average	27.3	28.0	28.8	29.7	29.6	28.8	28.2	28.6	27.9	28.8	28.6	27.8

Table 11: Average sst by month around Sri Lanka as recorded at cetacean sightings (n=83)

Locality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NMP				29.0 ³								
EMP	28.0 ⁴	28.2 ⁷	29.9 ⁶	29.4 ⁵	29.8 ⁶		28.0 ³	28.6 ⁴	26.8 ⁴	28.6 ⁸	28.9 ⁹	
SMP		28.3 ¹				26.2 ¹¹					28.5 ¹	
WMP			29.2 ¹			26.2 ¹⁰						
NWMP												
SL Average	28.0	28.2	29.8	29.3	29.8	26.2	28.0	28.6	26.8	28.6	28.9	-

Note: Number of monthly cetacean sighting records with readings is shown in superscript.

Table 12: Distribution of cetaceans relative to SST and salinity in Sri Lankan waters and NIO

Species Name	Sri Lanka's waters		NIO beyond SL		NIO combined	
	SST (°C)	Salinity (ppt)	SST (°C)	Salinity (ppt)	SST (°C)	Salinity (ppt)
<i>Balaenoptera musculus</i>	26.0-29.9 ²⁷	33.0-36.0 ¹⁴	26.0 ¹	34.0 ¹	26.0-29.9	33.0-36.0
<i>Balaenoptera edeni</i>	26.8-29.9 ⁸	-	29.6-29.9 ³	35.2-36.1 ³	26.8-29.9	35.2-36.1
<i>Megaptera novaeangliae</i>	27.9 ¹	33.6 ¹	-	-	27.9	33.6
<i>Physeter macrocephalus</i>	26.2-29.9 ¹⁷	33.5-34.7 ⁵	26.8-30.5 ²⁴	29.3-36.6 ²¹	26.2-30.5	29.3-36.6
<i>Kogia breviceps</i>	-	-	30.2 ¹	35.2 ¹	30.2	35.2
<i>Kogia sima</i>	-	-	29.9-31.9 ⁸	34.6-37.1 ⁸	29.9-31.9	34.6-37.1
<i>Indopacetus pacificus</i>	28.4-29.0 ²	-	28.6-30.4 ⁴	34.6-35.2 ²	28.4-30.4	34.6-35.2
<i>Orcinus orca</i>	28.2 ¹	-	29.9 ¹	35.3 ¹	28.2-29.9	35.3
<i>Globicephala macrorhynchus</i>	-	-	27.6-30.2 ⁷	32.5-35.9 ⁷	27.6-30.2	32.5-35.9
<i>Pseudorca crassidens</i>	28.2-29.0 ²	-	28.0-30.4 ⁵	33.0-35.9 ⁴	28.0-30.4	33.0-35.9
<i>Feresa attenuata</i>	-	-	29.9-30 ²	35.2-35.8 ²	29.9-30	35.2-35.8
<i>Grampus griseus</i>	28.0 ¹	33.9 ¹	26.0-32.0 ³¹	31.0-37.1 ³²	26.0-32.0	31.0-37.1
<i>Tursiops sp.</i>	28.0-29.9 ⁸	33.9-35.5 ⁴	26.0-32.0 ⁶³	30.6-37.1 ⁵⁰	26.0-32.0	30.6-37.1
<i>Delphinus capensis</i>	27.0-27.9 ²	31.0-34.5 ²	27.1-32.0 ²⁹	30.0-37.0 ²²	27.0-32.0	30.0-37.0
<i>Steno bredanensis</i>	29.9 ¹	-	30.0-32.0 ⁸	35.5-37.0 ⁸	30.0-32.0	35.5-37.0
<i>Stenella coeruleoalba</i>	26.8-29.8 ⁵	34.3 ¹	28.6-30.8 ¹⁵	34.4-36.6 ¹⁴	26.8-30.8	34.3-36.6
<i>Stenella attenuata</i>	-	-	27.7-30.2 ³	35.2-36.6 ³	27.7-30.2	35.2-36.6
<i>Stenella longirostris</i>	26.0-29.9 ²²	33.5-34.7 ¹⁰	26.6-32.0 ⁴³	29.4-37.0 ³⁸	26.0-32.0	29.4-37.0
<i>Sousa plumbea</i>	-	-	26.8-29.9 ⁹	33.5-34.1 ³	26.8-29.9	33.5-34.1

Note: Number of cetacean sighting records with readings is shown in superscript. Unidentified cetacean records are excluded.

Table 14: Recommended checklist of marine mammals in Sri Lankan waters identified by sightings

SL No.	Species Name	Date of Record	Published Source	Maritime Province								
				N	NW	W	S	E	SL	IN	MI	
1	<i>Balaenoptera musculus</i> *	1894	Haly, 1895	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	<i>Balaenoptera edeni</i> *	1982	Santerre & Santerre, 1983	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	<i>Balaenoptera omurai</i>	2017	De Vos, 2017	X	✓	X	✓	✓	✓	✓	✓	X
4	<i>Megaptera novaeangliae</i> *	1846	Santerre & Santerre, 1983	✓	✓	✓	✓	P	✓	✓	✓	✓
5	<i>Physeter macrocephalus</i>	1840s	Wray & Martin, 1980	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	<i>Kogia breviceps</i>	1891	Pearson, 1931b	X	✓	✓	✓	✓	✓	✓	✓	X
7	<i>Kogia sima</i>	1982	Joseph <i>et al.</i> , 1983	X	✓	✓	✓	✓	✓	✓	✓	✓
8	<i>Indopacetus pacificus</i>	1983	Anderson <i>et al.</i> , 2006	✓	X	✓	✓	✓	✓	✓	P	✓
9	<i>Ziphius cavirostris</i>	1939	Deraniyagala, 1940	X	X	✓	✓	✓	✓	✓	✓	✓
10	<i>Mesoplodon hotaula</i>	1963	Deraniyagala, 1963a; b	X	P	✓	X	X	✓	X	✓	✓
11	<i>Mesoplodon densirostris</i>	1986	Ilangakoon, 2003	X	X	✓	X	X	✓	X	✓	✓
12	<i>Orcinus orca</i> *	1868	Holdsworth, 1872	X	✓	✓	✓	✓	✓	✓	✓	✓
13	<i>Globicephala macrorhynchus</i>	1848	Wray & Martin, 1980	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	<i>Pseudorca crassidens</i>	1891	Haly, 1892	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	<i>Feresa attenuata</i>	1983	Alling, 1985a	X	X	✓	✓	✓	✓	✓	✓	✓
16	<i>Peponocephala electra</i>	1985	NARA, 1987b	P	P	✓	✓	✓	✓	✓	✓	✓
17	<i>Grampus griseus</i>	1982	Alling, 1986	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	<i>Tursiops truncatus</i>	1916	de Silva, 1987	✓	✓	✓	✓	✓	✓	✓	✓	✓
19	<i>Tursiops aduncus</i>	2008	Martenstyn, 2013a	✓	✓	P	✓	✓	✓	✓	✓	✓
20	<i>Delphinus delphis</i> *	1982	Alling, 1986	X	✓	✓	✓	✓	✓	✓	✓	X
21	<i>Lagenodelphis hosei</i>	1984	Prematunga <i>et al.</i> , 1985	X	✓	✓	✓	✓	✓	✓	X	✓
22	<i>Steno bredanensis</i>	1983	Alling, 1985a	X	X	✓	✓	✓	✓	✓	P	✓
23	<i>Stenella coeruleoalba</i>	1982	Alling, 1986	X	✓	✓	✓	✓	✓	✓	✓	✓
24	<i>Stenella attenuata</i> *	1983	Alling, 1986	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	<i>Stenella longirostris</i> *	1872	Holdsworth, 1872	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	<i>Sousa plumbea</i> *	1934	Deraniyagala, 1945	✓	✓	✓	P	X	✓	✓	✓	X
27	<i>Neophocaena phocaenoides</i>	2014	Nanayakkara <i>et al.</i> , 2017	✓	X	X	X	X	✓	✓	✓	X
28	<i>Dugong dugon</i>	1560	Tennent, 1859	✓	✓	X	✓	✓	✓	✓	✓	X
Total number of species as identified by sighting records				15	20	24	24	23	28	23	22	

Notes: * = Subspecies not fully elucidated in Sri Lankan waters. ✓ = Species sighting record confirmed. P = Species presence uncertain; probably/possibly present. X = No confirmed sighting record.

Date of record is the year in which a species was first recorded as confirmed.

Published Source is the publication that first confirmed or identified the species in Sri Lanka's waters.

Table 15: List of excluded marine mammals in Sri Lanka's waters identified by sightings

Species Name	Date of Record	Published Source	SL	IN	MI	Refer to
<i>Balaenoptera physalus</i>	1971	de Silva, 1983	X	X	X	Page 86
<i>Balaenoptera borealis</i>	1986	NARA, 1987b	X	X	X	Page 88
<i>Balaenoptera acutorostrata</i>	1937	Deraniyagala, 1960a	X	X	X	Page 109
<i>Eschrichtius robustus</i>	1936	Deraniyagala, 1948	X	X	X	Page 119
<i>Mesoplodon ginkgodens</i>	1983	Alling <i>et al.</i> , 1983	X	X	✓	Page 141
<i>Delphinus delphis</i>	1982	Alling, 1986	X	X	X	Page 191
<i>Sousa chinensis</i>	1934	Deraniyagala, 1945	X	✓	X	Page 215
<i>Lagenorhynchus obscurus</i>	1888	Blanford, 1891	X	X	X	Page 220
<i>Orcaella brevirostris</i>	1982-83	Joseph <i>et al.</i> , 1983	X	✓	X	Page 221

Notes: ✓ = Species present. P = Species presence uncertain; probably/possibly present. X = Unconfirmed sighting, no sighting or reclassified. Refer to page number for a detailed explanation as to why the species is excluded.

Table 18: Surveys of cetacean fisheries landings

<i>Location</i>	<i>Period</i>	<i>Source</i>
Beruwala	May-1982 to Aug-1984	Alling, 1985a; 1988
Negombo	Jul 1983	Alling, 1985a
Trincomalee	Feb-1983 to Oct-1984	Alling, 1985a; 1988
Valaichenai harbour	Mar-1983 to Jan-1984	Alling, 1985a; 1988
Trincomalee	1984 to 1986	Leatherwood & Reeves, 1991
Beruwala & Negombo	Jan to Nov-1985	Joseph & Siddeek, 1985
Chilaw to Kirinda fish landing centres ¹	1985 to 1986	NARA, 1987b; Leatherwood & Reeves, 1991; Ilangakoon 1997
Negombo, Beruwala, Mirissa & Kottegoda	May-1985 to Dec-1988	Ilangakoon 1997
14 fish landing centres ²	Sep-1991 to Sep-1992	Dayaratne & Joseph, 1993
Beruwala & Negombo	May-Oct 1994	Ilangakoon 2000a, b

Note 1. The fish landing sites visited during 1985-86nmMP were Chilaw, Negombo, Beruwala, Ambalangoda, Hikkaduwa, Galle, Batemulla, Mirissa, Dondra, Gandara, Kottegoda, Tangalle, Kalametiya, Hambantota and Kirinda.

Note 2. The 14 fish landing centres were Kalpitiya (NW), Kandakuliya (NW), Negombo (W), Colombo (W), Beruwala (SW), Galle (S), Mirissa (S), Dondra (S), Kottegoda (S), Kudawella (S), Tangalle (S), Hambantota (S), Kalmunai (E) and Trincomalee (NE).

Table 19: Percentage species composition of small cetacean fisheries in various studies

<i>Species</i>	<i>A85</i>	<i>J&S</i>	<i>L&R</i>	<i>N&I</i>	<i>D&J</i>	<i>I2000</i>	<i>All</i>
Spinner dolphin	38.9%	34.1%	45.3%	49.0%	58.1%	57.9%	53.6%
Spotted dolphin	12.5%	0.7%	16.8%	8.3%	6.9%	6.1%	8.5%
Bottlenose dolphin	6.9%	25.4%	5.4%	8.7%	8.4%	8.5%	8.5%
Striped dolphin	8.3%	10.9%	8.0%	12.5%	7.2%	12.6%	8.5%
Risso's dolphin	16.7%	6.5%	14.7%	5.6%	4.4%	8.8%	7.0%
Melon-headed whale				3.4%	2.6%	1.2%	1.9%
Pygmy killer whale	4.2%	0.7%	1.9%	3.8%	1.8%	0.7%	1.9%
Rough-toothed dolphin	4.2%		0.6%	2.0%	1.3%	2.5%	1.5%
Dwarf sperm whale	4.2%	2.9%	2.6%	2.2%	0.6%	0.2%	1.3%
False killer whale	1.4%		1.4%	0.9%	1.2%	0.5%	1.1%
Pygmy sperm whale		6.5%	0.9%	0.4%	0.6%	0.3%	1.0%
Fraser's dolphin		2.2%	0.1%	1.3%	0.5%	0.8%	0.6%
Common dolphin		3.6%		0.7%	0.1%		0.2%
Pilot whale			1.1%				0.2%
Cuvier's beaked whale	1.4%			0.7%			0.1%
Longman's beaked whale					0.1%		0.1%
Orca				0.2%			0.1%
Blainville's beaked whale				0.2%			0.02%
Unidentified cetaceans	1%	6.5%	1.2%	0.0%	6.3%		4.0%
Total	100%	100%	100%	100%	100%	100%	100%
No. of cetaceans	72	138	810	447	2,791	603	4,913
No. of species	10	10	12	16	14	12	18
Survey years	1982-84	1985	1984-86	1985-88	1991-92	1994	1982-94

Sources: A85 - Alling, 1985. J&S - Joseph & Siddeek, 1985 In: Dayaratne & Joseph, 1993. L&R - Leatherwood & Reeves, 1991. N&I - A combination of studies In: Prematunga *et al.*, 1985; NARA, 1987b; Leatherwood *et al.*, 1991 and Ilangakoon, 1997. D&J - Dayaratne & Joseph, 1993. I2000 - Ilangakoon, 2000a; 2000b. All - A combination of all fisheries studies and additional incidental records from 1982 to 1994 in MDD.

6. Strandings

Every year many marine mammals, alone or in groups, are found stranded alive or dead around the coastline of Sri Lanka. A stranding is a helpless or incapacitated animal or group of animals, dead or alive. Strandings are recorded when an animal or group of animals comes ashore, gets washed ashore or found incapacitated at sea. Many stranded animals at sea go unnoticed when they sink below the surface.

Since the mid-nineteenth century records of strandings in Sri Lanka are scattered throughout the published and unpublished literature. A total of 181 stranding records have been collated and listed in Volume II Appendix III. These records account for at least 183 stranding incidents and 527 marine mammals and have been examined in terms of species composition, area of coastline (maritime province), temporal distribution and stranding causes.

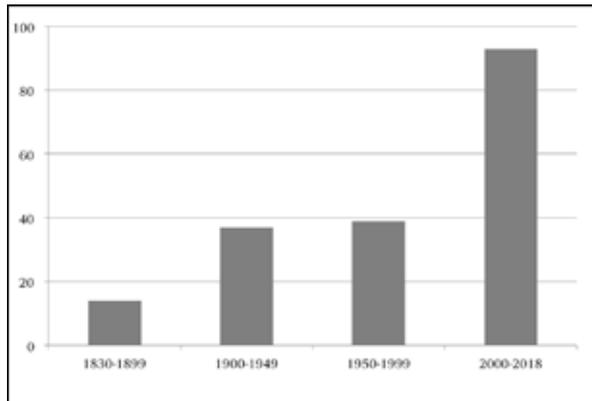


Figure 26: Stranding incidents by periods (n=183)

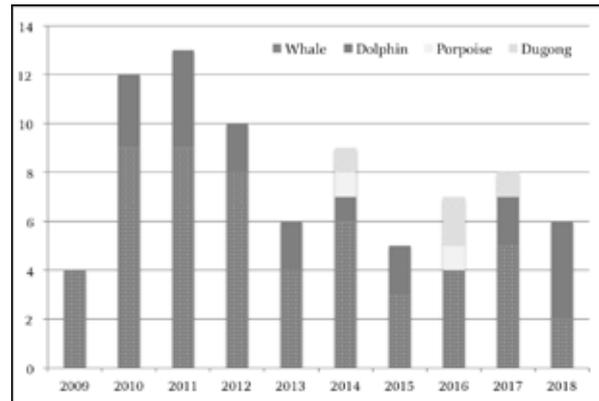


Figure 27: Annual stranding incidents in last 10 years (n=80)

While researching for this publication several historical stranding records were uncovered that have not reappeared in publications. In addition, the author's own stranding records as well as those obtained by networking with others are included (Martensyn, 2019).

Presently, there is no strandings network set up in Sri Lanka. Many strandings go unreported or are not published. Strandings from the north and east coasts are rarely reported. In February 2011 it was reported that there was a recent steady increase in dolphins and whales washing out to Jaffna coastal areas but have gone unrecorded (Nizam, 2011). Historical records show an increase in stranding incidents reported (Figure 26), particularly in recent decades. In recent years more strandings are being reported to DWLC field officers and NARA, but these are usually not published unless researchers or the press become aware. Eighty of the 183 stranding incidents have been recorded in the last 10 years (Figure 27). To a certain extent, the increase in incidents reported over time may be due to an improved communication infrastructure, networking, increased education and awareness, and the introduction of virtual social networks.

Seasonal Stranding Distributions

Since 1832, marine mammal strandings (n=148 incidents) have been recorded in all months (Figure 28). Overall, the largest number of marine mammal stranding events occurred in the months of January, August and November. Great whales too have stranded in all months (Figure 28). In terms of species, however, there are differences in the stranding data. When individual species' stranding records are examined, such as the blue whale (Figure 30) and sperm whale (Figure 31), very different patterns present themselves.

Blue whale strandings in Sri Lanka (n=36 incidents) have been recorded in all months except December and peak in April-May. Two of the incidents involved mother-calf pairs. However, Blue whale strandings in India (n=19 incidents) have been recorded in all months and peak in December (Ilan-gakoon & Sathasivam, 2012). Combined, blue whale strandings from Sri Lanka and India have been recorded in all months of the year with a peak in May, at the start of the southwest monsoon.

Sperm whale strandings (Figure 31) in Sri Lanka's waters (n=31 incidents) have been recorded in all months except in July and have twin peaks in August and November. Sperm whale strandings in India (n= 24 incidents) have been recorded in all months and are most frequent from August to November in Sri Lanka. Combined, sperm whale strandings from Sri Lanka and India have been recorded in all months of the year with a peak in November, at the end of the second intermonsoonal season IM-2.

Table 20: Species composition by strandings

Species	Incidents %	Animals %
<i>Pseudorca crassidens</i>	3.3%	50.9%
UID other whale	24.6%	9.5%
<i>Balaenoptera musculus</i>	24.6%	9.1%
<i>Stenella longirostris</i>	2.7%	8.7%
<i>Physeter macrocephalus</i>	18.0%	6.5%
<i>Globicephala macrorhynchus</i>	2.2%	6.5%
<i>Ziphius cavirostris</i>	3.3%	1.1%
<i>Sousa plumbea</i>	3.3%	1.1%
<i>Dugong dugon</i>	2.7%	1.1%
UID delphinid	2.7%	1.1%
<i>Kogia breviceps</i>	2.7%	0.9%
<i>Balaenoptera edeni</i>	2.2%	0.8%
<i>Kogia sima</i>	1.6%	0.6%
<i>Megaptera novaeangliae</i>	1.1%	0.4%
<i>Tursiops</i> sp.	1.1%	0.4%
UID cetacean	1.1%	0.4%
<i>Mesoplodon hotaula</i>	1.1%	0.4%
<i>Neophocaena phocaenoides</i>	1.1%	0.4%
<i>Orcinus orca</i>	0.5%	0.2%
Total %	100%	100%
Total number	183	527

Table 21: Strandings by species and maritime provinces (MP)

Species	MP						Total Incidents	Total Animals
	N	NW	W	S	E	SL		
<i>Balaenoptera musculus</i>	4	5	9	17	5	5	45	48
<i>Balaenoptera edeni</i>		1	2	1			4	4
<i>Megaptera novaeangliae</i>		1	1				2	2
UID balaenopterid	4	4	8	7	2		25	29
<i>Physeter macrocephalus</i>	2	9	13	8	1		33	34
<i>Kogia breviceps</i>			2	1	2		5	5
<i>Kogia sima</i>				2	1		3	3
<i>Ziphius cavirostris</i>			1	4	1		6	6
<i>Mesoplodon hotaula</i>		1	1				2	2
UID ziphiid				1			1	1
UID whale		1	11	6	1		19	20
<i>Orcinus orca</i>		1					1	1
<i>Globicephala macrorhynchus</i>			2		2		4	34
<i>Pseudorca crassidens</i>	1	1	1	2	1		6	268
<i>Tursiops</i> sp.		1			1		2	2
<i>Stenella longirostris</i>		2		1	2		5	46
<i>Sousa plumbea</i>		4	2				6	6
UID delphinid	2	2			1		5	6
UID cetacean		1	1				2	2
<i>Neophocaena phocaenoides</i>	2						2	2
<i>Dugong dugon</i>	4			1			5	6
Total	19	34	54	50	20	5	183	527

Table 26: Percentage composition of specimens collected

<i>Species</i>	<i>Percentage</i>
<i>Balaenoptera musculus</i>	0.7%
<i>Balaenoptera physalus?</i>	0.2%
<i>Balaenoptera edeni</i>	0.4%
<i>Balaenoptera acutorostrata?</i>	0.5%
<i>Megaptera novaeangliae</i>	0.2%
<i>Physeter macrocephalus</i>	1.3%
<i>Kogia breviceps</i>	2.0%
<i>Kogia sima</i>	4.0%
<i>Ziphius cavirostris</i>	0.9%
<i>Mesoplodon hotaula</i>	0.2%
<i>Orcinus orca</i>	0.2%
<i>Globicephala macrorhynchus</i>	0.5%
<i>Pseudorca crassidens</i>	3.8%
<i>Feresa attenuata</i>	2.7%
<i>Peponocephala electra</i>	0.9%
<i>Grampus griseus</i>	9.2%
<i>Tursiops sp.</i>	8.5%
<i>Delphinus capensis</i>	0.9%
<i>Lagenodelphis hosei</i>	0.5%
<i>Steno bredanensis</i>	1.8%
<i>Stenella coeruleoalba</i>	7.7%
<i>Stenella attenuata</i>	7.7%
<i>Stenella longirostris</i>	35.1%
<i>Sousa plumbea</i>	0.5%
Unidentified balaenopterid	1.1%
Unidentified mesoplodont	0.2%
Unidentified delphinid	0.4%
Unidentified cetacean	1.4%
<i>Dugong dugon</i>	6.7%
Total %	100%
Total number of specimens	556

8. Vessel-Based Expeditions & Studies

Several areas around Sri Lanka's waters have been the focus for various types of cetacean surveys or studies as listed in Table 27 below. The species composition recorded from these voyage related studies is provided in Tables 14 and 15. The sea areas north of Mullaitivu through to the Palk Straight and Adam's Bridge have as yet not been surveyed or studied to any extent as yet.

Table 27: Vessel based expeditions and mammal studies in Sri Lanka's waters

Dates	Vessel	Study Area	Nature of Voyage	Source
1952 to 1956	British mv	Indian Ocean	Incidental	Brown, 1957
1954 to 1959	Dutch mv & Naval	Indian Ocean	Incidental	Slijper <i>et al.</i> , 1964
Feb 1982 to Apr 1984	srv <i>Tulip</i>	Sri Lanka & the Maldives	Whale study, 195 days	See Table 28
4 Mar 1983	Aircraft - <i>Lake</i>	Colombo to Jaffna	Dugong survey, 1 day	Leatherwood <i>et al.</i> , 1984
16 Apr 1983	ms <i>World Discoverer</i>	N10.5° E80.7° to Trinco	Cetacean survey, 1 day	Leatherwood <i>et al.</i> , 1984
3 May 1983	mv <i>Mahasen</i>	Trincomalee	Cetacean survey, 1 day	Leatherwood <i>et al.</i> , 1984
May 1985 to Apr 1986	Several	Kalpitiya to Kirinda	NARANMMP	NARA, 1987b
May to Oct 1994	FV 3.5 ton	Negombo & Beruwala	Cetacean survey	Ilangakoon <i>et al.</i> , 2000a
21 & 27 Apr 1995	rv <i>Malcolm Baldrige</i>	West, N5-7° Channel	Opportunistic	Ballance <i>et al.</i> , 1996
18-19 June 1995	rv <i>Malcolm Baldrige</i>	West, N6° Channel	Opportunistic	Ballance <i>et al.</i> , 1996
29 Mar to 17 Jun 2003	srv <i>Odyssey</i>	Basses - Gulf of Mannar	Ocean study	Ocean Alliance, 2003
Apr 2004 to Mar 2005	FV & Dinghy	BRMS, Kalpitiya	Survey, 2 days/month	Ilangakoon, 2006a
Oct 2003 to Feb 2007	FORV <i>Sagar Sampada</i>	Arabian Sea - Bay of Bengal	Opportunistic	Afsal <i>et al.</i> , 2008
Sep 2008 to Apr 2009	FV 11 m	Koggala - Gandara	Survey, 20 days	Ilangakoon, 2012a
Jul 2010 to Jun 2011	Dinghy 5.5 m	Dutch Bay, Kalpitiya	Dolphin survey, 68 days	Nanayakkara <i>et al.</i> , 2014a
Jul 2010 to Jan 2012	FV 11 m	Trincomalee	Cetacean survey, 75 days	Nanayakkara <i>et al.</i> , 2014b
Dec-2011	Dinghy 5.5 m	Puttalam & Dutch Bay	Dolphin survey, 31 days	SLN In: Martenstyn, 2019
8 Mar to 3 Apr 2012	mv <i>Atlantic Explorer</i>	Kalpitiya, Gulf of Mannar	Seismic survey	Alexandria, 2012
9-11 Dec 2012	srv <i>Mir</i>	Batticaloa EEZ to Mirissa	Opportunistic	Ilangakoon & Alling, 2016
6-25 Jan 2013	srv <i>Mir</i>	Mirissa - BRMS, Kalpitiya	Opportunistic	Alling & Martenstyn, 2013
Dec 2009 to Nov 2012	wv <i>Raja & the Whales</i>	Mirissa	Blue whale data	Randage <i>et al.</i> , 2014
2009, Jan-Mar 2011-13	FV, wv 9.5 m	Weligama to Dondra	3 Blue whale studies	de Vos, 2015
28 Nov to 12 Dec 2013	rv <i>Roger Revelle</i>	Dondra to Bay of Bengal	Opportunistic, 15 days	Baumgartner&Stafford, 2014
Feb 2014 to Mar 2015	wv <i>Raja & the Whales</i>	South	Whale survey, 28 days	Priyadarshana <i>et al.</i> , 2016b
Mar to Apr 2015	srv <i>Mir</i>	South	Whale survey, 10 days	Priyadarshana <i>et al.</i> , 2016b
Jul to Aug 2017	FV <i>Sonne</i>	South, E81° Channel	Opportunistic	Goonewardena, 2017

Vessel information

srv *Tulip*, an ocean-going 10m sloop with a 25hp diesel engine converted for research purposes.

ms *World Discoverer*, a 90m merchant ship.

mv *Mahasen*, a 25m tug boat.

rv *Malcolm Baldrige* is an 85m U.S. Department of Commerce research vessel operated by NOAA.

srv *Odyssey* is a 12m steel hulled ketch operated by Ocean Alliance for field research.

FORV *Sagar Sampada* is a 72m Indian Fishery Oceanographic Research Vessel.

mv *Atlantic Explorer* is a 91m seismic survey vessel.

Raja & the Whales is a 13m deep-sea 225hp fishing vessel converted for whale-watching.

srv *Mir* is a 34.2m auxiliary powered sailing research vessel.

rv Roger Revelle is a 84m auxiliary research vessel operated by Scripps Institution of Oceanography under charter agreement with Office of Naval Research as part of the University-National Oceanographic Laboratory System fleet.

rv *Sonne* is a 118m deep ocean German research vessel.

Merchant Ship Voyages in the Indian Ocean (1952-56)

Two known studies on whales were conducted in the Indian Ocean; one by the British with reports from British merchant ships from 1952 to 1956, and the other that started in 1954 by the Netherlands with the aid from the Netherlands navy and merchant-service. Areas traversed in the Indian Ocean were limited to a great extent by the main shipping routes.

1. Incidental cetacean sightings were recorded during voyages in the Indian Ocean by British merchant ships and other vessels (Brown, 1957). The approaches to Sri Lanka showed one of the greatest mileage steamed. The vessels apparently kept a fairly close watch for whales. From April 1952 to April 1956 133 reports were received by the National Institute of Oceanography at Wormley, UK. The reports identify, more or less tentatively, sperm whales, humpback whales and other unidentified rorquals. Within Sri Lanka's waters, sperm whales were reported in two recording periods, September to November and March to May. Humpback whales were sighted (n=5 sighting records) west of Sri Lanka near the Chagos-Laccadive Ridge centred around N8° (c. 50nm north of the Maldives). The highest concentration of whales in the NIO were reported from the Arabian Sea. This study is limited by the shipping routes, number of sightings and observer experience.
2. In 1954 the Netherlands Whale Research Group, Amsterdam (Holland) with the aid from the Royal Netherlands Navy and Netherlands merchant-service collected valuable information about whales (Slijper *et al.*, 1964). It was similar to the above British initiative and studied in more detail. A little booklet rather than a pamphlet dealing with whales was provided to the observers. Captain W.F.J. Mörzer Bruyns contributed sighting data from 1953 to 1959 with much greater reliability. As with the British voyages the approaches to Sri Lanka showed one of the greatest mileage steamed. This study has similar limitations as the previous but appears to be a little more reliable and detailed. The monthly distribution charts of whales in the Indian Ocean in 10° squares provide useful information in understanding their basic whereabouts. Sighting reports of whales from the Indian Ocean part of the study were as follows:

Species	No. of sightings	No. of animals
Rorquals	799	1,618
Sperm whales	-	728
Humpback whales	500	-

Tulip Expeditions (1982-84)

The *Tulip* research project was setup in 1981 in response to the need for benign whale research in the Indian Ocean Sanctuary. The expeditions were funded by the WWF (Netherlands) and carried out with the cooperation of NARA and CRIOMM in Sri Lanka. An enormous number of people helped with this project. In particular Dr Sidney Holt was largely responsible for its conception. Hal Whitehead led the project for the first two seasons and was an inspiring example and guide in the field. He and Roger Payne were major influences in initiating much of the field work. Jonathan Gordon took over from Whitehead and led the expeditions in the final season. Abigail (Gaie) Alling, Christopher Concerse, Nicola Davies, Philip Gilligan, Peter Lagendijk, Vassilli Papastavrou, Margo Rice, Nicola Rotton, Caroline Smythe, Martha Smythe and Linda Weligart were all part of the dedicated and enthusiastic crew members and field assistants (Alling *et al.*, 1982; 1983; 1984; Whitehead *et al.*, 1983; Gordon, 1987a).



SRV *Tulip*, Little Basses, A. ALLING

Visiting scientists onboard *Tulip* included Khamis al Farsi (Oman), Nihal de Abrew, Alexander Hiby (Netherlands), Dr. Leslie Joseph (NARA), Elizabeth Kemf (WWF International), Pieter Lagendijk (Netherlands), Cedric Martenstyn (NARA), Dr. Roger Payne (USA), and Rosemarie Sommer. Flip Nicklin (National Geographic) was onboard 5-13 November 1983.

During *Tulip* expeditions in Sri Lanka's waters benign research was conducted on sperm whales and blue whales as well as incidental sightings of all cetaceans were recorded from the Gulf of Mannar, around the south to Mullaitivu on the northern seaboard. The main focus of the expeditions was to study sperm whales. Gordon's primary focus was on sperm whales whilst Alling led the research on blue whales.

Tulip expeditions in Sri Lanka's waters were conducted over 4 seasons as listed in Table 28 (Alling *et al.*, 1982; 1983; 1984, Whitehead *et al.*, 1983; Alling, 1984a). Seventeen cetacean species were recorded during these expeditions and the species composition is shown in Table 33 (Alling *et al.*, 1982; 1983; 1984, Alling, 1984a; 1984b; Alling, 1986; Whitehead *et al.*, 1983). A seventeenth species, the humpback whale song was recorded in the Gulf of Mannar (Whitehead, 1983a). The full set of sperm whale sighting records are unavailable with the exception of season #3.

Table 28: Expeditions by *Tulip* in Sri Lankan and Maldivian waters (1982-84)

Season	Dates	Study Area	Voyage Duration	Source
#1	11-14 Feb 1982	South India to Colombo	4 days	Alling <i>et al.</i> , 1982
	19 Feb to 01 Mar 1982	Colombo & Gulf of Mannar	11 days	Alling <i>et al.</i> , 1982
	07-11 Mar 1982	Colombo & Gulf of Mannar	5 days	Alling <i>et al.</i> , 1982
	13-17 Mar 1982	Western seaboard	5 days	Alling <i>et al.</i> , 1982
#2	20 Jan to 25 Jan 1983	Gulf of Mannar	6 days	Alling <i>et al.</i> , 1983
	28 Jan to 07 Feb 1983	Colombo to Trincomalee	11 days	Alling <i>et al.</i> , 1983
	13-19 Feb 1983	Trincomalee	7 days	Alling <i>et al.</i> , 1983
	23 Feb 1983	Trincomalee	1 day	Alling <i>et al.</i> , 1983
	28 Feb 1983	Trincomalee	1 day	Alling <i>et al.</i> , 1983
	02-14 Mar 1983	Trincomalee to Batticaloa	13 days	Alling <i>et al.</i> , 1983
	16-22 Mar 1983	Trincomalee to Batticaloa	7 days	Alling <i>et al.</i> , 1983
	25-28 Mar 1983	Trincomalee to Kuchcheveli	4 days	Alling <i>et al.</i> , 1983
	29-31 Mar 1983	Trincomalee to Kuchcheveli	3 days	Alling <i>et al.</i> , 1983
	01 Apr 1983	Trincomalee	1 day	Alling <i>et al.</i> , 1983
	03-12 Apr 1983	Trincomalee to North of Mullaitivu	10 days	Alling <i>et al.</i> , 1983
	17-24 Apr 1983	Trincomalee to Batticaloa	8 days	Alling <i>et al.</i> , 1983
	#3	16 Oct to 27 Oct 1983	East: Trincomalee to Okanda	12 days
02 to 13 Nov 1983		Trincomalee to Colombo	12 days	Whitehead <i>et al.</i> , 1983
17 to 27 Nov 1983		Colombo to Male via Gulf of Mannar	11 days	Whitehead <i>et al.</i> , 1983
04 to 10 Dec 1983		Maldives	7 days	Whitehead <i>et al.</i> , 1983
#4	12-22 Feb 1984	Male to Trincomalee	13 days	Alling <i>et al.</i> , 1984
	01-08 Mar 1984	Trincomalee	9 days	Alling <i>et al.</i> , 1984
	10-19 Mar 1984	Trincomalee to North of Mullaitivu	10 days	Alling <i>et al.</i> , 1984
	23-25 Mar 1984	Trincomalee to Batticaloa	3 days	Alling <i>et al.</i> , 1984
	27 Mar to 01 Apr 1984	Trincomalee to Mullaitivu	6 days	Alling <i>et al.</i> , 1984
	08-12 Apr 1984	Trincomalee to Mullaitivu	5 days	Alling <i>et al.</i> , 1984
	16-17 Apr 1984	Trincomalee	2 days	Alling <i>et al.</i> , 1984
	19-25 Apr 1984	Trincomalee to Mullaitivu	7 days	Alling <i>et al.</i> , 1984
27 Apr 1984	Trincomalee	1 day	Alling, 1984a	

During season #4, Flip and Terry Nicklin spent much time at sea with *Tulip* aboard two locally chartered boats *Sofie* (a 10.4m motor cruiser) and *Roma*, a 12.8m yacht. They took advantage of *Tulip*'s close proximity to sperm whales to take underwater pictures for National Geographic Magazine. (Alling *et al.* 1984a). A article featuring the wwf Indian Ocean Sperm Whale Project was published in the Journal of the *National Geographic Society* was written by Hal Whitehead with photographs taken by Flip Nicklin between November 1983 and April 1984 (Alling *et al.* 1984a, Whitehead 1984).

The crew of the *Tulip* and NARA personnel assisted James R. Donaldson III's film crew, which included two well-known underwater cinematographers, Chuck Nicklin and Gordy Waterman, in the filming of blue whales and sperm whales for the production of two underwater films, *Whales Weep Not* and *Shadows & Footprints*, in association with NARA and WWF. NARA personnel who assisted with the production included Tissa Amaratunge, Dr. Hiran Jayewardene (NARA chairman), Rodney Jonklaas, Cedric Martenstyn and Dr. Onil Perera.

National Marine Mammal Programme (1985-86)

The NMMP programme was Sri Lanka's pioneering marine mammal project undertaken by NARA to establish systematic research. The programme was funded by UNEP through the UN Conservation Stamp fund. It was conducted by NARA under the chairmanship of Dr. Hiran Jayewardene with the advice of volunteer scientific consultants Dr. Roger Payne and Stephen Leatherwood with assistance from Abigail Alling. They trained NARA staff in techniques of data collection and analysis. The NARA staff included Afzal Ameen, Nihal de Abrew, Chitrangali Dissanayake, Asoka Gamage, Rohan Gunaratna, Palitha Gunewardene, Anouk D. Ilangakoon, G.R. Karunatileke, W.P. Mahendra, Chandana Mendes, Obeysekere, Lester Perera, W.P. Prematunga, Sujeewa D. Senanayake, and H.A. Kanthi Subasinghe.

TABLE 30: NMMP expeditions and mammal studies in Sri Lanka's waters

<i>Period</i>	<i>Vessel Name</i>	<i>Area</i>	<i>Nature of Cruise</i>
04-09 May 1985	SRV <i>Heraclitus</i>	Colombo to Dondra	Opportunistic
18 Jun 1985	FV 3.5 ton	Beruwala	Dolphin fishery study
06 Aug 1985	FV 3.5 ton	Beruwala	Dolphin fishery study
Sep 1985	RV <i>Samudra Maru</i>	Colombo	NARA training
16-19 Sep 1985	FV NW51	Mirissa	Opportunistic
16-19 Oct 1985	FV NW48	Southern fishing grounds	Dolphin fishery study
23 Oct 1985	FV <i>Masuda</i>	Mirissa	Dolphin fishery study
25 Oct 1985	FV 3.5 ton	Mirissa	Dolphin fishery study
05 Nov 1985	FV NW46	Mirissa to Galle	Opportunistic
19 Nov 1985	RV <i>Samudra Maru</i>	West of Colombo	Opportunistic
20 Nov 1985	RV <i>Samudra Maru</i>	Southwest of Colombo	Opportunistic
21 Nov 1985	RV <i>Samudra Maru</i>	Southwest of Colombo	Opportunistic
14-19 Dec 1985	RV <i>Samudra Maru</i>	Colombo - Kirinda	1st Oceanographic cruise
05-06 Mar 1986	MY <i>Lady Chatterly</i>	Negombo-Tangalle	Marine mammal study
29 Mar to 01 Apr 1986	TV <i>Muthukumari</i>	Colombo-Kalpitiya-Dondra	NARA training

Vessel Information: SRV *Heraclitus* - no further information. FV NW46, NW48, NW51 and FV *Masuda* are 11m fishing trawlers. RV *Samudra Maru* is a 22m NARA research vessel. MY *Lady Chatterly* - no further information. TV *Muthukumari* - a Fisheries Ministry training vessel.

From May 1985 to April 1986 at least fifteen voyages (34 days) that were conducted during this study are listed in Table 30 (NARA, 1987b; Leatherwood & Reeves, 1991). A Terminal Report to UNEP was completed for the project covering the entire contract period from 1 January 1985 to 31 March 1986. It is available at NARA, library catalogue number SL-083. Three technical progress reports were also produced during the course of the project for the periods January to May 1985, June to September 1985, and October 1985 to March 1986.

During the period 1984 to 1986, there are ninety-five live sighting records that comprise 11 cetacean species (Table 33). These records include live sightings from Oceanic Society expeditions and 12 NMMP voyages listed in Table 30 along with records from NARA whale-watching, and NARA land-based live sighting records.

Negombo & Beruwala Cetacean Survey (1994)

A monthly cetacean survey was conducted from May to Oct 1994 off Negombo and Beruwala along a 44nm cruise track (Ilangakoon *et al.*, 2000a). The cruise track off Negombo traversed continental shelf waters and off Beruwala it traversed across both sides of the continental shelf edge contour. Twenty-five sighting records of dolphins were catalogued as follows:

<i>Species</i>	<i>Negombo</i>	<i>Beruwala</i>
Bottlenose dolphins	2	9
Spinner dolphins	13	1

The differences in the number species sighting records documented off these two locations is likely due to the bathymetry differences of the two survey tracks. Spinner dolphins are more likely to be sighted on the continental shelf whereas bottlenose dolphins are more likely to be seen beyond the continental shelf.

Mir Voyages into Sri Lanka & Gulf of Mannar (2012-13)

CRIOMM invited Biosphere Foundation (a US based Foundation) to study the abundance and distribution of cetaceans and make recommendations for their long-term protection. Two voyages were conducted under this programme aboard *srv Mir*, a 34.4m research yacht.

1. Voyage into Sri Lanka (2012)

srv Mir on its voyage from Singapore entered the EEZ at N8° off Batticaloa on 9 December 2012 and arrived at Mirissa harbour on 12 December 2012. During this 4-day voyage in Sri Lanka's waters, six sighting records (5 x spinner dolphin and 1 x common dolphin) were documented (CRIOMM & BF, 2012; Ilangakoon & Alling, 2016).

Crew members: Abigail Alling (BF), Ed Baker, Ellie Heywood, Anouk Ilangakoon (CRIOMM), Dinouk Perera (CRIOMM), Leina Sato, Robert Thoren, Mark Van Thillo (skipper).

2. Gulf of Mannar Cruise (2013)

A research voyage from 16 to 23 January 2013 to study humpback whales in the Gulf of Mannar. Opportunistic sightings of cetaceans were recorded during the voyage. Total distance travelled from Mirissa to north of Kalpitiya and back to Mirissa was 463nm mostly in rough seas BS4-6.

Ten cetacean sighting records were documented (1 x blue/Bryde's whale, 1 x Bryde's whale (possible), 5 x spinner dolphin, 1 x humpback dolphin (probable), and 2 x unidentified delphinid) on 5 of the 11 days at sea (Alling & Martenstyn, 2013). Acoustic recordings were taken but no humpback whales were recognised.

Crew members: Roshan Abetwickrema (NARA-CRIOMM), Abigail Alling (BF), Chris Cooke, Virginia Coyle, Howard Martenstyn (CRIOMM), Ellie Starr, Robert Thoren, Mark Van Thillo (skipper).



Onboard *srv Mir*, Gulf of Mannar, CRIOMM/BIOSPHERE FOUNDATION

Southern Sri Lanka Blue Whale Observations (2009-12)

From December 2009 to November 2012 blue whale sighting data were collected by the crew of a whale-watching vessel, *Raja & the Whales*, a few miles south of Mirissa harbour. During this period a total of 485 blue whale sighting records were documented on a total of 390 days (Randage *et al.*, 2014). Days with no blue whale sightings are not provided. The total number of individuals was estimated to be 2,213 blue whales which include resightings of the same individual.

Southern Sri Lanka Blue Whale Studies (2009 & 2011-13)

Three studies on blue whales were conducted from 2009 and 2011 to 2013 between Weligama and Don- dra off the southern coast of Sri Lanka:

1. Blue Whale Inter-Annual Distribution (2009, 2011-12)

A study of the inter-annual variability in blue whale distribution. Data were collected in 2009 and during two field seasons between January and March in 2011 and 2012. Salinity, temperature and blue whale sightings including photo identifications were recorded. There was an apparent shift in blue whales further offshore in 2011 resulting from unusually high rainfall and increased fresh water run-offs (de Vos *et al.*, 2014; de Vos, 2015).

Table 32: Blue whale bathymetry distribution off Matara

Year	No. of sightings	$\leq 1,000$ m	$> 1,000$ m
2009	53	79%	21%
2011	39	20%	80%
2012	176	82%	18%

Table 33: Species composition from voyages in Sri Lanka's waters

Species	Tulip		NMMP		M. Baldirige		S. Sampada		South		P. Explorer		South	
	1982-84	1984-86	1995	2003	2003-07	2004-05	2008-09	2010-12	2012	2012	2012	2012	2014-15	
<i>Balaenoptera musculus</i>	29.2%	20.0%	16.4%	12.5%	6.5%	3.0%	23.2%	30.7%		77.7%			52.6%	
<i>Balaenoptera edeni</i>	12.3%	12.6%	5.5%	4.2%			5.8%	9.8%					3.2%	
<i>Megaptera novaeangliae</i>	0.2%	2.1%			1.1%									
<i>Physeter macrocephalus</i>	9.3%	5.3%	23.6%	13.9%	4.3%	9.1%	1.4%	17.6%		30.6%		5.8%	2.4%	
<i>Kogia breviceps</i>														
<i>Kogia sima</i>	0.2%		3.6%			3.0%		0.5%						
<i>Indopacetus pacificus</i>	0.5%							0.5%						
<i>Ziphius cavirostris</i>														
<i>Orcinus orca</i>		2.1%					1.4%	0.5%				0.7%		
<i>Globicephala macrorhynchus</i>	0.7%						1.4%							
<i>Pseudorca crassidens</i>	0.5%		1.8%	2.8%			1.4%					0.7%	0.3%	
<i>Feresa attenuata</i>	0.5%		1.8%	2.8%			1.4%	1.0%					0.6%	
<i>Peponocephala electra</i>				4.2%		3.0%						0.3%		
<i>Feresa attenuata</i>							1.4%							
<i>Grampus griseus</i>	7.9%	6.3%		8.3%	1.1%								1.5%	
<i>Tursiops sp.</i>	5.4%	2.1%	1.8%	4.2%	5.4%	9.1%	4.3%	1.5%		25.0%		4.5%	1.5%	
<i>Delphinus delphis</i>	0.5%	1.1%			2.2%					5.6%				
<i>Lagenodelphis hosei</i>	0.2%			6.9%										
<i>Steno bredanensis</i>	0.2%		1.8%											
<i>Sousa plumbea</i>						30.3%								
<i>Stenella coeruleoalba</i>	3.4%	1.1%	1.8%	4.2%	1.1%								3.5%	
<i>Stenella attenuata</i>	3.2%	2.1%		6.9%						2.8%			0.3%	
<i>Stenella longirostris</i>	12.5%	18.9%	23.6%	5.6%	7.6%	33.3%	56.5%	34.6%		11.1%		8.9%	11.2%	
<i>Balaenoptera sp.</i>	1.0%	2.1%	18.2%	1.4%	22.8%	9.1%	1.4%	1.0%		25.0%		1.4%	2.4%	
Unidentified whale	0.2%			1.4%	21.7%								7.6%	
Unidentified delphinid	10.6%	5.3%		20.8%	26.1%								11.5%	
Unidentified cetacean	1.2%						1.4%						1.5%	
Total %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
No. of sighting records	407	95	55	72	92	33	69	205	36	292	340	292	340	
No. of species recorded	17	11	10	12	5	7	9	11	5	7	10	7	10	

Note: Fin whale, sei whale and minke whale sighting records are included in *Balaenoptera* sp.

9. Whale Watching

It was off the coast of Sri Lanka in 2003 that Genevieve Johnson, the well-known cetological conservationist and broadcaster, had her ‘profoundly moving’ experience. Sri Lanka is one of the few places in the world that can offer a wealth of such experiences, yet the country’s reputation as a marine mammal haven is of relatively recent date. For centuries, Sri Lanka’s whales, dolphins and dugongs were a secret known only to fisherfolk and other residents of the island’s coastal districts including a small number of foreign mariners, whalers and naturalists.

The country first became the focus of international cetological attention in the early 1980’s, after three respected cetacean researchers – Hal Whitehead, Jonathan Gordon and Roger Payne – documented the unusual frequency of great whale sightings of its coasts aboard RV *Tulip*. Word began to spread beyond the cetological community in 1983, following an international conference held in Colombo (Volume II Appendix V) to increase awareness of the country’s cetacean heritage and the importance of conserving it. Even the President of the country ventured out to see these giant visitors (Yoo, 1983).

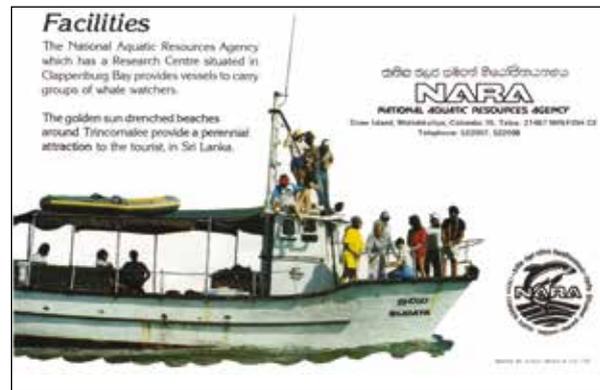
This stock of whales has probably never before afforded man economic gain. If it were exploited in the traditional way it would give short-term gain to a few, probably not local, people, before it was depleted. Hopefully it will now provide sustained incomes for several people and a great deal of enjoyment to many.

- SRV *Tulip*, WWF news

By 1984 whale-watching tours were being offered by NARA to a growing number of enthusiastic tourists and researchers. Sri Lankans from Colombo took part in the maiden voyage in Trincomalee. Under the leadership of Cedric Martenstyn/NARA, they were able to witness not only blue whales but also to observe pods of sperm whales resting at the surface (WWF, 1984).

Table 36: Oceanic Society whale-watching expeditions

Date	Vessel	Port
May 1984	wv <i>Sudaya</i>	Trincomalee
12-14 Mar 1985	wv <i>Sudaya</i>	Trincomalee
7-9 Mar 1986	MY <i>Lady Chatterly</i>	Tangalle



One tour operator of particular significance was the Oceanic Society, a us-based conservation group which conducted whale-watching tours out of Trincomalee in May 1984, March 1985 and off the south coast of Sri Lanka in March 1986 (NARA, 1984; 1987b; WWF, 1984, Leatherwood & Reeves, 1991). Numerous cetacean sightings were recorded on these tours: species observed included blue whales, Bryde’s whale, Risso’s dolphin, bottlenose dolphins and spinner dolphins. Professionally managed and conducted by NARA, the Oceanic Society tours proved conclusively that marine mammal watching in Sri Lanka’s waters was a viable commercial proposition. Unfortunately, the long period of ethnic and civil conflict into which the country entered at about the same time brought commercial whale-watching – as well as most other tourism-related activity – to a halt.

To see a blue whale at sea is something most of us can only dream about. To see more than one in a lifetime is a rarity reserved for a fortunate few. To be in a boat surrounded by five or six blue whales is an experience so profoundly moving, it inspires us to... fight for the conservation of whales and their ocean environment.

- Genevieve Johnson
Conservationist

Following the end of the war in 2009, marine mammal watching in Sri Lanka experienced a resurgence in Kalpitiya and Mirissa. Early pioneers have now been followed by a growing number of commercial operators based at the same locations, as well as at Trincomalee on the east coast of the country. Whale-watching is now high on the list of holiday activities for tourists visiting Sri Lanka.

Observing marine mammals at close range, we are typically enchanted or awed by what we see. We bond with these wondrous creatures emotionally and aesthetically even as we gain first-hand knowledge about their lives and deeper understanding of the dangers facing them. Increased interest in and sympathy toward marine mammals tends to generate more support for conservation, helping preserve Earth’s marine mammal biodiversity for generations to come.

- Howard Martenstyn
Out of the Blue

10. Catalogue of Species: Distributions, Observations & Status

This chapter provides detailed information for each marine mammal species. These include observations based on sighting records, any taxonomic notes if any and its status. Distribution records for each of the species are given in Volume II Appendix VI along with the source reference(s). Each species account follows the following format:

FRONT MATTER

Each species account starts with the most current widely used common name and scientific name of the species along with a illustration of the specimen.

Synonyms: Other scientific names applied to a single taxon referenced in sighting records (Volume II Appendix VI). Only synonyms quoted in Sri Lanka sighting records or checklists are included.

Other common names: Sinhala and Tamil common names with references to published literature as applicable. There are several variations in Sinhala and Tamil that have been documented for marine mammals. They sometimes vary by region and/or species.

<u>English</u>	<u>Sinhala</u>	<u>Tamil</u>
whale	thalmaha (Deraniyagala, 1932)	thimingalam (Gunaratna In: NARA, 1987b)
	thalmasa (Martensstyn, 2013b)	thiminkalam (Yapa & Ratnavira, 2013)
dolphin	mulla (Lantz & Gunasekara, 1955)	ongil (Lantz & Gunasekara, 1955)
		oongi (Gunaratna In: NARA, 1987b)

Smaller blackfish were known locally as *makara mulla*, or dragon dolphin (Leatherwood & Reeves, 1991).

Panavai meen may also be a general Tamil name for all dolphins (Sathasivam, 2004).

Other English common names of a species used in past literature are also included but their use is discouraged in preference to the widely accepted common name today. Some of the English common names are now outdated and not used anymore.

IUCN Status: Worldwide conservation status as determined by IUCN is given for each species. Since cetacean taxonomy continues to evolve the ecological needs and parameters for many species are as yet not well understood. There are several species of cetaceans that are listed as Data Deficient or not evaluated. In some cases local conservation status may differ. For example, the dugong - regarded by IUCN as merely 'vulnerable' - is more likely highly threatened and heading for extinction in Sri Lanka's waters.

Taxonomic Notes: The latest relevant taxonomic information, if any, relating to each species.

For some species, a description of the identification features of the species or differences between closely related species or subspecies is provided.

The number of species sighting records in Sri Lanka's waters is summarized in a table at the beginning of each species section. Numbers shown in the table are total of all sighting records rated as positive with the inclusion of the number of probable, possible and undetermined records, if any. Numbers of museum and institution specimens are given under the table. The total number of museum specimens does not distinguish between positive and unconfirmed species records.

OBSERVATIONS

This sub-section provides information based on all sighting records related to the subject species. It includes information on strandings, fishery specimens and live sightings.

In most species accounts, charts related to the number of records by month, maritime province and bathymetry distribution are provided. The bathymetric distribution charts represent live sighting records based on sea depth at point of first sighting only. Given the non uniform topography of the continental shelf around Sri Lanka with its submarine canyons, it makes more sense to look at cetacean distribution as it relates to bathymetry rather than distance from shore.

Distribution maps depict locations (POI) where marine mammal sightings have been recorded. The GPS locations mapped include the first and last locations of sighting where available in sighting records. Intermediate animal sighting locations are not included in the maps although they have been recorded in some instances for further studies. On sighting location maps (Figure 41), the whitish line around Sri Lanka shows the continental shelf edge contour while the line between India and Srilanka is the Indo-Sri Lankan maritime boundary which extends out to the EEZ. Dots represent cetacean sighting locations where n is the number of POI on the map.



Figure 41: Distribution map of cetacean sighting locations (n=2,637 POI)

Other information related to live sightings such as documented behaviour, movements, individual identification and resightings, presence of calves and associates are included in the observations where available.

All or some of the strandings are detailed under observations for each of the marine mammal species. Strandings as a whole entity was treated as a subject previously (page 41) and all stranding records are listed in Volume II Appendix III. Further information about a stranding may be obtained from the source references of each of the sighting records provided in Volume II Appendix VI.

Also included are available metrics from the sighting records such as group size, lengths, calves, appearance, number of throat groves/baleen plates or number of teeth, diet, acoustics, DNA, SST and salinity.

Movements: The movements of the species largely based on recorded animal headings.

Individual Identification: Information related to resightings of individuals largely based on photo ID. Photographs of individuals in the CRIOMM ‘Records Photo Library’ along with repeatedly recognized individuals are shown in Volume II Appendix II.

Associations: Number and type of mixed-species sighting records is listed for each species and is treated as a whole entity in Chapter “11. Mixed-Species Associations” on page 229. Refer to Volume II Appendix I for detailed observation notes of each sighting recorded.

Adjacent Waters: Observations related to marine mammal sightings in adjacent seas of the Maldives, India and may extend to other parts of the NIO, particularly in rare or uncommon species.

DISCUSSION

A discussion around the observations studied for the species.

CONCLUSION

Concluding remarks based on all of the above information of the species.

Blue Whale



Balaenoptera musculus (Linnaeus, 1758)

Synonyms: *Balaenoptera indica* (Blyth, 1859), *Sibbaldus musculus* (Linné, 1758)

Sinhala names: nil thalmasa/thalmaha

Tamil names: neelath thimingalam

IUCN Status: Endangered.

CITES: Appendix I

CMS: Appendix I

Taxonomic Notes: Within the Indian Ocean three subspecies have been recognised by the Committee on Taxonomy (2018): Antarctic blue whale, *B. m. intermedia* (Burmeister, 1871), pygmy blue whale, *B. m. brevicauda* (Ichihara, 1966) and Northern Indian Ocean blue whale, *B. m. indica* (Blyth, 1859). The first subspecies, *B. m. intermedia*, is accepted as a ‘true’ blue whale and the existence of a separate subspecies, *B. m. indica*, is not widely recognised. Blue whale sub specific taxonomy in NIO is not fully elucidated. Uncertainty surrounding the blue whale’s status, as a subspecies, resides in the problem of distinguishing among them and populations (Rice, 1988; Reeves *et al.*, 1998).

Elsewhere, there are two other subspecies: Northern blue whale, *B. m. musculus* (Linnaeus, 1758) and Chilean blue whale, *B. m.* un-named ssp. (Committee on Taxonomy, 2018).

Differences of Antarctic and Pygmy forms of Blue Whales: The Antarctic blue whale is the largest of the subspecies in the Indian Ocean that attains a total length greater than 29m as against up to c. 25m in pygmy blue whales. It has a “torpedo-shaped” body and longer peduncle as compared to the pygmy blue that has a “tadpole-shaped” body with a proportionately larger head, slightly fewer ventral grooves and shorter baleen. Antarctic blue whale bodies are blue steel-grey in colour whereas pygmy blues are more silvery-grey. (Jefferson *et al.*, 2015).

Another morphological difference is the position of the central groove of the blowholes in relation to the blowholes. The central groove usually ends with the anterior margin of the nostrils in the Antarctic blue but extends beyond the nostrils in the pygmy blue (Kato *et al.*, 2001; Ilangakoon & Sathasivam, 2012).

Table 39: Number of blue whale records

<i>Stranding Records</i>	<i>Fisheries Records</i>	<i>Specimen Records</i>	<i>Live Sighting Records</i>	<i>Total Records</i>
29-42	1	0	669-1,880	699-1,923

Number of museum specimens: 5

OBSERVATIONS

Blanford (1891) was the first to mention the occurrence of *Balaenoptera indica* on the coasts of Sri Lanka.

Strandings: There are several stranding records of this species and has previously been discussed collectively in “6. Strandings” on page 41. Information related to each stranding record is provided in Volume II Appendix III. The earliest records of blue whale strandings are September 1894, August 1910, 26 May 1932, 30 May 1932. Except for the 26 May 1932 record the others lack species specific information. Deraniyagala’s description of the 26 May 1932 specimen fits fairly well with the forma typica except for the number of baleen plates that could possibly have been miscounted (Deraniyagala, 1932).

Since 1932, there are at least another four stranding incidents reported between 1934 to 1946. In 1949, individual whale strandings were recorded at Bambalapitiya, Colombo in April and June, and another specimen 22m in length at Araliyai, Jaffna (Deraniyagala, 1950; 1965c). All three whales were thought to be fin whales, *Balaenoptera physalus*. These non-descriptive specimen records are most likely misidentification’s and have now been re-classified as probable blue whales.

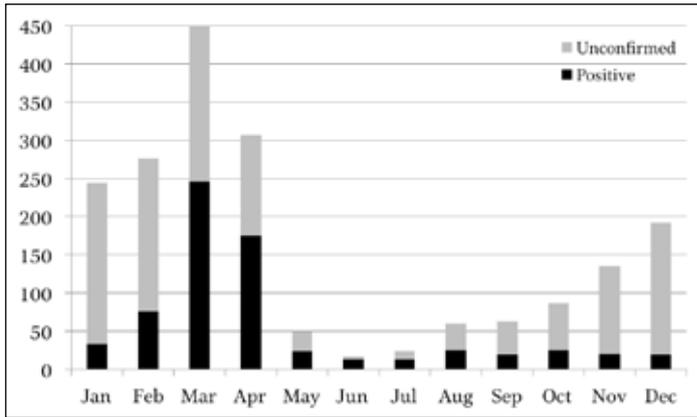


Figure 43: Blue whale distribution sighting records by month (n=1,906)

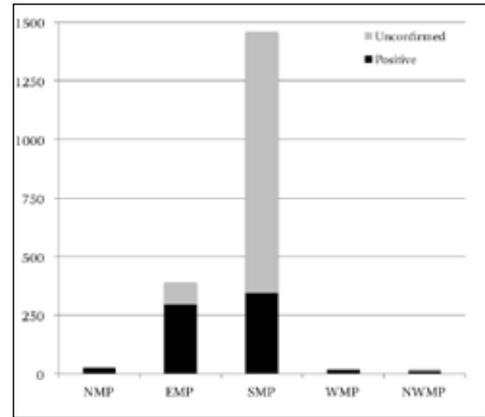


Figure 44: Blue whale distribution sighting records by MP (n=1,920)

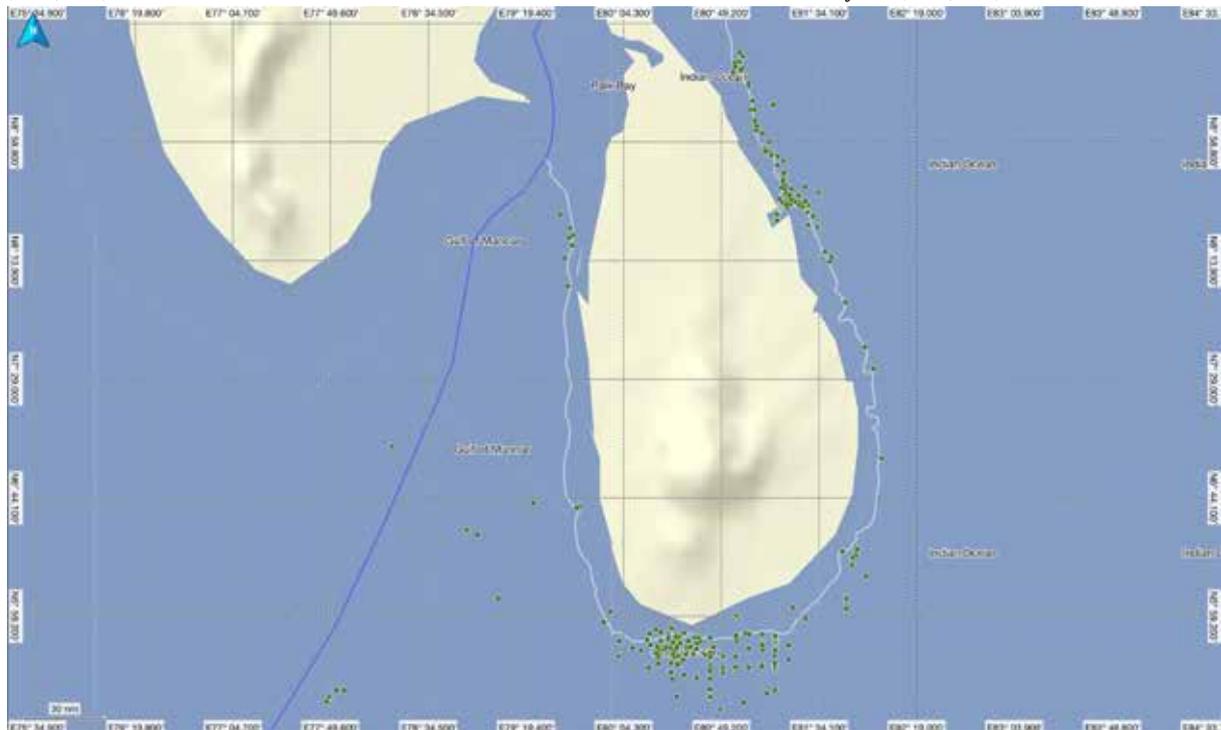


Figure 45: Blue whale sighting locations (n=864 poi)

Live Sightings: Blue whales have been recorded in all months (Figure 42). There is a distinct sighting peak around Sri Lanka during 1M-1 with an abundance of sightings recorded from Galle to Hambantota (in the SMP) and from Trincomalee to Kokkilai (EMP). Many of these records are unconfirmed and come from commercial whale-watching.

Blues are widely distributed in Sri Lanka's waters off the southern coast from Galle to Little Basses canyon, and in the east and northeast from Batticaloa canyon to Mullaitivu canyon (Figure 45). This species occurs mainly on and near the continental shelf edge and also in open oceanic waters (Figure 46). Aggregations of blue whales have been mostly recorded around submarine canyons with blooms of plankton where they tend to gather for feeding. Individuals rarely entered neritic waters (less than 50m depths) to feed but have been recorded in shallow waters off Kalpitiya, Mirissa and in Trincomalee outer harbour (Martenstyn, 2019). Bryde's whales are known to forage in these very same areas as the blues.

Blue whale sightings are very scarce in June-July around Sri Lanka (Figure 42). This scarcity of

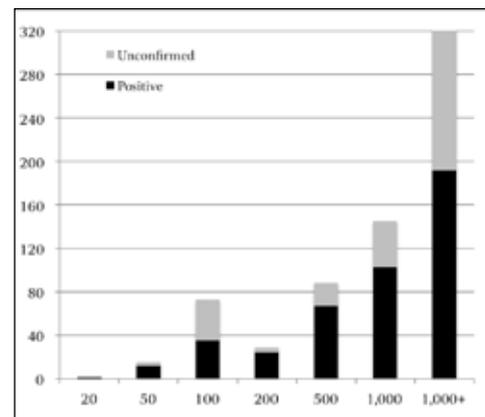


Figure 46: Blue whale bathymetric distribution sighting records in metres (n=676)

Table 43: Net vector headings of blue whales by month around Sri Lanka (n=86)

<i>Locality</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>Jul</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
Mullaitivu			S ¹	S ²					
Trincomalee		SE ²	SSE ²⁵	SSE ¹⁷	SE ²	N ²	N ³		
Little & Great Basses					W ⁵				
Kirinda					W ¹				
Ahangama-Dondra	SE ⁴	SE ³	SSW ³	SE ⁷			SE ¹	E ¹	SE ²
Kalpitiya			S ¹	SSW ⁴					

Note: Number of records with whale headings for the month is shown in superscript.

Table 44: Sightings of repeatedly recognised blue whales

<i>Whale ID No.</i>	<i>First Sighting</i>		<i>Second Sighting</i>		<i>Third Sighting</i>	
	<i>Date</i>	<i>Location</i>	<i>Date</i>	<i>Location</i>	<i>Date</i>	<i>Location</i>
3	28 Feb 1983	Trincomalee	08-Mar-1984	N8 34.5 E81 28.2	19 Mar 1984	N8 34.4 E81 28.2
11	28 Feb 1983	N8 34.1 E81 19.5	03 Mar 1983	N8 37.2 E81 16.2	05 Mar 1983	N8 34.3 E81 15.8
14	28 Feb 1983	N8 36.2 E81 19.3	03 Mar 1983	N8 37.4 E81 15.9	31 Mar 1983	N8 36.5 E81 17.0
1	02 Mar 1983	N8 34.0 E81 18.7	05-Mar-1983	N8 34.3 E81 15.8		
5	03 Mar 1983	N8 37.2 E81 16.2	17 Mar 1983	N8 34.7 E81 20.8		
19	06 Mar 1984	N8 35.9 E81 26.6	07 Mar 1984	N8 35.5 E81 25.4		
24	06 Mar 1984	N8 35.4 E81 22.7	08 Mar 1984	N8 34.5 E81 24.8	23 Mar 2011	N8 32.2 E81 22.8
23	07 Mar 1984	N8 35.6 E81 27.1	08 Mar 1984	N8 36.0 E81 25.5	19 Mar 1984	N8 36.5 E81 24.3
27	30 Mar 1984	N9 25.3 E80 54.6	17 Apr 1984	N8 35.7 E81 20.8		
25	16 Apr 1984	N8 35.9 E81 26.0	17 Apr 1984	N8 35.7 E81 20.8		
SLBM044	03 Apr 2008	Mirissa	18 Apr 2013	Mirissa	10 Jan 2015	Mirissa
SLBM027	21 Feb 2011	Mirissa	17 Jan 2012	Mirissa		
SLBM045 BLW047	4 Mar 2012	Mirissa	13 Apr 2018	N8 43.5 E81 18.9		
BLW002	01 Oct 2012	N8 36.1 E81 18.8	22 Aug 2016	N8 41.1 E81 16.6		
BLW008	01 Oct 2012	N8 36.0 E81 18.2	22 Aug 2016	N8 41.1 E81 16.6		
BLW010	04 Oct 2012	N8 41.9 E81 20.7	05 Oct 2012	N8 43.0 E81 19.5		
SLBM013	25 Jan 2013	N5 47.2 E80 26.6	26 Jan 2013	N5 45.3 E80 27.5		
SLBM035	26 Jan 2013	N5 48.7 E80 26.7	15 Feb 2013	N5 45.2 E80 26.5		
SLBM033 BLW028	05 Feb 2013	Mirissa	01 Apr 2017	N5 49.0 E80 24.4		
SLBM034	06 Feb 2013	Mirissa	08 Feb 2013	Mirissa	19 Feb 2013	Mirissa
SLBM044?	25 Nov 2013	Mirissa	10 Jan 2015	Mirissa		
BLW018	12 Apr 2015	N5 48.9 E80 32.7	10 Mar 2016	N5 47.3 E80 27.5		
BLW029	15 Apr 2017	N8 32.2 E81 16.6	18 Apr 2017	N8 29.1 E81 14.8	19 Apr 2017	N8 29.0 E81 14.0
BLW037	06 Apr 2018	N9 28.8 E80 55.4	7 Apr 2018	N9 20.1 E81 01.7		
BLW039	08 Apr 2018	N9 07.0 E81 04.5	13 Apr 2018	N8 43.5 E81 18.9		

Individual Identification: During 1983-84 *Tulip* expeditions, 35 blue whales were identified through photos (Alling *et al.* 1991). Ten of these blues were repeatedly recognised whales between Trincomalee Bay and Mullaitivu (Table 44). Since 2013 a photo identification project on Sri Lankan blue whales has catalogued at least 81 individual blues off Mirissa and Trincomalee and from which at least five individuals were identified as repeatedly recognised whales off Mirissa (Gemmell *et al.*, 2014). Since then one other repeatedly recognised blue whale has been published (De Vos, 2016). Photo identification of another 49 blues by the author from Mullaitivu, Trincomalee, Little Basses, Mirissa and Kalpitiya sea areas have been catalogued in the CRIOMM Photo Library (Martenstyn, 2019). In addition, another seven blues with photo identification are included in the Photo Library (Goonewardena In: Martenstyn, 2019). In total, about 170 individual blues have been identified through photo identification in various

catalogues. As a result of further photo identification studies by the author, the number of resightings of repeatedly recognized blue whales has increased from 15 to 24 individuals (Table 44).

This photo identification study of repeatedly recognised blues has the following observations:

- The longest movement in the same year was of blue whale number 27, a distance of c. 55nm in 18 days that moved southwards in March-April from Mullaitivu to Trincomalee (Alling *et al.*, 1991). The second longest movement was of blue whale number BLW039 that moved a distance of 27nm over 5 days from Mullaitivu to Trincomalee (Martenstyn, 2019).
- Besides the 2 individuals above sighted at Mullaitivu and then at Trincomalee in the same year, the first record that connects blues at different geographical areas around Sri Lanka has become available. This record is of blue whale number SLBM045 sighted off Mirissa in March 2012 and resighted six years later (BLW047) off Trincomalee in April 2018 (Martenstyn, 2019).
- The longest time between resighting individuals within a year was 31 days by whale number 14 off Trincomalee (Alling *et al.* 1991). The longest time between resighting individuals was 27 years for whale number 24 off Trincomalee (Alling *et al.*, 1991; De Vos, 2016).
- Two individuals sighted on 1 October 2012 (BLW002 and BLW008) were resighted on 22 August 2016 in almost the same location (5.3nm away) off Swami Rock, Trincomalee (Martenstyn, 2019; Goonewardena In: Martenstyn, 2019)

Sightings of repeatedly recognised whales have been recorded at Mullaitivu (N9° 20-28'), Trincomalee (N8° 29-44') and Mirissa (N5° 45-49') sea areas in the following months.

<u>Mullaitivu</u>	<u>Trincomalee</u>	<u>Mirissa</u>
Mar-Apr	Feb-Apr, Aug, Oct	Jan-Apr, Nov

Three repeatedly recognizable photographs of whale number SLBM037 were examined in Gemmill *et al.* (2014). The individual was resighted 2 times (both in the month of February) over two years and then again 3 years apart. However, they appeared to be different whales and is therefore excluded in the list of repeatedly recognised blue whales.

One recognisable blue (BLW018) sighted in April 2015 and then again in March 2016 was recorded 5.3nm apart south of Mirissa (Martenstyn, 2019). Another blue whale (BLW029) was sighted entering Koddidiyar Bay on 15 April 2015. It was seen daily until 20 April morning when it was reported (unconfirmed) to have been struck by a whale-watching dinghy. A search for the whale in Trincomalee outer harbour was conducted in the evening of 20 April but there was no blue whale to be seen (Martenstyn, 2019). Photographs of repeatedly recognised and other individual blue whales from the CRIOMM Photo Library are provided in Volume II Appendix II.

Associations: 9 x blue whale and Bryde's whale, 2 x blue whale and Omura's whale, 1 x blue whale and humpback whale, 3 x blue whale and spinner dolphin, 1 x blue whale, Bryde's whale and Eden's whale, 2 x blue whale, Bryde's whale and Omura's whale, 1 x blue whale, Bryde's whale and orca, 1 x blue whale, pilot whale, common bottlenose dolphin and Indo-Pacific bottlenose dolphin, 2 x blue whale and giant manta ray. Almost all blue whales had one or several remoras attached to its flukes, body or head.

Group Size: 2-25+. Blue whales are mainly solitary or found in pairs (pod size up to 3) but loose aggregations are sighted in feeding areas, sometimes forming large aggregations of over 20.

Table 45: Blue whale sighting records of over 15 whales

<i>Sighting Date</i>	<i>Group Size</i>	<i>Location</i>	<i>Notes</i>	<i>Source</i>
23-Feb-1983	16	Trincomalee	Within 4 hours	NARA, 1987b
22-Mar-1983	23	Trincomalee	Spread within 10nm	Alling <i>et al.</i> , 1983
05-Nov-2010	25+	Mirissa	Travelling east	de Silva Wijeyeratne & JEH, 2012
Jan-2011	24	South	Swam past vessel	Martin & Web, 2011
25-Mar-2012	20-50	Hikkaduwa	Resting	Goonewardena, 2015
20-Mar-2014	41-42	Hambantota	Spread within 12.6nm	Priyadarshana <i>et al.</i> , 2016
01-Nov-2016	18-25	Little Basses	Shallow feeding	Martenstyn, 2019
02-Nov-2016	16-24	Little Basses	Shallow feeding	Martenstyn, 2019
06-07 Mar 2018	40+	Trincomalee	5 groups	Goonewardena In: Martenstyn, 2019

During the austral winter, there may possibly be some Antarctic blue whales present in Sri Lankan and Maldivian waters (Yapa & Ratnavira, 2013). If these species were to migrate into Sri Lanka's waters then one would expect them to be present sometime during May to September (austral autumn and winter). This period coincides with the southwest monsoon when voyages off the southern and western seaboard are not practical and where upwelling is greatest. Could it be possible that the dip in sightings during the SWM indicate that most of the blue whales have migrated or the blue whales seen during the dip include subspecies from the southern ocean or are some of the blue whales residents? Are all of the whales seen from September to May pygmy blue whales and could some of those seen June to August be Antarctic blue whales? These and many other questions are yet to be answered by further research.

Within Sri Lanka's waters blues are distributed mainly on and near the continental shelf edge and also in open oceanic waters beyond the shelf (Figure 46). Interestingly blues sometimes feed in shallow waters (50-100m isobaths) sympatric with Bryde's whales. Individuals rarely entered neritic waters (less than 50m depths) to feed. They appear to have less of a preference between the 100m and 200m isobaths. Large aggregations of blues tend to occur around submarine canyons when blooms of zooplankton are present. Site fidelity extending from several days to over a week is evident during blooms of plankton.

Due to lack of technical information and discrepancies of specimen descriptions in early records it is difficult to say which is the earliest definitive record of a blue whale from Sri Lanka. For these reasons, in 1983 NARA was hesitant to add the blue whale to the checklist of marine mammals (Santerre & Santerre, 1983). There is no way of knowing but it is quite possible that the earliest record of the blue whale from Sri Lanka maybe even an unidentified rorqual record such as the stranding in 1832 (Kelaart, 1852).

CONCLUSION

There is no doubt about the presence and abundance of blue whales around Sri Lanka. Blues have been recorded since 1891 but it is not possible to say with certainty which was the earliest recorded blue whale due to lack of descriptions, discrepancies in descriptions, reclassifications without reasons and confusion with fin whales. Even the earliest unidentified rorqual stranding in 1832 (Kelaart, 1852) may have been a blue whale. In 1983 Santerre and Santerre after a careful examination of historical records were hesitant to add this species to the checklist of cetaceans from Sri Lanka.

Despite being the largest mammal on Earth and the most common baleenopterid species in Sri Lanka's waters, blue whale distribution and movements within Sri Lankan waters and the NIO remain imperfectly understood. After reviewing several 100's of blue whale sighting records and research papers written on blue whales in the Indian Ocean, the movements or migrations of blue whales in and out of Sri Lanka's waters are beginning to show patterns but remains uncertain and will need to be revised as new information becomes available. Data shows strong evidence of Sri Lanka's waters being a feeding and breeding area for blue whales. In addition, there's a likelihood of more than one subspecies or population occurring in Sri Lanka's waters (Branch *et al.*, 2007; Ilangakoon & Sathasivam, 2012). Analysis of vocalizations suggests there may be three sub-populations of a tropical subspecies in the northern and tropical Indian Ocean (Branch *et al.*, 2007).

Blue whales are commonly sighted in Sri Lanka's waters in all months of the year with a peak in March-April. As evidenced by sightings their population appears to be recovering since the Indian Ocean was declared a sanctuary. IUCN has assessed the global population numbering 5,000-15,000 mature individuals with an increasing population trend. Blue whales have been recorded on the continental shelf but are more likely to be found nearer the continental slope and also beyond. It appears that the largest abundance of blue whales seen around Sri Lanka during the northeast monsoon and first intermonsoonal seasons possibly migrate or move to some unknown destination(s) in the west and southwest towards the end of April and through May and return to Sri Lankan territorial waters around July to October. Parts of the Sri Lankan population (subspecies) possibly migrate to areas of intense upwelling and possibly to more than a single destination such as Diego Garcia and West Africa. Some may remain in or near Sri Lanka's waters to the west and south, and take advantage of the intense upwelling during the mature phase of SWM.

During the austral autumn and winter (May-September), blue whale sightings in Sri Lanka's waters are significantly less than the rest of the year and are recorded mostly off the northeast coast and to a small extent off the south and west coasts. The latter is largely due to a lack of sighting effort. Besides *B.m. breviceauda*, if there is another population or subspecies of blue whales present in Sri Lanka's waters, then this is likely to occur in and around July to August. Further scientific research is needed to correlate these understandings to the blue whale subspecies and/or populations of which at least two may occur in Sri Lanka's waters and adjoining seas.

Table 52: Number of Omura's whale records

<i>Stranding Records</i>	<i>Fisheries Records</i>	<i>Specimen Records</i>	<i>Live Sighting Records</i>	<i>Total Records</i>
0	0	0	9-10	9-10

Number of museum specimens: 0

OBSERVATIONS

This species is known from 6-8 recent live sightings from Trincomalee, Little Basses reef and Mirissa in shallow water at depths less than 200m (Figure 68, Figure 70). All sightings occurred in only 3 months of the year mostly during the intermonsoonal periods IM-1 and IM-2 (Figure 67).

1. The first sighting record of Omura's was in April 2013 when photographs taken during a whale-watching trip from Chaaya Blu resort shows spinners bowriding off a Omura's whale. In one instance a spinner was observed under and across as the whale surfaced. This apparent friendly association of these two species were sighted at Trincomalee close to Swami Rock for a period of over half an hour (Gemmell In: Martenstyn, 2019). The photograph of spinners bowriding the whale was mistaken published in 2013 as a Bryde's whale (Martenstyn, 2013b).
2. The next sighting record of Omura's was in April 2015 of a mother-calf pair off Ilanthadiya, Kalpitiya. They were closely associated in the vicinity of a blue whale (Martenstyn, 2019).
3. The following year in April 2016 an Omura's whale was observed travelling away from Trincomalee outer harbour towards Swami Rock c. 1nm from shore. The whale was photographed by a whale-watcher and the scientist onboard identified the species at the time of sighting (Vincze In: Martenstyn, 2019).
4. In the early morning hours of 2 November 2016 a mixed aggregation of Omura's whales amongst Bryde's whales and a blue whale were observed at Little Basses Reef within 1.7nm of the lighthouse, spot depths ranged from 23-130m. These were initially thought to be 12 Bryde's whales until photographic analysis was conducted several months later. At the time of observation some of the whales looked different in colouration including markings and were thought to be a variant of Bryde's whale complex.

Unknowingly the first published photograph of an Omura's whale in Sri Lanka's water was mistakenly identified as a Bryde's whale when it was hurriedly published within weeks of the sighting which showed a Bryde's whale having a white coloured right lower jaw (Martenstyn 2016b). The asymmetrical jaw colouration was mistakenly discounted initially as an earlier Bryde's whale photograph showed a similar right lower jaw colouration due to reflection of water pouring out of its mouth. The number of Omura's present was later estimated at 4-8 individuals based on all photographs taken over almost 4 hours. Another mixed aggregation was recorded the previous afternoon which probably included Omura's in the mix but there are no photographs to confirm this. Fortunately the unusual Bryde's whales initially seen prompted a return to the area early the next morning for another look (Martenstyn, 2019).

5. The fourth confirmed record is a sighting in 2017 of an individual between Mirissa and Mataara c. 3.5nm from shore, spot depth 60-65m. This was the first published record that identified Omura's in Sri Lanka's waters (De Vos, 2017).

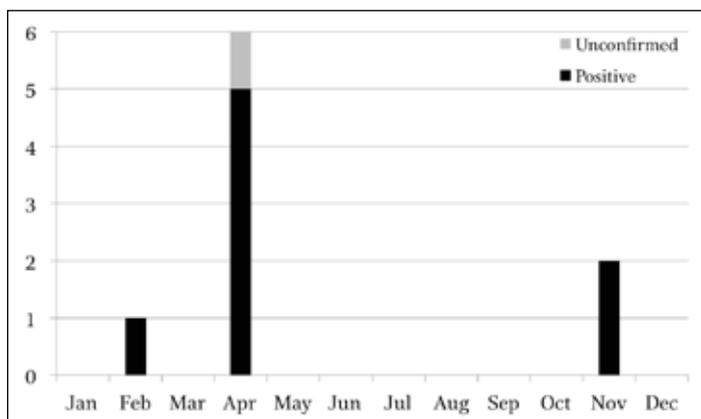


Figure 67: Omura's whale distribution sighting records by month (n=9)

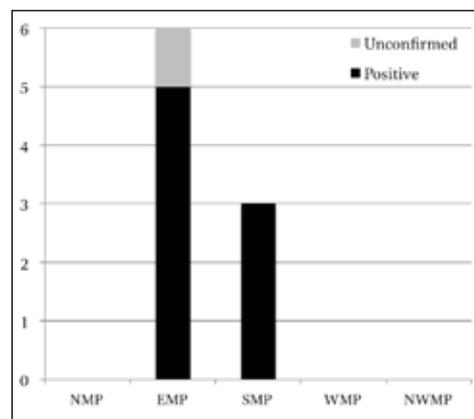


Figure 68: Omura's whale distribution sighting records by MP (n=9)



Figure 69: Omura's whale sighting locations (n=10 POI)

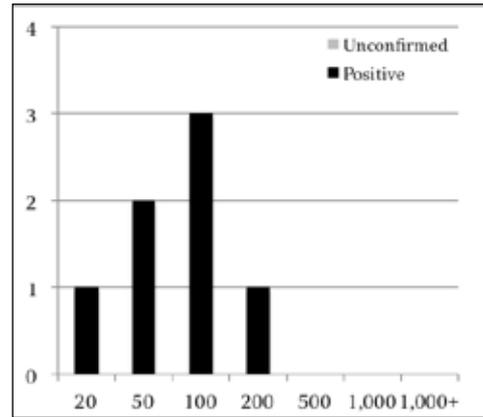


Figure 70: Omura's whale bathymetric distribution sighting records in metres (n=7)

6. Also in 2017 an individual was sighted off Elizabeth Island in Koddigar Bay, Trincomalee outer harbour and the first drone footage of this species was taken (Dykstra In: Martenstyn, 2019).
7. The next two records were of an individual sub-adult c. 8m in length that was sighted in Koddigar Bay, Trincomalee outer harbour on two consecutive days in April 2018. The two sightings were 1nm apart close to Upparu bridge, sea state BS0-1. First sighting spot depth was 9.2m and the next day's sighting spot depths ranged of 30-90m (Martenstyn, 2019).
8. Three days later, there is an unconfirmed sighting reported of an individual in Koddigar Bay, Trincomalee outer harbour (Goonewardena In: Martenstyn, 2019).

Behaviour: A total of 11 dive and surface times were recorded from an individual in Koddigar Bay with spot depths that ranged from 30 to 90m. Average dive time was 5:20min and average surface time was approximately 2 minutes with 4-6 breaths. It surfaced near the vessel on a couple of occasions. It never showed its flukes on dives. The animal did not have a preferred heading and instead appeared to be feeding as evidenced by its behaviour, occasional baitfish at surface and its track. At the end of the sighting period the animal was moving towards Tambalagam Bay. There were no other vessels around to cause disturbance.

Lunge feeding was observed twice at the Little Basses reef. Terns were present and also feeding along with the whales. There is one rare sighting of a Omura's whale with bowriding spinner dolphins near Swami Rock, Trincomalee (Gemmell In: Martenstyn, 2019). This individual was initially thought to be a Bryde's whale. Fluking was observed in one instance at the Little Basses and the white ventral surface of the flukes were seen.

Individual Identification: There is one confirmed resighting of a sub-adult in Koddigar Bay, Trincomalee on two consecutive days. There were likely resightings of individuals on 1-2 November 2016 at the Little Basses reef but cannot be confirmed without photographic identifications from the first day.

Table 53: Sightings of repeatedly recognised Omura's whales

ID #	First Sighting		Second Sighting	
	Date	Location	Date	Location
OMW010	25 Apr 2018	N8 28.80 E81 14.64	26 Apr 2018	N8 29.09 E81 13.59

Associations: 2 x blue whale and Omura's whale, 1 x Omura's whale and spinner dolphin, 2 x blue whale, Bryde's whale and Omura's whale.

Group Size: solitary and aggregations of 4-8 occur at feeding grounds.

Calves: One mother-calf pair was sighted in April 2015 off Kalpitiya.

Dorsal fin: highly variable in shape; triangular or recurved. Tip is mostly acutely rounded or may be pointed. The dorsal fin tip is mostly pointed backwards. Smaller animals' dorsal fin may be more erect similar to a Bryde's whale.

Diet: Likely feed on baitfish and possibly zooplankton.

Adjacent Waters: In 2015, a positive sighting of 4-5 Omura's whales just outside Port Blair, Andaman Islands travelling at c. 8 knots. There are no sighting records available as yet from the Maldives.

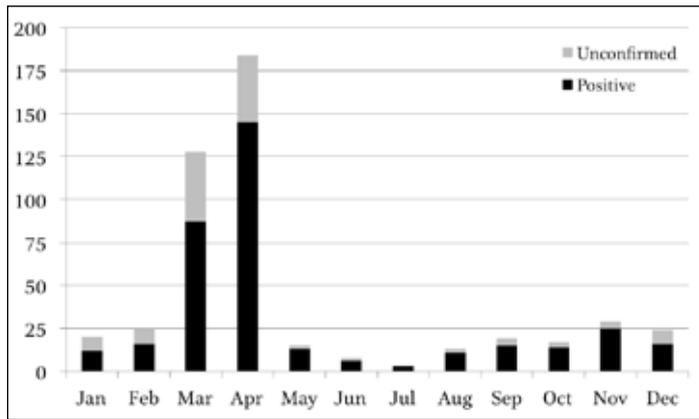


Figure 76: Sperm whale distribution sighting records by month (n=485)

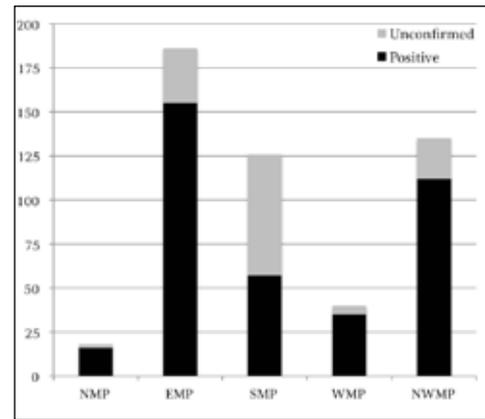


Figure 77: Sperm whale distribution sighting records by MP (n=505)

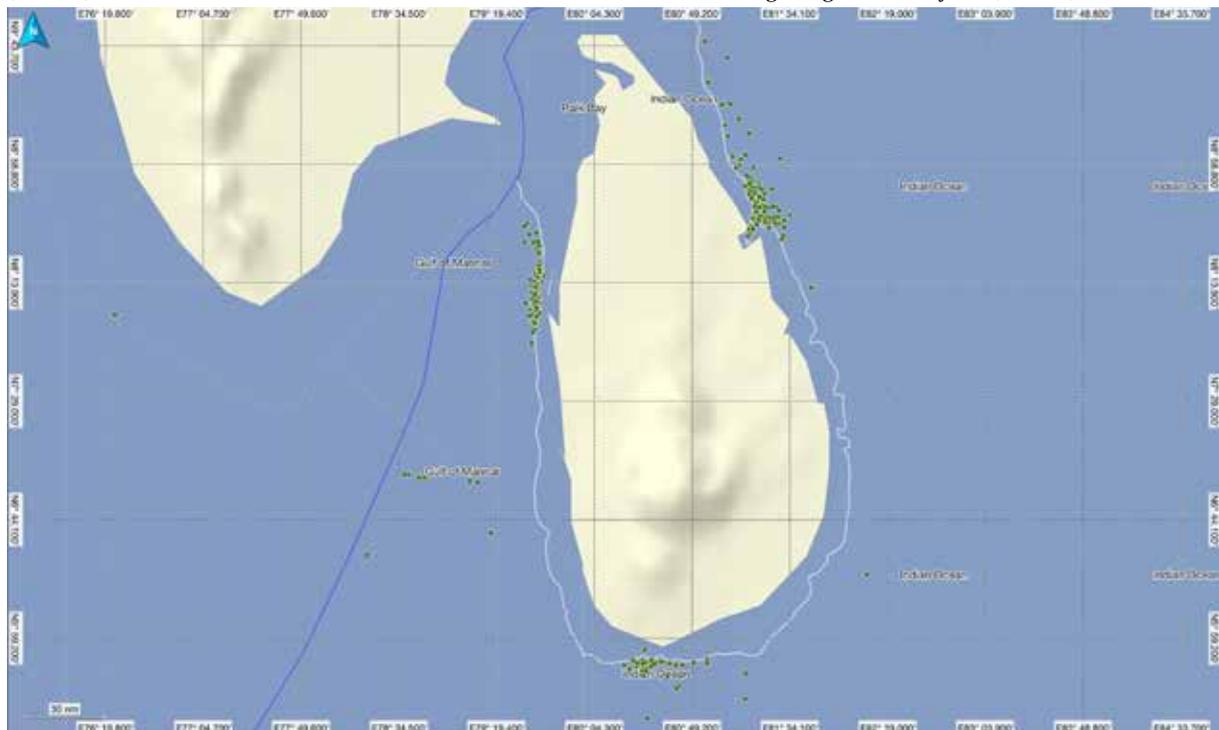


Figure 78: Sperm whale sighting locations (n=294 poi)

Table 58: Some logs of the whaling ship *Arab* in Sri Lankan waters (1846-55)

<i>Date(s)</i>	<i>Logbook Entries</i>
Nov 1846	10 sperms killed
26 Nov 1846 - 24 Feb 1847	13 sperms killed east of the Maldives
Sep-1847	Gulf of Mannar full of sperms
15 Sep - 29 Nov 1847	15 sperms killed
14 Dec 1847 - 07 Jan 1848	No sperms
16 Jul - 16 Aug 1848	2 sperms killed
17 Aug - 21 Sep 1848	No sperms
22 Sep - 02 Nov 1848	9 sperms killed
07 Oct 1850	No sperms
20 Sep 1851	No sperms
25-26 Nov 1852	1 sperm killed in Laccadive Sea
11 Feb 1855	No sperms

Whaling: Captain Samuel Braley of the *Arab* reported that he found the Gulf of Mannar off Sri Lanka to provide some of the best and worst whaling (Table 58) due to the year over year variations of sperm whales occurring during the period September to February (Wray & Martin, 1983). Sperms were hardly encountered in the months of July and August.

Live Sightings: Besides the ‘Yankee’ whaling period and merchant vessel voyages in the 1950s, the most reliable information of sperm whales started to be recorded from 1982 with *srv Tulip* expeditions. Since then sperm whales have been recorded in all months of the year in Sri Lanka’s waters with peak sightings during IM-1 and then again a slight increase during IM-2 but significantly less (Figure 75). Sightings are almost non-existent during June and July in Sri Lanka’s waters. Sperms appear to be widely distributed around Sri Lanka with the greatest seasonal concentrations in the northeast and northwest (Figure 77 and Figure 78). This species is very rarely found on the continental shelf and is predominantly a deep water species. It appears to prefer offshore waters beyond the 500m bathymetry contour (Figure 79). They are seen closer to the continental shelf edge when they appear to be travelling.

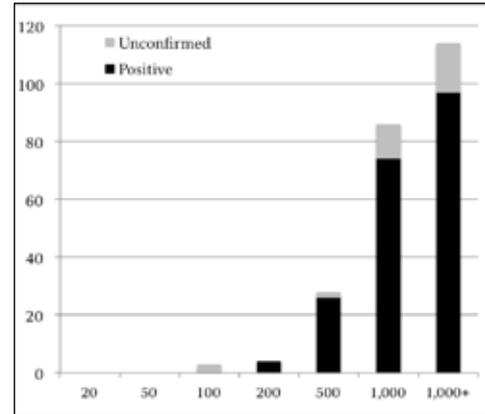


Figure 79: Sperm whale bathymetric distribution sighting records in metres (n=235)

Kalpitiya, Laccadive Sea and Gulf of Mannar

Wray and Martin (1983) stated that in the 1840’s sperm whales were abundant in the Gulf of Mannar between August and December but not in July (Table 58). Most sperm whaling took place off Colombo and extended to Galle. In September, the Gulf of Mannar would be full of sperm whales. The start of the NEM signalled the end of the whaling season off the western seaboard. Whaling ships would then move south and west to Diego Garcia (S7° E72°) and other Chagos Islands where sperm whaling was lucrative from January to May (Wray & Martin, 1983). By the 1850’s whaling season, there appeared to be no more sperm whales in the Laccadive Sea.

Sperm whales were recorded in the Laccadive Sea in November (Whitehead *et al.*, 1983). At Kalpitiya, few sightings are recorded but show an increase from August to December (Figure 80) as sea conditions improve along with the number of whale-watching trips. On 14-15 December 2010 sperms were seen *en masse* travelling southwards in single file (occasionally an adult was accompanied by a juvenile) out of Kalpitiya (Martensstyn, 2019). By the end of December (latest first week of January), sperm whales seem to have moved away from Kalpitiya (Figure 80).

January to February is low season for sperm whales at Kalpitiya in the Gulf of Mannar. *srv Tulip* had only one sperm whale sighting on a 6-day Gulf of Mannar cruise 20-25 January 1983. *srv Mir* did not see any sperm whales during a Gulf of Mannar cruise in January 2013. Sperm whales re-emerge in Kalpitiya starting towards the end of February and beginning of March. There are exceptions. In 2017, sperms arrived later towards the end of March. In 2019, sperms started to arrive at the end of January.

From the end of February, records indicate that at least some sperm whales move up from lower latitudes and enter Kalpitiya in the Gulf of Mannar. It is also possible that some sperm whales enter the Gulf

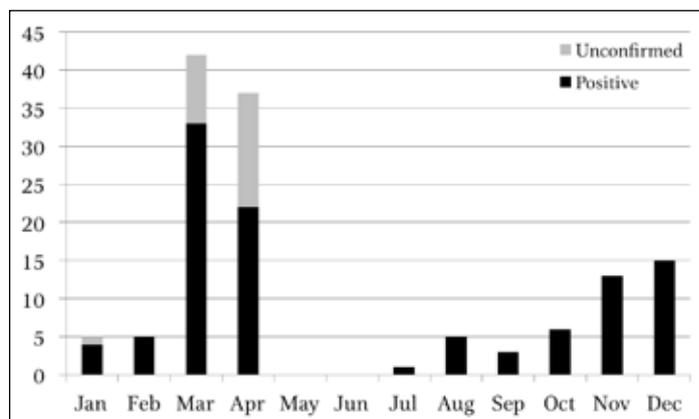


Figure 80: Sperm whale distribution sighting records by month off NWMP (n=132)



Figure 81: Sperm whale sighting locations off Kalpitiya sea area (n=95 poi)

of Mannar from the Arabian Sea in the northwest. March-April is the cephalopods season at Kalpitiya. Sightings raise the possibility of sperm whales having entered the bay in the Gulf of Mannar for feeding are then prevented by the land mass from moving north and head slowly southwards along the Kalpitiya peninsular (Table 60). At this time they have been observed milling around socializing and resting along the way taking advantage of any feeding opportunities (visible reddish-brown clouds of faeces at surface). Peak Kalpitiya sightings are in March to April during IM-1. Superpods have been recorded in March and April (Table 61).

No recent sightings have been recorded from May to July in the Gulf of Mannar. Rough seas from May to August on the northwest coast hinder any sailings by small vessels and in any case sighting efficiency would be significantly reduced. However, based on historical records discussed earlier it would be unlikely that one would encounter sperm whales in this area in June and July.

Between mid-July and mid-August, the whaling ship *Arab* only netted two whales, but by late September the whales were predictably abundant (Wray & Martin, 1983). *Arab* also found that there were unusually no whale sightings in the months October 1850, September 1851, only 1 whale in November 1852 and then again as anticipated no whales in February 1855. This data along with recent records is evidence that sperm whale sightings are not consistent year over year between September and December.

Trincomalee & the Eastern Seaboard

The first indication of sperm whales on the eastern seaboard was in 1876 a Ceylon Rifles Officer wrote that sperm whale sightings are not uncommon on the eastern side of the island (Anonymous, 1876). It was only in February 1983 with the arrival of *Tulip* into Trincomalee that sperm whales were discovered in abundance in the northeast.

At Trincomalee, August and September sees the emergence of small numbers of sperm whale groups into Trincomalee (Figure 82). This also coincides with the emergence of blue whales to the northern Trincomalee canyon area. Records show a small but steady number of sperm whale sightings at Trincomalee from August to November. These groups do not stay in the area and are generally on the move elsewhere. Sightings support the possibility that during this period sperm whales come into eastern Sri Lanka waters from the southeast and move to higher latitudes in the Bay of Bengal. From December to February, strong northeast winds hinder voyages and sightings efficiency off the eastern seaboard.

Sperm whale sighting records peak with the onset of IM-1 at the end of February. During IM-1 the highest concentration of sperm whales are recorded at Trincomalee canyon 7nm north of and south of N8° 40' E81° 19'. Superpods are regularly seen in March and April mostly heading south and occasionally eastwards. Sperm whales appear to leave the Trincomalee area towards the latter half of April and by the beginning of May they seem to have all departed with the exception of probable stragglers.

During the fiercest SWM months of June and July and although it is the whale-watching season at Trincomalee sperm whale sightings are almost non-existent. A group of 30+ sperm whales seen on 1 August 2015 entering Trincomalee outer harbour had a calf (Martenstyn, 2019).

2018 was an exceptional year in that sperm whales were not seen off Trincomalee till the end of April and their arrival coincided with the delayed start of the squid season as evidenced by fish market surveys in March and April (Martenstyn, 2019). The Mullaitivu seas also did have any sperm whales in early April.

Mullaitivu & the Northern Seaboard

There are few sightings recorded from NMP (n=13-14). However, the number is actually much greater as *Tulip* spent considerable time in the Mullaitivu canyon area studying sperm whales. Only a few *Tulip* sighting records from Mullaitivu are available at this time. They are mostly between Chalai and Pulmodai (Alling *et al.*, 1983; 1984, Alling, 1984a; Gordon, 1987a). During IM-1 the highest concentration of sperm whales were recorded by *Tulip* at Mullaitivu canyon around N9° 30' E80° 57'. This area to the north, particularly off Mullaitivu and off Trincomalee seems to have the greatest abundance of sperm whales (Gordon 1987). Besides *Tulip* expeditions up to Mullaitivu, the northern seaboard in the Bay of Bengal remains largely unexplored. There are no records of sperms in the Bay of Bengal Inlet.

Dondra, Little Basses & the Southern Seaboard

During British merchant vessel voyages in the 1950's, sperm whales were sighted within Sri Lanka's waters in two recording periods, September to November (Galle and Dondra) and March to May (Little Basses). They were sighted south of India in the Gulf of Mannar during the recording period December to February. No sightings were recorded around Sri Lanka in the period June to August (Brown, 1957).

sightings from June to September may possibly be attributed to lack of sailings on the western seaboard. However, records in other months indicate the occurrence of bulls throughout most of the year.

Starting in August through to October, it appears that sperm whales enter eastern Sri Lankan waters from lower latitudes including the southeast (Figure 82, Figure 84, Slijper *et al.*, 1964; Martenstyn, 2019). They appear to travel around off the eastern seaboard and then move to higher latitudes in the Bay of Bengal as evidenced by movements and lack of individual resightings. From the end of the NEM season, sperm whales in the Bay of Bengal appear to move southwards off Mullaitivu and Trincomalee and leave the area by the end of April or latest by beginning of May. There is generally about a 3 week annual variation with this latest departure date. In 2018 sperms arrived much later in Trincomalee almost as though they sensed the start of the squid season.

During IM-1 sperm whales are seen passing through the Little Basses and Dondra in the south. It is quite possible that most of these whales are heading south to Chagos and Diego Garcia where the greatest concentrations of sperms in the Indian Ocean have been recorded. By June and in July the whereabouts of sperm whales in the NIO are not known. The majority of them are possibly in some undisturbed area of the NIO off shipping routes or have moved south of the equator (such as Seychelles) or were undetected in the Arabian Sea due to prevailing monsoon conditions that reduces sighting efficiency. In these two months there are sporadic live sightings and strandings of few sperms from the Arabian Sea along latitude N5-9° including Sri Lanka waters (Slijper *et al.*, 1964; Ballance *et al.*, 1996; Figure 31 on page 42). In July 2002, *Odyssey* reported collecting tissue samples from 16 sperm whales in the Chagos area (Johnson 2002).

In August, just as off the east coast, there is a re-emergence of sperm whales in the Laccadive Sea west of Sri Lanka. Where they come from is not known but there is a possibility that at least some may arrive from the Madagascar area where sperms have been known to be the most abundant in the Indian Ocean. By September the Gulf of Mannar was once found to be full of sperms by Yankee whalers. Sperms are present off Kalpitiya from August onwards and almost all leave the area by the end of December heading for lower latitudes. During November and December, sperms in the Gulf of Mannar may travel southwards beyond Sri Lanka's waters and some possibly travel around the south coast and move into higher latitudes of the Bay of Bengal. In January and February there are a few sightings recorded off Kalpitiya but sperms are not regularly seen every year. From the end of February onwards there is a re-emergence of sperm whales off Kalpitiya. Most of these initial arrivals may possibly be from the southwest and possibly followed soon after by some sperms from the Bay of Bengal side. By end of April sperms move out of Kalpitiya and by the beginning of May they appear to have left the Gulf of Mannar. Records indicate that they head for lower latitudes towards Chagos.

The movements of sperm whales off the eastern seaboard and western seaboard may be connected but not conclusive without evidence. It's c. 450nm between Trincomalee and Kalpitiya and well within their range. During the intermonsoonal seasons, it was evident that sperm whales clearly displayed preferences in their headings indicating travel. Their whereabouts during the fierce SWM months of June to August are largely unknown.

All movements of sperm whales are based on available data and are not conclusive. However, this study provides a baseline for future work. Much more research and better recording of sightings are needed to strengthen or dispute these latest findings.

CONCLUSION

Sperm whales have been known to be present in Sri Lanka's waters since the 1840's. It is an offshore species that has a seasonal as well as a patchy distribution around Sri Lanka from the Gulf of Mannar, around the south to north of Mullaitivu in the Bay of Bengal. Concentrations of sperm whales are found off the northeast and northwest coasts from March to May where they are known to feed. Sperm whales seen off the southern coasts are generally passing through travelling at speed or milling along their journey. There is no evidence as yet to connect the sperm whales seen off the northeast and northwest coasts.

Socially, sperm whales appear to be structured along cultural lines. They are nomadic in nature driven by secondary production which they may sense. Sperms find Sri Lanka's waters favourable for feeding and breeding, and individual resightings have been recorded in two consecutive years at the same feeding grounds indicating site fidelity. Their movements into and out of Sri Lanka's waters is only just beginning to be understood. The hypothesis on the sperm whale movements discussed above will remain until substantial new information becomes available and keeping in mind that in some years there can be no sperms in well known seasonal feeding grounds for one reason or another.

Orca (Killer Whale)



Orcinus orca (Linnaeus, 1758)

Sinhala names: makara komaduva (Deraniyagala, 1965b), palmyrah fish (Anonymous, 1876), talgas mulla (Holdsworth, 1872), mini thalmasa (Yapa & Ratnavira, 2013).

Tamil names: killer thimingalam (Martenstyn, 2013b), kollaith thiminkalam (Yapa & Ratnavira, 2013).

IUCN Status: Data Deficient **CITES:** Appendix II **CMS:** Appendix II

Taxonomic Notes: Although a single species of orca is recognised, recent genetic, morphological, and ecological studies suggest that there are at least eight distinct forms (offshore, Type 1 & 2, and Type A, Type B large and small, and Type C & D), including several with overlapping ranges (Jefferson *et al.*, 2015). Two forms are currently recognised; resident and transient. Indian Ocean forms of orcas are yet to be described. No surprise then that this species is likely to be split into a number of species and/or subspecies in the coming years.

Table 73: Number of orca records

<i>Stranding Records</i>	<i>Fisheries Records</i>	<i>Specimen Records</i>	<i>Live Sighting Records</i>	<i>Total Records</i>
1	5	0	62-97	68-103

Number of museum specimens: 1

OBSERVATIONS

The earliest sighting record is from the nineteenth century of a male orca and was described by Edmund Holdsworth (1872) off Chilaw in calm seas.

“Being attracted to it by a blowing sound, as it partly rose above water; it appeared to be about 25 feet long, having a round back and a remarkable dorsal fin 5 feet high shaped like a sword blade.”

Commenting on the description and the sketches supplied by Holdsworth, William Thomas Blanford (1891) had no hesitation in stating ‘the only cetacean of this kind is the Orca’.

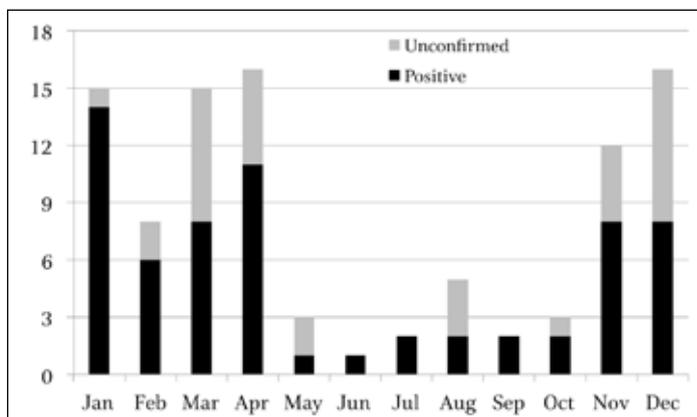


Figure 109: Orca distribution sighting records by month (n=98)

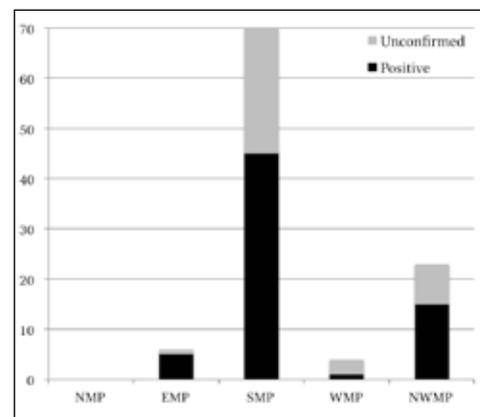


Figure 110: Orca distribution sighting records by MP (n=103)



Figure 111: Orca sighting locations (n=26 POI)

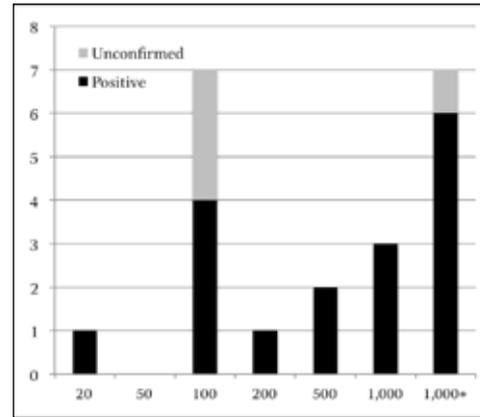


Figure 112: Orca bathymetric distribution sighting records in metres (n=21)

Fisheries: Between 1982 and 1986 there are 3 to 5 specimens taken from fisheries; one specimen entangled in a gillnet from Kirinda fish market in 1982 (Leatherwood & Reeves, 1989; 1991), one 7-8m specimen at Kottegoda in 1983 (Leatherwood & Reeves, 1989; 1991), two unconfirmed specimens from Beruwala in 1985 with source quoted as Alling, 1985 (Leatherwood *et al.*, 1991), and one female specimen 2.8m in length taken in a gillnet c. 21.6nm southwest of Negombo on 8 April 1986 (NARA, 1987b).

Alling (1985a) did not record any orcas in the 72 fisheries specimens and as such, the two records in 1985 from Beruwala cannot be confirmed. The specimen from 1986 was sent to the University of Peradeniya.

Strandings: One stranding has been reported in 2011.

Live Sightings: There are many sightings recorded (n=58-86) mostly off the south coast and also from the northwest coast. Most sightings obtained are from whale-watching vessels and several are not evaluated without a supporting photograph. However, the orca is an easily distinguishable species at sea and records of this species would likely be reliable. Sightings have been recorded in all months and there are as yet no sightings from the northern seaboard.

Northwestern Seaboard

There are some (n=15-22) sightings recorded on the northwestern seaboard. All sightings have occurred off the Kalpitiya peninsula in the months of October and from December to April. Live sightings have been recorded in the months of October and December to April. Besides the April 1868 sighting off Chilaw, the first sighting of an adult orca by whale watchers in Sri Lanka was in March 2008. It was seen about 3nm off Kandakuli and the photograph appeared in a newspaper (Abeyratne, 2008). This orca (KIW001) would be the most re-sighted orca in Sri Lanka's waters. On 26 March 2013, two separate pods of four orcas were sighted heading south spaced apart longitudinally by more than 35nm. The leading pod was a fair distance behind a superpod of sperm whales (Martensyn, 2019).

Western Seaboard

There is just one live sighting recorded on the western seaboard likely reflecting the lack of sailings. The record is of land-based sighting of c. 30 possible orcas from Galle Face Green, Colombo in March 1986 (NARA, 1987b).

Southern Seaboard

There are many sightings (n=41-60) recorded on the southern seaboard between Koggala and the Little Basses. From December 2008 onwards, whale-watching vessels from Mirissa, Weligama and Galle have recorded the majority of the sightings but lacking in valuable GPS data and direction of travel. Live sightings were recorded in all months except for May, July and September.

Eastern Seaboard

There are few live sightings (n=5-6) recorded on the eastern seaboard and all have occurred in the Trincomalee area. Fishermen on the east coast affirm that there is a large man-killing dolphin seen singly or in pairs (Deraniyagala, 1965b). Off Trincomalee, the sightings were recorded between 2011 and 2015 in the months of February, May, July and September.

Behaviour: Spyhopping, breaching, porpoising, predation on whales and dolphins. A mother was observed throwing a tuna high into the air for a calf to feed on. Orcas have been observed travelling in close nit pods particularly with the presence of young ones. On one occasion a pod was seen travelling at an average speed of c. 3.8 knots abreast and parallel but spread out over a distance of 1.2 km. No aggression towards humans in the water even in cases where orcas were attacking cetaceans.

Movements: There are 19 sighting records with orca headings around Sri Lanka.

Table 74: Net vector headings of orcas by month around Sri Lanka (n=20)

Locality	Jan	Feb	Mar	Apr	May	Nov	Dec
Trincomalee		S ¹			E ¹		
Little Basses						SW ¹	
Dondra to Koggala	N ³	N ¹	S ¹	SW ¹			SSE ²
Kalpitiya	S ²	S ¹	S ³	N ³			

Note: Number of records with headings for the month is shown in superscript.

Table 75: Sighting and resighting logs of orca individuals and pods through photo ID

CRIOMM ID #	NIOKWA ID #	Pod Size	Sighting Date	No. of Individuals	Location	Notes	
Pod A κiw001, κiw002	Pod 10	1	15-Mar-2008	1	Kalpitiya	5	
		2	29-Dec-2008	2	Mirissa	6	
		2	31-Jan-2010	2	Kalpitiya	-	
		3	30-Jan-2011	3	Kalpitiya	7	
		2	18-Jan-2012	2	Mirissa	8	
			17-Nov-2013	2	Mirissa	-	
			25-Nov-2013	2	Mirissa	9	
			26-Nov-2013	2	Mirissa	-	
			27-Nov-2013	2	Mirissa	-	
			29-Nov-2013	2	Mirissa	-	
			07-Jan-2014	2	Mirissa	-	
			12-Apr-2014	2	Mirissa	-	
			14-Apr-2014	2	Mirissa	-	
			10-Dec-2014	2	Mirissa	-	
	22-Mar-2015	4-5	Kalpitiya	10			
	28-Oct-2015	5	Mirissa	-			
	28-Nov-2015	2	Mirissa	-			
	07-Apr-2018	2-3	Kalpitiya	16			
Pod B	Pod 11	11	08-Jun-2008	7	Abu Dhabi	-	
			31-Aug-2015	10	Mirissa	-	
Pod C	nio038	1	26-Dec-2011	2	Mirissa	-	
			01-Dec-2012	1	Mirissa	-	
			03-Dec-2012	1	Mirissa	-	
	nio050	1	26-Jan-2012	1	Mirissa	11	
Pod D	Pod 7	5	31-Mar-2012	3	Mirissa	2	
			22-Jun-2012	5	Mirissa	-	
			28-Jan-2015	7	Mirissa	3	
Pod E κiw003-006, κiw014-017	-	4	26-Mar-2013	4	Kalpitiya	13	
		6	07 Dec 2014	6	Kalpitiya	14	
		1	17-Apr-2013	1	Mirissa	-	
nio039	1	17-Apr-2013	1	Mirissa	-		
Pod F	Pod 6	6	18-Apr-2013	5-6	Mirissa	1	
Pod G	Pod 8	6	25-Apr-2014	7	Mirissa	4	
Pod H	Pod 9	3	10-May-2015	-	East	-	
		1	17-Jan-2016	1	Mirissa	12	
			26-Jan-2016	1	Mirissa	-	
			10-Feb-2016	1	Mirissa	-	
			11-Feb-2016	1	Mirissa	-	
Pod I	κiw007-013	-	7	02-Nov-2016	7	Little Basses	15
Pod J	κiw018-023	-	6	12-Jan-2019	6	Dondra	-

From India there are a few sighting records from the Laccadive, Andaman and Nicobar Islands, Gujarat and Tamil Nadu. In 1976 a pod of three orcas were sighted within 4.3nm of Chennai harbour (Sathasivam, 2004). An orca sighting was recorded by ms World Discoverer north of the Andamans in 1983 and an individual off Lakshadweep Islands in 2000 (de Silva, 1987; Leatherwood *et al.*, 1991; Sathasivam, 2004; LGL, 2007). No orca sightings were recorded by FORV *Sagar Sampada* 2003-07 oceanic expeditions in the Arabian Sea and Bay of Bengal (Afsal *et al.*, 2008).

Nine sightings are reported in Maldivian waters over a twelve year period 1990-2002 (Anderson, 2005). Another sighting in Maldivian waters in 2004 was made from Odyssey (Clark *et al.*, 2012).

Elsewhere orcas have also been recorded from Myanmar, Ninety East Ridge, Pakistan, Gulf of Aden and Somalia (de Silva, 1987; Leatherwood *et al.*, 1991). ΝΙΟΚΩΑ Pod 11 was sighted off Abu Dhabi in the Persian Gulf as well as off Sri Lanka (ΝΙΟΚΩΑ 2016). Studies by ΝΙΟΚΩΑ provide invaluable information on orcas in the ΝΙΟ.

DISCUSSION

Orcas are cosmopolitan and are known to roam the oceans of the world. This species has been recorded from the nineteenth century and its distribution appears to be patchy in ΝΙΟ. Besides many recent sightings reported around Sri Lanka, they have been sighted in adjoining seas of the Maldives and west of India, as well as being recorded at the Andaman's, Ninety East Ridge, northern Bay of Bengal and Arabian Sea areas. It is recorded in moderate numbers and is certainly not a rare species as thought to be. The orca is the most encountered blackfish species by whale watchers. However, it does seem to be seldom sighted in the Bay of Bengal compared to the Arabian Sea that perhaps has a greater abundance of food and more favourable oceanic conditions such as higher salinity levels.

Transient pods sighted consist primarily of small numbers of individuals. It was once widely accepted that transients are usually found in pods of 1-7. Recent data has shown pods up to ten individuals. Resident pods may number up to 25. Several years ago there was a fishermen's report of c. 20-25 orcas off the south coast indicating that there may be a resident population but the current view is that this is unlikely. There is no evidence yet of a resident orca sub-population in Sri Lanka's waters.

Orcas have been resighted several times in Sri Lanka's waters including the resighting of a pod between Sri Lanka and the Persian Gulf. Pod A has been resighted at least 18 times since 2008. There are very likely more unpublished sightings and photographs of orcas by whale watchers. Transients are generally observed on the move and on occasion a pod may remain in the same area for days and even a couple of weeks. This is likely due to availability of food or in anticipation of it becoming available. Very little information has been recorded on orca movements around Sri Lanka. It appears that orcas sighted in Kalpitiya from January to March are heading southwards towards Mirissa and in April they are seen heading north in anticipation of sperm whales north of Kalpitiya. Generally in Kalpitiya their southward track mostly follows the dolphin line and the northward track follows the sperm whale line.

The orca is a top ocean predator and predation on cetaceans have been observed in 6 instances (3 x sperm whales, 1 x beaked whale, 1 x Fraser's dolphins and 1 x spinner dolphins) another indication that this species sees Sri Lanka's waters as a lucrative feeding area. In two of the attacks on a sperm whale calf, orca pods aggregated (n=20-25 individuals) and coordinated their attack. Friendly associations between orcas and cetaceans have not been observed at sea and there has not been any aggressive behaviour to humans in the water.

CONCLUSION

Orcas have been known in Sri Lankan waters since the nineteenth century. As a top predator orcas are expectedly found in moderate numbers. Transient orcas are sighted in all months of the year round Sri Lanka from Kalpitiya to Trincomalee and around the south from Koggala to the Little Basses. With the resurgence of whale and dolphin watching trips in Sri Lanka since 2008, this species has been seen and photographed several times every year travelling along the northwestern and southern seaboard and far less sightings on the eastern seaboard. Their movements appear to be mostly related to food and as such find Sri Lanka's waters favourable. It is also possible that Sri Lanka's waters may offer favourable reproductive conditions. Little has now become known from this study about the ecology, movements and population structure of transient orcas in Sri Lanka's waters. Further sightings and studies will unravel more information in the future about the mysterious orcas that transit through and revisit Sri Lanka's waters.

Bottlenose Dolphin Species

Although considerable variations exist in bottlenose dolphin species, at present most researchers and whale-watchers in Sri Lanka have taken the conservative view of recognising only one species *Tursiops truncatus* (Montagu, 1821) or simply call it the bottlenose dolphin.

As far back as 1891 it was thought that two *Tursiops* species were probably present in Indian waters (Blanford, 1891). In 1983 the possibility of a *Tursiops* sp. other than *Tursiops truncatus* in Sri Lanka's waters were observed (Alling *et al.*, 1982; 1983).

Taxonomic Notes: Until 1998, the genus *Tursiops* was considered monospecific, but a second species - Indian Ocean bottlenose dolphin or Indo-Pacific bottlenose dolphin, *Tursiops aduncus*, - is now also widely recognised.

The taxonomic status of *Tursiops aduncus* was established, when Wang *et al.* (1999) confirmed that in Chinese waters two genetically distinct morphotypes of bottlenose dolphins, which he referred to as *T. truncatus* and *T. aduncus*, existed in sympatry. The two species are known to be taxonomically distinct based on concordance in genetics, osteology, and external morphology (Wang *et al.* 1999; 2000). Since there is now a consensus recognising two species, *Tursiops* sp. specimens collected from Sri Lanka should prove genetically the existence of both these species in Sri Lanka's waters. Genetic analysis of *Tursiops* specimens from southern India have showed closest proximity to *T. aduncus* compared to *T. truncatus* (CMFRI, 200?).

Differences of *T. truncatus* and *T. aduncus* forms of bottlenose dolphins

Published information in marine mammal guidebooks and Internet portals on differences between *Tursiops aduncus* and *Tursiops truncatus* can be confusing and difficult to comprehend.

Based on current knowledge, Jefferson *et al.* (2015) describe in detail the differences including distribution of the aduncus and truncatus forms of bottlenose dolphin *Tursiops*. The differences may be helpful in distinguishing between the two species in the field (Table 91).

Tursiops sp. have a relatively robust body, short to moderate length beak, recurved flippers, and a tall slightly falcate dorsal fin set near the middle of the back. The dorsal cape is dark grey with a light grey dorsal field lateral to it extending onto the flanks and a whitish ventral area. Some may have flecks on the belly - age dependent.

Table 91: Differences between *T. truncatus* and *T. aduncus*

Characteristic	<i>T. truncatus</i>	<i>T. aduncus</i>
Body length	Longer, up to c. 3.8 m	Shorter, up to c. 2.7 m
Beak	Shorter and stouter with a slightly curved mouthline that dips from the tip of the beak, then comes back up and finally down again at the gape.	Relatively longer and thinner beak, which is angled slightly downward.
Melon	Convex	Slightly less convex
Flippers	Recurved with somewhat pointed tips	Recurved with acutely rounded tips
Dorsal fin	Larger, falcate and wider-based	Smaller, less falcate
Colouration	Varies from nearly black to light grey on the back and flanks, fading to white (sometimes pinkish hue) on the belly. A faint dorsal cape may be visible. Sometimes a faint spinal blaze may be present or prominent. Small flecks are rarely present on the belly. No dark ring around the eye.	Tends to be lighter. Varies from dark grey on the back and flanks, fading smoothly to light grey or off-white on the belly. The dorsal cape is more distinct and may have a slightly brownish tinge. A visible light spinal blaze is almost always present and extends to below the dorsal fin. Prominent black spots or flecks on the belly in adults. It has a dark ring around the eye.
Teeth	18-27 stout pointed teeth in each jaw	21-29 teeth in each jaw; more slender shaped
Distribution	Distributed in deep oceanic waters but are more common in coastal and continental shelf waters.	Usually occur almost exclusively over the continental shelf and in shallow coastal waters. There are also populations around island groups such as the Maldives.

Source: Jefferson *et al.*, 2015

Photographic evidence in Sri Lanka's waters shows that sometimes *Tursiops* sp. tend to have a lighter coloured lower lip. The lower jaw extends beyond the upper jaw. When viewed from above this gives the impression that it has a "white nose".

Dusky Dolphin

Lagenorhynchus obscurus (Gray, 1828)

Synonyms: *Lagenorhynchus obscurum* (Gray, 1828)

Other common names: beakless dolphin (Osman Hill, 1939)

IUCN Status: Data Deficient **CITES:** Appendix II **CMS:** Appendix II

OBSERVATIONS

The only record of this species is a specimen skull, described as the beakless dolphin, *Lagenorhynchus obscurus*, that was collected in 1888 from the Palk Straight, Sri Lanka and was placed in the Kolkata National Museum, West Bengal (Blanford, 1891). Some characteristics and dimensions of *Lagenorhynchus obscurum* listed by Blanford are compared in Table 119 with more recent information of this species and the melon-headed whale. Osman Hill (1939) refers to a specimen, *Lagenorhynchus obscurum*, obtained from the Sri Lanka side of the Palk Straight. Blanford, 1891 is mentioned in the references to literature and this record likely refers to the 1888 specimen record. Further, the 1888 specimen was later reclassified as a melon-headed whale, *Peponocephala electra* (de Silva, 1987).

Table 119: Some comparisons of *Lagenorhynchus obscurum* and *Peponocephala electra*

	<i>Lagenorhynchus obscurum</i>	<i>Lagenorhynchus obscurus</i>	<i>Peponocephala electra</i>
<i>Rostrum</i>	No distinct beak. Skull and rostrum much narrower than in <i>L. electra</i> .	Short and pointed.	No distinct beak but females & young have a very short & poorly defined beak.
<i>Head</i>	Sloping gradually down to the upper lip.		Triangular head (aerial view), sloping down (lateral view)
<i>Teeth</i>	30 upper & 30 lower; small & curved inwards.	27-36 on each side of each jaw; small & pointed.	20-25 on each side of each jaw
<i>Colour</i>	Black, neck and belly white, a black band from the angle of the mouth to the pectoral fins; lateral oblique streaks of white.	Complex; countershaded dark grey to blue black above and white below; sides are marked with blazes and patches of pale grey; broad light grey thoracic patch that encompasses the face, most of the head, and thorax, tapering towards the belly.	Charcoal grey to dark grey, white urogenital patch with irregular margins; some with anchor-shaped light patch underside of head, black triangular face "mask".
<i>Dimensions</i>	Length (of type skin) 165cm	Maximum length 210cm	Maximum length 278cm
<i>Distribution</i>	Indian and Pacific Oceans.	Southern Hemisphere; widespread in disjunct populations.	N40° to S35° tropical/sub-tropical oceans.
<i>Source</i>	Blanford, 1891	Jefferson <i>et al.</i> , 2015	Jefferson <i>et al.</i> , 2015

Note: *Lagenorhynchus electra* is a synonym of *Peponocephala electra*.

DISCUSSION

Blanford distinguishes *Lagenorhynchus obscurum* from *Peponocephala electra* by the skull and rostrum being dimensionally different. In addition differences in number of teeth and colouration such as the black band from the mouth to the pectoral will eliminate the 1888 specimen from being a melon-headed whale. Thus, the reclassification of the 1888 specimen as being a melon-headed whale is unjustified.

Although the colouration of the dusky dolphin is complex, it is not known to have a black band from the mouth to the pectoral fins and the number of teeth in the 1888 specimen is significantly less than the *forma typica*.

There is no information on whether the specimen obtained from the Sri Lankan side of the Palk Straight was from fisheries or a stranding incident.

CONCLUSION

Dusky dolphins are not known to be present in the NIO. They occur in the southern Hemisphere only. Given this and other discrepancies discussed, this record by Blanford as a dusky dolphin or beakless dolphin is likely a case of mistaken identity. The 1888 specimen does not seem to resemble a melon-headed whale. The dusky dolphin described by Blanford is more similar in appearance to a Fraser's dolphin but with much less teeth. Fraser's dolphins or melon-headed whales are not likely to be found in the shallow waters of the Palk Straight. In that case, the beakless dolphin specimen could possibly be a finless por-

poise or even an Irrawady dolphin that are more likely to be found in shallow waters of the Palk Strait. Till scientific work is conducted on the museum specimen this record should be classified as an unidentified dolphin. Dusky dolphin, *Lagenorhynchus obscurus*, is therefore not justified in any list of marine mammals in Sri Lanka and adjacent seas.

Irrawady Dolphin

Orcaella brevirostris (Owen In: Gray, 1866)

Synonyms: *Platanista indi* (Blyth, 1859), *Orcella brevirostris* (Owen, 1866)

IUCN Status: Endangered

CITES: Appendix I

CMS: Appendix II

OBSERVATIONS

Aelian in his account of Taprobane reports a dolphin species that is fierce and armed with sharp pointed teeth, which gives endless trouble to the fishermen, and is of a remorseless cruel disposition (Nevill, 1887). In the Indian Antiquary for October 1885, Ball suggests that this species may have been *Platanista indi*. as Nevill had not met this species in Sri Lanka and suggests that it is more likely to be a sawfish species, *Pristis* sp..

Osman Hill (1939) states that the Irrawady dolphin is 'not definitely known from Ceylon but likely to occur off the east coast' for the reason it is known from the Bay of Bengal (Santerre & Santerre, 1983).

Joseph *et al.* (1983) recorded the Irrawady dolphin in Negombo fisheries by-catch in 1982 and 1983. This unpublished paper was presented at the NARA/SMMIO in 1983 and is unavailable. No other information about these specimens is available to review this species record.

During a cetacean and dugong study in the Jaffna peninsula, Rohan Gunaratna (In: NARA, 1987b) thought that this species is likely to be found in Sri Lanka's waters but has escaped positive identification. However, Gunaratna visited Jaffna during the NMMP programme and does not mention the finless porpoise in his cetacean summary report of Jaffna peninsula.

Adjacent Waters: Irrawady dolphin is positively known in North India from Chilka Lake, Orissa (Sathasivam, 2004). De Silva (1987) reported a skull collected by Sir Walter Elliot at Vizagapatam, Bay of Bengal is in the British Museum of Natural History. There is a live stranding record from Chennai in Tamil Nadu. Miller (1995) reported an Irrawady dolphin that stranded alive in 1977 about quarter mile from the sea in a pool of water created by an overnight storm surge due to a cyclone in the Bay of Bengal. A photograph was taken of the dolphin being carried back to the sea by rescuers. Unfortunately, neither the photograph nor does the description clearly differentiate this species from the finless porpoise that was known to be present in the same area.

DISCUSSION & CONCLUSION

Irrawady dolphins can be confused with finless porpoises and even small dugongs but can be clearly distinguished from these two species due to the presence of a small dorsal fin. Clearly there is no scientific information or photographs to confirm the presence of this species in Sri Lanka's waters but anecdotal evidence does suggest the possibility. As such, there is no justification at present to add the Irrawady dolphin, *Orcaella brevirostris*, in the checklist of marine mammal species for Sri Lanka.

Indo-Pacific Finless Porpoise



Neophocaena phocaenoides (G. Cuvier, 1829)

Sinhala names: avaral porpoise (Martensstyn, 2013b), avaral dhenuva (Yapa & Ratnavira, 2013), varal nomathy porpoise

Tamil names: minikutty (Sathasivam, 2004), chettaiyatta kadal pantry (Yapa & Ratnavira, 2013) malagan (Sterndale, 1884), molagan (Sathasivam, 2004).

IUCN Status: Vulnerable.

CITES: Appendix I **CMS:** Appendix II

Taxonomic Notes: Two species of finless porpoises are recognised largely based on external morphology:

1. Indo-Pacific finless porpoise, *Neophocaena phocaenoides* (G. Cuvier, 1829), and
2. Narrow-ridged finless porpoise, *Neophocaena asiaorientalis* (Pilleri and Gihir, 1972).

The two forms are reproductively separate and differ in craniometry. The latter is only known in coastal waters of the western Pacific Ocean.

Table 120: Number of finless porpoise records

<i>Stranding Records</i>	<i>Fisheries Records</i>	<i>Specimen Records</i>	<i>Live Sighting Records</i>	<i>Total Records</i>
2	1	0	3-6	6-9

Number of museum specimens: 0

OBSERVATIONS

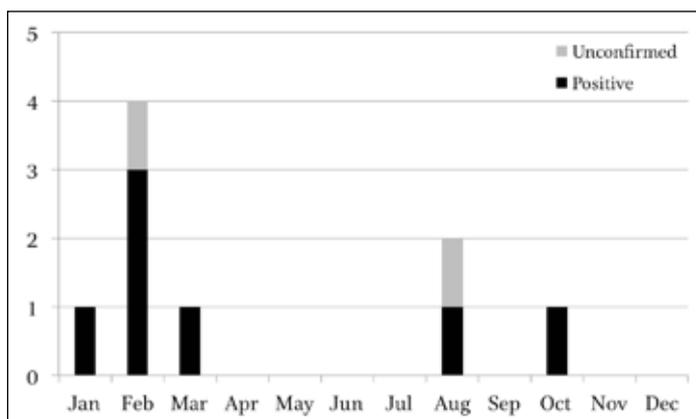


Figure 170: Finless porpoise distribution sighting records by month (n=9)

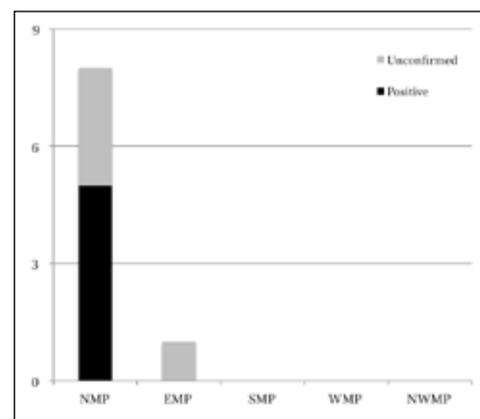


Figure 171: Finless porpoise distribution sighting records by MP (n=9)

The earliest reference is by Sir Walter Elliot who mentions a species of dolphin c. 81cm long, of a uniform black colour, small mouth and no dorsal fin called *Malagan* by Tamil fishermen (Sterndale, 1884). Since then there are unconfirmed reports of this species in Trincomalee harbour on the northeast coast where it has apparently been seen in small pods (Osman Hill, 1939). Arthur C. Clarke reported in 1961 that a porpoise was speared off Wellawatte and that they were seen in the harbour. There are no details to establish the identity of this species or whether Clarke was referring to dolphins. During a 2015 study in the Jaffna Peninsula it was reported locally that finless porpoises are present in January to February (Martensstyn, 2019).

Strandings: The first confirmed record of the finless porpoise in Sri Lanka is a specimen 120cm in length that washed ashore at Talaimannar near the lighthouse on 1 February 2014 (Nanayakkara *et al.*, 2017). Ranil Nanayakkara provided a photograph of another finless porpoise that washed ashore at Talaimannar on 22 January 2016.

Live sightings: There are three sighting records in February to March 2014 off Talaimannar of 3 pods consisting of 5-8 porpoises, 3.3-4.6nm from shore, bathymetry 8-10m (Nanayakkara *et al.*, 2017). One possible sighting of an individual in 2018 off Mullaitivu, bathymetry 60m (Martenstyn, 2019).

Fisheries: In August 2018, Protect Sri Lanka posted a video on facebook of finless porpoises caught in a fishing net at Jaffna. The net appears to be from a shore seine. At least 7 finless porpoises can be seen returned to the sea by fishermen.

Movements: In February heading west (n=2) and March heading east (n=1).

Group size: 5-8.

Appearance: The stranded specimen appeared blackish-grey dorsally with the throat to belly region being grey with a cream tinge (Nanayakkara *et al.*, 2017).

Length: 120cm.

Teeth: 36 in upper jaws, 38 in lower jaws (Nanayakkara *et al.*, 2017).

Diet: Mainly prawns, also on small cephalopods and fish (Blanford, 1891).

Adjacent Waters: Finless porpoises have been recorded from India, Pakistan and the Arabian Gulf (de Silva, 1987). They are known to inhabit shallow coastal waters.

One specimen 670mm in length was obtained from Wadge Bank, India on 20 March 1970 by the Smithsonian Carangid Survey Team (de Silva, 1987). This was a female specimen that was collected by Tyson R. Roberts and brought ashore at Kuru Nagar (probably refers to Guru Nagar), Jaffna fishing landing site in Sri Lanka. The whole animal was placed in ethanol at the Museum of Comparative Zoology, Harvard University, USA and is catalogued as Mammology 52745 (Harvard University, 2018).

Finless porpoises have been recorded off Mangalore and along the adjacent southern coast of India. These records include fisheries landings at Rameswaram and Mandapam (Tamil Nadu), Gangoli (Karnataka) and strandings at Thondi, Tamil Nadu (Ganapathy, 1992; Nammalwar *et al.*, 2002; CMFRI, 200?). The type locality for this Indo-Pacific species is thought to be the Malabar coast of India (Rice, 1998).

DISCUSSION

This species, *Neophocaena phocaenoides*, is present in tropical to warm temperate zones of the Indo-Pacific region. It is found only in shallow nearshore waters, bathymetry up to c. 50m. Finless porpoises are small and cryptic and therefore difficult to detect and more so if seas are not calm (BS0-1). When not seen clearly, they may also be confused with Irrawady dolphins or young dugongs. In some older literature, small cetaceans are sometimes referred to as porpoises that can further add to the confusion.

There is confusion in literature that this species was confirmed in Sri Lanka's waters (Ilangakoon, 2002; 2017). One confirmed fisheries record is available for this species that was landed at Jaffna fish landing site, Sri Lanka but the specimen was obtained from neighbouring waters in India (at Wadge Bank) and did not therefore constitute a species presence in northern Sri Lankan waters.

As evidenced by a number of Indian records that show the presence of this porpoise in the Gulf of Mannar and Bay of Bengal Inlet in Indian waters it is not surprising that there is now evidence of the finless porpoise presence in NMP.

CONCLUSION

The Indo-Pacific finless porpoise is a neritic species and in adjoining waters it is distributed along the coastline of India and present in Sri Lanka's shallow waters in the north. The record of the specimen obtained from Wadge Bank was not in Sri Lanka's waters as thought to be. And, now there is confirmed evidence that this species is present in Sri Lanka's waters. However, it may possibly be a rare or uncommon and an endangered species that strays with the currents into northern Sri Lankan waters during the NEM. With the recorded evidence from 2014, the finless porpoise, *Neophocaena phocaenoides*, is included in the checklist of marine mammal species for Sri Lanka.

11. Mixed-Species Associations

When cetaceans encounter each other, the association can be an interactive one or there can be no interaction where they simply ignore one another. The interaction can be friendly or even aggressive as in the case of orcas. Sometimes these associations are loose aggregations such as in feeding areas by blue whales, Bryde’s whales and Eden’s whales. In other instances, the interaction is friendly and involves socializing, feeding and swimming together. In some cases, one species causes a disturbance in what appears to be a playful (harasses) to another species as has been observed between spinner dolphins and sperm whales, between Fraser’s dolphins and a pilot whale and also between Risso’s and pilots.

Orcas have been observed to attack a number of species; sperm whales, an unidentified beaked whale, Fraser’s dolphins and spinners. On the other hand, a pod of orcas with a calf paid no attention when they encountered adult Bryde’s whales and a large aggregation of adult and sub-adult blue whales. Both species of bottlenose dolphins have been sighted several times travelling with pilot whales during the intermonsoonal season. They tend to lead the pilots on their journey and mostly the species involves common bottlenoses.

At least 128 instances that involved association of more than one cetacean species have been recorded. Three or more species were associated in 15 of these instances. Table 123 shows if any or no interaction was observed and recorded between two species. Associations between unconfirmed cetacean species are included. Observations recorded on the individual interspecies encounters are provided in Volume II Mixed Species Observations.

Spinner dolphins were recorded associated with the most number of other cetacean species (n=10), followed by bottlenose dolphins, *Tursiops* sp. (n=9). On the flip side, blue whales rarely showed interest in associating with other cetacean species although they are often found in feeding areas mostly with Bryde’s whales and also with Omura’s whales. During *Tulip* voyages, Risso’s dolphins association with sperm whales was found to be the most common.

Table 123: Cetacean interspecies encounters

	bw	brw	ew	ow	sw	lbw	ubw	orc	pw	fkw	pkw	rd	cbd	ibd	ubd	cd	fd	std	spd	sd	hd	
bw		√	√	X				X	X				X	X							X	
brw	√		√	√	√			√													P	
ew	√	√																				X
ow	X	√																				√
sw		√						√	√		√	√	X	X								√
lbw										X												
ubw								√														
orc	X	X			√		√										√					√
pw	X				√					P		√	√	√	√		√					√
fkw						X			P			√										√
pkw					√							P										
rd					√				√	√	P		√		√						√	√
cbd	X				X				√			√		√								√
ibd	X				X				√				√				√					
ubd									√			√							√	√	√	√
cd																		√				
fd								√	√					√								
std															√	√				√	√	
spd										√		√	√		√				√		√	
sd	X	P	X	√	√			√	√			√			√				√	√		
hd															√							

Legend:

√ - interaction observed in at least one instance, X - no interaction was ever observed, P - possible interaction.

bw - blue whale, brw - Bryde’s whale, ew - Eden’s whale, ow - Omura’s whale, sw - sperm whale, lbw - Longman’s beaked whale, ubw - unidentified beaked whale, orc - orca, pw - short-finned pilot whale, fkw - false killer whale, pkw - pygmy killer whale, rd - Risso’s dolphin, cbd - common bottlenose dolphin, ibd - Indo-Pacific bottlenose dolphin, ubd - bottlenose dolphins (*Tursiops* sp.), cd - common dolphin, fd - Fraser’s dolphin, std - striped dolphin, spd - spotted dolphin, sd - spinner dolphin, hd - humpback dolphin.

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**SRI LANKA
MARINE MAMMAL
RESEARCH AND CONSERVATION
1560-2019**

VOLUME II

Technical Report

By

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I. Mixed-Species Observations

Observation notes recorded on marine mammal interspecies encounters are provided below.

Two Cetacean Species Associations

Observations of incidental sightings of two cetacean species encounters in Sri Lanka's waters:

9 x blue whale and Bryde's whale (5 Apr 1983, 13 Apr 2009, 10 Mar 2012, 29 Jan 2017, 19 Apr 2017, 2 Apr 2018, 7 Apr 2018, 8 Apr 2018, 17 Apr 2018).

Blue whale and Bryde's whales associations were almost always loose aggregations in feeding areas usually some distance apart from individuals. They amicably shared feeding areas and would come within 100m of each other briefly.

1. In 1983 two blues with a Bryde's whale sighted off Komari, bathymetry 800m (Alling 1984).
2. In April 2009, three blue whales and one Bryde's whale were sighted 10-12nm from Mirissa, sighting duration 18min (de Silva Wijeyeratne & JEH, 2012)
3. In 2012, a loose aggregation of five blue whales and a Bryde's whale feeding 7.8nm off Matara. In one instance, a blue whale and Bryde's whale surfaced together and swam side by side. On diving the blue whale fluked-up while the Bryde's whale fluked-down (Martenstyn, 2018).
4. In January 2017 a loose aggregation of 3-6 blues and 1 Bryde's whale were recorded off Mirissa, bathymetry 960-1,000m. No interaction between species was seen (Martenstyn, 2018).
5. In April 2017 a blue whale and Bryde's whale were recorded in Koddigar Bay, Trincomalee. They appeared to be sharing the feeding area and were in close vicinity to each other briefly during the blue sighting period of about 5 hours. No interaction between species was seen (Martenstyn, 2018)
6. On 2 April 2018 a loose aggregation of 3 blue whales and 7+ Bryde's whale were sighted off Alampil feeding (Takaji In: Martenstyn, 2018).
7. On 7 April 2018 a Bryde's whale was photographed amongst 4 loosely aggregated blue whales off Mullaitivu. They appeared to be feeding (Martenstyn, 2018).
8. On 8 April 2018 one Bryde's whale and an unidentified balaenopterid were loosely associated in the vicinity of 4 blue whales foraging off Kokkilai, bathymetry c. 700m. In one instance a Bryde's whale was about 200-300m away from a blue whale. The dorsal fins shapes of the two balaenopterid were unusual. Photographs were taken (Martenstyn, 2018).
9. On 17 April 2018 a mixed group of 3 blue whales with a Bryde's whale were observed just south of Talawila about 2nm from shore. They appeared to be feeding. All blue whale dives were fluke-down or no fluking (D. Martenstyn In: Martenstyn, 2018).

1 x blue whale and Omura's whale (2 Apr 2015, 25 Apr 2018).

1. In April 2015 a blue whale and Omura's whale mother-calf pair were sighted off Ilanthadiya, Kalpitiya at around 08:00 hrs. They were feeding in shallow waters, bathymetry 50-100m. A juvenile whale shark was also present. Some hours later around 13:00 hrs the mother-calf pair were still in the same location but the blue whale had left the area. During the initial sighting there was no interaction between the two species other than sharing the same feeding grounds (Martenstyn, 2018).
2. A blue whale and Omura's whale sighted in Koddigar Bay shallow waters. They appeared to be feeding. The blue whale briefly came within about 400m of the Omura's whale. At this time, spot depths of 30m and 9.2m were recorded for the blue whale and Omura's whale respectively. The blue did not venture into shallower waters closer to the Omura's whale and instead turned away (Martenstyn, 2018).

Blue whales and Omura's whales associate amicably in shallow feeding areas but do not interact with one another.

1 x blue whale and humpback whale (2 Dec 2018)

1. In December 2018 a blue whale and humpback whale mother-calf pair were sighted off Weligama at around 09:00 hrs. They were observed crossing each others paths, bathymetry 1,000+m (A. Seneviratne In: Martenstyn, 2018).

II. Photographic Identification of Cetaceans

Photographs of cetacean sightings are stored in the CRIOMM ‘Records Photo Library’. A subset of these photographs are utilised for identifying specimens and repeatedly recognizing cetaceans. This individual species photographs are placed in the CRIOMM ‘Photo ID Catalogue’. Each photograph is cropped in the ratio of 3:2 and is assigned a cetacean identification number in the format AAAxxxSSyyyymmdd_sMPLL©Photographer.jpg where:

AAA = Species code (FAO, 2009 is used as a guide for nomenclature).

Table 1: Cetacean species, codes and identified individuals

Species code	Common name	Species	No. of individuals	No. repeatedly recognized
BLW	Blue whale	<i>Balaenoptera musculus</i>	53	9
BRW	Bryde’s whale	<i>Balaenoptera edeni</i>	31	2
EDW	Eden’s whale	<i>Balaenoptera edeni edeni</i>	5	0
OMW	Omura’s whale	<i>Balaenoptera omurai</i>	10	1
SPW	Sperm whale	<i>Physeter macrocephalus</i>	68	0
KIW	Orca	<i>Orcinus orca</i>	23	4
HDI	Indian Ocean humpback dolphin	<i>Sousa plumbea</i>	5	5

xxx = 001-999 Individual identification number.

SS = Cetacean’s part of body where BL = body left-hand side, BR = body right-hand side, DL = dorsal fin left-hand side, DR = dorsal fin right-hand side, FL = flukes lower side FU = flukes upper side.

yyyymmdd_s = Date of sighting and photographer’s reference number.

MP = Maritime Province: NW = North West, NN = North, EE = East, SS = South, WW = West.

LL = Abbreviation for the location: DC = Dondra canyon, DI = Dikwella, KA = Kalpitiya, LB = Little Basses, MI = Mirissa, MU = Mullaitivu, PA = Panadura, TR = Trincomalee.

©photographer = Photograph copyright followed by photograph owner’s name.

All of the available repeatedly recognized cetacean photos along with some of the more recognizable individuals are provided on the following pages by species. 🟢 indicates that the specimen photograph has been matched.

Blue whales and sperm whales are recognizable from the shape and markings on their flukes and also from the dorsal fin shape, size and markings. Fluke shape and markings are the most reliable. Bryde’s, Eden’s and Omura’s whales are repeatedly recognizable from their dorsal fin shape, markings and size, and sometimes from markings on body. Orcas are recognizable from their dorsal fin shape, markings and size and also from the shape of the saddle patch and eye patches.

III. Marine Mammal Stranding Records

Listed below are 179 stranding records that were extracted and placed into the MMDD from various sources including the author's collection. References for each of the stranding records listed below may be cross-referenced from the species records in Appendix VI.

Table 2: List of available marine mammal strandings around the coasts of Sri Lanka (n=181)

Date	Species Name	Typ	Area	Locality	Qty	Sex	TL	P/V	Source
1832	<i>Balaenoptera</i> sp.	MS	W	Mount Lavinia	1	-	-	-	Leatherwood & Clark
02-Mar-1848	<i>G. macrorhynchus</i>	-	W	Colombo	2	-	-	-	Wray & Martin
1859	<i>Balaenoptera</i> sp.	-	E	near Trincomalee	1	-	-	-	Edward Blyth
1859	<i>Balaenoptera</i> sp.	-	S	near Galle	1	-	-	-	Edward Blyth
1859	Unidentified whale	-	W	Fort lighthouse, Colombo	1+	-	-	-	Sir James E. Tennent
1872	Unidentified whale	-	S	Southern coast	1+	-	-	-	Ceylon Rifles Officer
1872	Unidentified whale	-	W	Western coast	1+	-	-	-	Ceylon Rifles Officer
Aug-1884	<i>Balaenoptera</i> sp.	MS	S	Weligama Bay	1	-	-	-	Dr. Arthur Willey
Sep-1889	<i>Physeter macrocephalus</i>	MS	N	South on Mannar Island	1	-	5.21	-	Dr. Amyrald Haly
Pre-1891	<i>Kogia breviceps</i>	MS	E	near Trincomalee	1	-	-	-	Hugh Nevill
Sep-1894	<i>Balaenoptera musculus</i>	MS	S	Ambalangoda	1	-	19.8	Yes	Dr. Amyrald Haly
Jun-1904	<i>Physeter macrocephalus</i>	-	S	Athuruwela (Induruwa)	1	-	-	-	Dr. Arthur Willey
Nov-1904	<i>Physeter macrocephalus</i>	-	W	Mount Lavinia	1	-	-	-	Dr. Arthur Willey
Aug-1910	<i>Balaenoptera musculus</i>	-	NW	Deduru Oya, Chilaw	1	-	20.1	-	Fernando 1912
30-Nov-1915	<i>Kogia sima</i>	MS	W	Moratuwa	1	-	2.55	Yes	J.B.N. Jayasinghe
03-Aug-1929	<i>Pseudorca crassidens</i>	MS	N	Kambanturai, Kayts	167	-	1.8-4.5	Yes	J. Pearson
26-May-1932	<i>Balaenoptera musculus</i>	-	E	Tambalagam Bay, Trinco	1	M	18.0	Yes	P.E.P. Deraniyagala
May-1932	Unidentified whale	-	E	Trincomalee	1	-	12.2	-	S.T. Moses 1947
30-May-1932	<i>Balaenoptera musculus</i>	-	E	Koddiyar Bay, Trinco	1	-	20.1	-	S.T. Moses?
1932	<i>Balaenoptera musculus</i>	-	E	Nirodumunai	1	-	10.7	-	S.T. Moses 1947
06-Feb-1934	<i>Balaenoptera musculus</i>	-	S	Polhena, near Matara	1	F	15.1	Yes	S.T. Moses 1947
Feb-1934	<i>Balaenoptera musculus</i>	-	W	Bambalapitiya, Colombo	1	-	-	-	P.E.P. Deraniyagala
01-Jun-1934	<i>Balaenoptera</i> sp.	-	W	Bambalapitiya, Colombo	1	-	-	-	P.E.P. Deraniyagala
Aug-1934	<i>Balaenoptera</i> sp.	-	NW	Chilaw	1	-	-	-	P.E.P. Deraniyagala
10-Nov-1934	<i>Pseudorca crassidens</i>	-	E	Muttur, Koddiyar Bay	97	-	4.29	Yes	P.E.P. Deraniyagala
09-Aug-1936	<i>Kogia breviceps</i>	-	S	Gunapana?	1	-	-	-	P.E.P. Deraniyagala
20-Aug-1936	<i>Ziphius cavirostris</i>	-	S	Goiyapana	1	-	4.27	-	Daily paper
02-Nov-1936	<i>Eschrichtius robustus</i>	-	S	Galle ramparts	1	M	13.7	-	A. Irving
19-May-1937	<i>B. a. bonaerensis</i>	-	N	Mannar	1	-	6.40	Yes	Times of Ceylon
10-Jan-1939	<i>Ziphius cavirostris</i>	-	S	Dodanduwa	1	-	4.27	-	Daily News
10-Jan-1939	<i>Balaenoptera musculus</i>	-	S	Dodanduwa, Hikkaduwa	1	-	-	-	P.E.P. Deraniyagala
11-Mar-1939	<i>Physeter macrocephalus</i>	-	NW	Ihahatuduva, nr Marawila	1	-	-	-	P.E.P. Deraniyagala
24-Jun-1939	<i>Ziphius c. indicus</i>	MS	W	Colombo Harbour	1	F	5.64	No	P.E.P. Deraniyagala
30-Sep-1939	<i>Pseudorca crassidens</i>	MS	S	Godavaya	1	-	-	-	P.E.P. Deraniyagala
1945	<i>Balaenoptera</i> sp.	MS	N	Kolumbuthurai	1	-	-	Yes	Jaffna Arch. Museum
23-Jan-1946	<i>Balaenoptera musculus</i>	-	E	Trincomalee harbour	2	F	18.3	-	Capt. Mount Haes
Aug-1946	<i>Physeter macrocephalus</i>	-	NW	Kalpitiya	1	-	-	-	P.E.P. Deraniyagala
Aug-1946	<i>Physeter macrocephalus</i>	-	NW	Chilaw	1	-	-	-	P.E.P. Deraniyagala
Aug-1946	<i>Physeter macrocephalus</i>	-	S	Kathaluwa, Galle	1	-	-	-	P.E.P. Deraniyagala
1932-1948	<i>Balaenoptera musculus</i>	-	SL	Sri Lanka	5	-	-	-	P.E.P. Deraniyagala
08-Apr-1949	<i>Balaenoptera musculus</i>	MS	W	Bambalapitiya, Colombo	1	-	-	-	P.E.P. Deraniyagala
01-Jun-1949	<i>Balaenoptera musculus</i>	-	W	Bambalapitiya, Colombo	1	-	-	-	P.E.P. Deraniyagala

Date	Species Name	Typ	Area	Locality	Qty	Sex	TL	P/V	Source
07-Jun-1949	<i>Balaenoptera musculus</i>	MS	N	Ariyalai, Jaffna	1	-	22.2	-	P.E.P. Deraniyagala
1949	<i>Balaenoptera musculus</i>	-	S	Matara	1	-	-	-	P.E.P. Deraniyagala
28-Jan-1954	<i>B. a. bonaerensis</i>	-	N	Chempianpattu, Jaffna	1	M	7.92	-	P.E.P. Deraniyagala
1948-58	<i>Balaenoptera</i> sp.	-	W	Bambalapitiya, Colombo	1	-	-	-	Rodney Jonklaas
14-Aug-1960	<i>Kogia breviceps</i>	-	W	Wadduwa	1	-	4.27	Yes	Silumina
30-Aug-1960	<i>Physeter macrocephalus</i>	-	S	Ambalangoda	1	-	-	-	Ditric Rev. Officer
1960s	<i>Dugong dugon</i>	-	S	Galle	1	-	-	-	W.P. Mahendra/NARA
03-Jul-1962	<i>B. acutorostrata talmaha</i>	MS	N	Velanai East, near Kayts	1	-	8.53	Yes	Asst. Curator SLNM-J
12-Jul-1962	<i>B. acutorostrata talmaha</i>	MS	N	Delft West	1	-	10.7?	-	Asst. Curator SLNM-J
18-Jul-1962	<i>B. acutorostrata talmaha</i>	-	N	Analaitivu, Jaffna	1	-	9.14	-	Asst. Curator SLNM-J
18-Jul-1962	<i>B. acutorostrata talmaha</i>	-	N	Nainativu, Jaffna	1	-	9.14	-	Asst. Curator SLNM-J
23-Jul-1962	<i>B. acutorostrata talmaha</i>	-	N	Velanai East, near Kayts	1	-	9.14	-	Asst. Curator SLNM-J
26-Jan-1963	<i>Mesoplodon hotaula</i>	MS	W	Ratmalana	1	F	4.45	-	P.E.P. Deraniyagala
01-Jul-1963	<i>Ziphius c. indicus</i>	MS	S	Telwatte, Hikkaduwa	1	-	-	-	P.E.P. Deraniyagala
03-Apr-1965	<i>Balaenoptera musculus</i>	-	W	Wellawatte, Colombo	1	-	-	-	de Silva 1985
14-Apr-1965	<i>Balaenoptera musculus</i>	-	N	Kokkilai	1	-	-	-	Deraniyagala 1965
11-Jan-1966	<i>Physeter macrocephalus</i>	-	S	Kahawa, nr Ambalangoda	1	-	-	-	A.D. Ilangakoon
Jun-1967	<i>Ziphius cavirostris</i>	MS	S	Madihe, Matara	1	-	5.60	-	de Silva 1987
11-Aug-1971	<i>Balaenoptera physalus</i>	-	W	Uswetakeiyawa	1	-	13.7	-	de Silva 1987
Mar-1976	<i>Balaenoptera musculus</i>	-	W	Galle Face, Colombo	2	F	-	-	de Silva 1985
22-Jan-1981	<i>Megaptera novaeangliae</i>	MS	NW	Chilaw	1	F	12.0	Yes	Christie Fernando
09-Feb-1984	<i>Balaenoptera musculus</i>	-	NW	Chilaw	2	F	-	-	Fernando 1981
13-Sep-1985	Unidentified whale	-	S	Induruwa & Kosgoda	1	-	-	-	R. Gunaratne/NARA
23-Sep-1985	Unidentified whale	-	W	Bentota	1	-	-	-	R. Gunaratne/NARA
1-14-Dec-1985	<i>Physeter macrocephalus</i>	MS	S	Kalametiya	1	-	-	-	A.Ilangakoon/NARA
1985	<i>Balaenoptera musculus</i>	-	S	Ambalangoda	1	-	-	-	A.Ilangakoon/NARA
06-May-1986	<i>Physeter macrocephalus</i>	-	W	Hendala, Wattala	1	-	3.50	Yes	W.P. Mahendra/NARA
11-Jul-1986	<i>Balaenoptera musculus</i>	-	NW	Chilaw	1	-	18.8	-	A.D. Ilangakoon
17-Feb-1988	<i>Physeter macrocephalus</i>	-	W	Negombo	1	-	7.30	-	A.D. Ilangakoon
Aug-1989	<i>Physeter macrocephalus</i>	-	NW	Karukkapone	1	-	-	-	A.D. Ilangakoon
17-Oct-1989	<i>Physeter macrocephalus</i>	-	W	Negombo	1	-	7.60	-	A.D. Ilangakoon
10-Nov-1989	<i>Physeter macrocephalus</i>	-	NW	Thoduwawa, Chilaw	1	-	9.10	-	A.D. Ilangakoon
26-Mar-1990	<i>Physeter macrocephalus</i>	-	W	Dehiwela	1	F	8.90	-	A.D. Ilangakoon
21-Apr-1990	<i>Megaptera novaeangliae</i>	-	W	Palliyawatte, Hendala	1	-	8.40	-	A.D. Ilangakoon
Mar-1993	<i>Stenella longirostris</i>	-	E	Trincomalee area	1	-	-	-	Mark Carwardine
12-Jan-1994	<i>B. acutorostrata</i>	-	W	Payagala, Kalutara	1	-	7.6-8.5	-	A.D. Ilangakoon
1994	<i>Physeter macrocephalus</i>	-	W	Dehiwela	1	-	-	-	A.D. Ilangakoon
1994	<i>Physeter macrocephalus</i>	-	W	Galle Face, Colombo	1	-	-	-	A.D. Ilangakoon
1994	<i>Balaenoptera</i> sp.	-	W	Bambalapitiya, Colombo	1	-	-	-	A.D. Ilangakoon
03-Nov-1997	<i>G. macrorhynchus</i>	MS	W	Colpetty, Colombo	1	F	3.70	-	A.D. Ilangakoon
1998	<i>Kogia sima</i>	-	S	Rumassala, Galle	1	-	1.10	-	A.D. Ilangakoon
21-Jul-1999	<i>Balaenoptera musculus</i>	-	S	Kapparatota, Weligama	1	F	22.7	-	A.D. Ilangakoon
10-Aug-1999	<i>Balaenoptera brydei</i>	-	S	Mirijawila / Hambantota	1	-	10-12	-	A.D. Ilangakoon
1999	Unidentified whale	-	S	Ahungalla	1	-	-	-	A.D. Ilangakoon
1999	Unidentified whale	-	S	Ahungalla	1	-	-	-	A.D. Ilangakoon
09-Oct-2000	<i>Balaenoptera</i> sp.	-	S	Hikkaduwa	1	-	-	-	A.D. Ilangakoon
05-Nov-2000	<i>Physeter macrocephalus</i>	-	S	Induruwa	1	-	10.6	-	A.D. Ilangakoon
14-Nov-2000	<i>Physeter macrocephalus</i>	-	S	Kaluwella, Galle	1	-	3.90	-	A.D. Ilangakoon

Stranding Reports

A selection of stranding reports are provided below.

1800-1899

1832. According to Kelaart (1852) the skeleton of a stranded balaenopterid specimen that cast ashore at Mount Lavinia some 20 years earlier was still in the Colombo National Museum. No further information about this specimen is available.
1849. The second earliest stranding record is a pilot whale off Colombo observed by whaling ship *Montezuma* (Wray & Martin, 1980).
1859. Two unidentified Great rorquals stranded; one near Galle and the other at Trincomalee (Blyth, 1859). No further details are provided to establish the identity of the species. This is thought to be the earliest possible stranding of a blue whale in Sri Lanka (de Vos, 2015).
1859. Also in 1859 more than once the carcasses of whales having being disposed of by whalers washed ashore near the lighthouse in Colombo (Tennent, 1859).
1872. There are two records; a Ceylon Rifles Officer reported occasional strandings of whales on the southern and western coasts (Anonymous, 1876).
- Aug 1884. A baleen whale washed ashore at Weligama Bay. The bones were recovered and placed in the Colombo National Museum (Willey, 1905).
In 1885 a larger part of the skull, cervical vertebrae, scapulae, some ribs and vertebrae of a blue whale that washed ashore at Weligama Bay were secured by the Colombo National Museum (de Silva, 1977). It is likely that de Silva (1977) was referring to the same 1884 stranding with the bones recovered the following year.
- Sep 1889. The first sperm whale stranding record was a decayed specimen that washed ashore on the south coast of Mannar Island. Most of the skeleton less the lower jaw was recovered by H.F. Fernando. The skull was placed in the Colombo National Museum (Haly, 1890; Willey, 1905; Fernando, 1912).
According to de Silva (1977), parts of a sperm whale that washed ashore on the south coast of Mannar were secured for the Colombo Museum in 1899. It is probable that de Silva (1977) was referring to the 1889 stranding and that the year '1899' is a typographical error.
The earliest record is September 1889, a sperm whale washed ashore on the south coast of Mannar Island. Injuries appeared to be a result of a ship strike or harpoon (Haly, 1890). Fernando (1912) examined the specimen's injuries and supposed that the whale received a blow from some large vessel and less likely received its death from the hands of harpooners.
- Pre-1891. The first pygmy sperm whale, *Kogia breviceps*, stranded near Trincomalee. The specimen (No. 1891.10.3.1) was collected and sent to the Museum of National History, London, UK by Hugh Nevill. It contained the right tympanum and periotic bones of the skull (Pearson, 1931b; Deraniyagala, 1960; Phillips, 1984). This species was based on the monospecific genus.
- Sep 1894. The first reported blue whale stranding is of an adult whale carcass, 20.9m in length that washed ashore at Ambalangoda and the skeleton mounted in the Colombo National Museum by Dr. Joseph Pearson (Haly, 1895; Willey, 1905; Fernando, 1912; Deraniyagala, 1960; de Silva, 1977). This specimen was initially classified as the Great Indian Fin whale, *Balaenoptera indica* (Fernando, 1912). Osman Hill (1939) stated that *musculus* and *indica* are synonyms. Deraniyagala (1960) referred to this record under common rorqual or finback whale, *B. physalus*. De Silva (1977) also refers to this specimen as a fin whale, *B. physalus*. There are 12 reference sources relating to this stranding and no other information is provided to confirm the species. The whale skeleton was displayed in the Colombo National Museum as a blue whale, *Balaenoptera indica* (Leatherwood 1985). It has recently been rehoused in the museum and is now simply referred to as the blue whale without a scientific name. There are 12 reference sources for this stranding.

1900-1949

- Aug 1910. A Great Indian fin whale, *Balaenoptera indica*, was reported to have stranded near Chilaw in a highly decayed state. Wounds on the body indicated that it was harpooned (Fernando, 1912). *B. indica* is a synonym of *B. musculus*. As such, the species is re-classified as a blue whale, *Balaenoptera musculus*. This would be the second reported blue whale stranding specimen.

IV. Museum & Institution Collections

Table 3: List of marine mammal specimens acquired by museums & institutions

Species	Specimen No.	Date	Location	Collected /Gifted by	Material / Comments
BRITISH MUSEUM OF NATURAL HISTORY, LONDON, UK					
<i>Kogia breviceps</i>	1891.10.3.1	1891	Trincomalee	Hugh Nevill	Tympanum & skull
<i>Tursiops truncatus</i>	-	-	Kalpitiya	W.W.A. Philips	Skull
<i>Tursiops truncatus</i>	-	-	North of Colombo	-	Skull
<i>Tursiops truncatus</i>	-	-	-	G.C. Beaumont	Skull
<i>Tursiops truncatus</i>	-	-	Sri Lanka	-	Skull
<i>Stenella attenuata</i>	BMNH1948-4-20-1	-	Sri Lanka	-	-
<i>Stenella attenuata</i>	BMNH1949-10-27-2	-	Sri Lanka	-	-
<i>Stenella attenuata</i>	BMNH1949-10-27-1	-	Sri Lanka	-	-
<i>Stenella attenuata</i>	BMNH1819-10-13-2	-	Sri Lanka	-	-
<i>Stenella longirostris</i>	-	pre-1936	Trincomalee	Hugh Nevill	Skull & skeleton
<i>Stenella longirostris</i>	-	pre-1936	North of Colombo	G.C. Beaumont	Skull & skeleton
<i>Stenella longirostris</i>	-	pre-1936	North of Colombo	-	Skull & scapulae
<i>Stenella longirostris</i>	-	pre-1936	West coast	W.C. Osman-Hill	Skull
FIELD MUSEUM OF NATURAL HISTORY, CHICAGO, USA					
<i>Stenella longirostris</i>	FM095044-48	-	Sri Lanka	-	-
<i>Stenella longirostris</i>	-	-	Trincomalee	E.C. Fernando	5 skulls
SMITHSONIAN INSTITUTE, USA					
Small odontocetes	-	1982-1984	Beruwala/Trinco	A. Alling	6 skulls
MUSEUM OF NATURAL HISTORY, BELFAST					
<i>Dugong dugon</i>	-	1847	Mannar	-	-
MUSEUM NATIONAL d'HISTOIRE NATURELLE, PARIS, FRANCE					
<i>Stenella attenuata</i>	GAL-ZOOL-18	-	Sri Lanka	Dussumier	Mounted specimen
<i>Stenella longirostris</i>	-	-	Sri Lanka	Dussumier	Mounted specimen
<i>Stenella longirostris</i>	MS 894	02-May-1829	Sri Lanka	-	-
US NATIONAL MUSEUM OF NATURAL HISTORY, WASHINGTON, USA					
<i>Stenella longirostris</i>	USNM-STRO2661	03-Feb-1970	Yala	-	-
INDIAN MUSEUM, KOLKOTA, WEST BENGAL, INDIA					
<i>Peponocephala electra</i>	-	1888	Palk Straight	-	Skull
ROYAL COLLEGE OF SURGEONS MUSEUM, SRI LANKA					
<i>Stenella longirostris</i>	-	pre-1923	Arippu, Mannar	-	Skull
<i>Sousa plumbea</i>	P. Z. S.	pre-1883	Arippu, Mannar	E.W.H. Holdsworth	Skull only
SRI LANKA NATIONAL MUSEUM, JAFFNA					
<i>Balaenoptera musculus</i>	54-91-3	07-Jun-1949	Ariyalai, Jaffna	E. Hart	Skeleton
<i>B. a. thalmaha</i>	62.203.6	03-Jul-1962	Velanai, Jaffna	-	Skull
<i>Balaenoptera</i> sp.	55-128-4	17-Mar-1955	Velvettithurai	-	Partial skull
<i>Dugong dugon</i>	54-25-1	30-Oct-1954	Sri Lanka	-	2 tusks
<i>Dugong dugon</i>	-	21-Oct-1960	Pannai, Jaffna	-	Fetus
<i>Dugong dugon</i>	61-196-6, 61-197-6	24-Mar-1961	Pannai, Jaffna	-	Fetus
<i>Dugong dugon</i>	61-198-6	01-May-1961	Pannai, Jaffna	-	Fetus
<i>Dugong dugon</i>	-	12-Aug-1961	Sri Lanka	-	Fetus
<i>Dugong dugon</i>	-	29-Jan-1962	Pannai, Jaffna	-	Fetus
<i>Dugong dugon</i>	-	21-Feb-1962	Pannai, Jaffna	-	Fetus
<i>Dugong dugon</i>	-	11-Mar-1962	Pannai, Jaffna	-	Fetus
ARCHEOLOGICAL MUSEUM, JAFFNA					
<i>Balaenoptera</i> sp.	-	1945	Kolumbuthurai	-	Mandible
NATIONAL MARITIME MUSEUM, GALLE					
<i>Balaenoptera brydei</i>	-	02-Nov-2003	Colombo Port	NARA	Skeleton
RATNAPURA MUSEUM, SRI LANKA					
<i>Physeter macrocephalus</i>	-	-	-	-	Partial skull
<i>Mesoplodon hotaula</i>	-	26-Jan-1963	CMB Museum	CMB Museum	Cast of 3WZS
<i>Ziphius cavirostris</i>	-	-	-	CMB Museum	Cast of head
<i>Sousa plumbea</i>	93	03-Apr-1934	Moratuwa	CMB Museum	Stuffed specimen

Species	Specimen No.	Date	Location	Collected /Gifted by	Material / Comments
SRI LANKA NATIONAL MUSEUM, COLOMBO					
<i>Balaenoptera</i> sp.	-	1832	Mount Lavinia	E.F. Kelaart	Skeleton
<i>Balaenoptera</i> sp.	-	Aug-1884	Weligama Bay	-	Bones
<i>Balaenoptera musculus</i>	-	Sep-1894	Ambalangoda	-	Entire skeleton
<i>Balaenoptera musculus</i>	-	08-Apr-1949	Bambalapitiya	E. Hart	Skull
<i>Balaenoptera physalus?</i>	-	-	Sri Lanka	-	Baleen plates
<i>B. a. thalmaha</i>	2.W	03-Jul-1962	Velanai,, Jaffna	-	Scapulae
<i>B. a. thalmaha</i>	1 W.Z.S	12-Jul-1962	Delft West, Jaffna	-	Skull
<i>Physeter macrocephalus</i>	-	Sep-1889	Mannar Island	H.F. Fernando	Partial skeleton
<i>Physeter macrocephalus</i>	88	-	-	-	Fetus
<i>Kogia breviceps</i>	89	30-Nov-1915	Moratuwa	-	Skull / Skeleton
<i>Kogia sima</i>	89	-	-	-	ID by Nishiwaki
<i>Ziphius cavirostris</i>	88 A	24-Jun-1939	Colombo harbour	-	Skull w/ mandibles
<i>Ziphius cavirostris</i>	88 B	30-Jul-1940	Ratmalana	-	Skull, jaw, teeth
<i>Ziphius cavirostris</i>	88 C	01-Jul-1963	Hikkaduwa	-	-
<i>Ziphius cavirostris</i>	88 D	Jun-1967	Madihe, Matara	-	Skull
<i>Mesoplodon hotaula</i>	3W, 3WZS	26-Jan-1963	Ratmalana	-	Skull, cast, parts
<i>G. macrorhynchus</i>	-	1945	Colombo	S.M. Cleeve	Fossil vertebrae
<i>G. macrorhynchus</i>	009	26-Feb-1983	Negombo	Leatherwood	Partial skull
<i>G. macrorhynchus</i>	-	03-Nov-1997	Colpetty, Colombo	-	-
<i>Pseudorca crassidens</i>	90 A	Dec-1890	Moratuwa	Dr. Spence	Skeleton
<i>Pseudorca crassidens</i>	90 B	1891	Sri Lanka	-	-
<i>Pseudorca crassidens</i>	-	03-Aug-1929	Kayts	-	12 skull, 2 skeleton
<i>Pseudorca crassidens</i>	-	30-Sep-1939	Godavaya	-	-
<i>Pseudorca crassidens</i>	-	-	Sri Lanka	-	Skeleton
<i>Pseudorca crassidens</i>	-	-	Sri Lanka	-	Plaster cast
<i>Tursiops</i> sp.	92 C	Dec-1916	Puttalam	W.E. Wait	Skull
<i>Tursiops</i> sp.	92	Mar-1924	Pearl Bank	-	Skull
<i>Tursiops</i> sp.	92 A, 92 B	1930	Sri Lanka	-	Partial skull
<i>Tursiops</i> sp.	-	1935	Chilaw	-	-
<i>Tursiops</i> sp.	001	-	Sri Lanka	-	-
<i>Tursiops</i> sp.	002	-	Sri Lanka	-	-
<i>Delphinus capensis</i>	15 B	-	Sri Lanka	-	Skull
<i>Delphinus</i> sp.	92-1	-	Sri Lanka	-	Partial skull
<i>Delphinus</i> sp.	92-2	-	Sri Lanka	-	Partial skull
<i>Delphinus</i> sp.	-	-	Sri Lanka	-	Skull
<i>Delphinus</i> sp.	92-4	-	Sri Lanka	-	Partial skull
<i>Steno bredanensis</i>	003	26-Feb-1983	Pitipana, Negombo	Leatherwood	NARA/CRIO MM
<i>Stenella coeruleoalba</i>	a	-	Sri Lanka	-	Partial skull
<i>Stenella attenuata?</i>	92-3	-	Sri Lanka	-	Partial skull
<i>Stenella attenuata</i>	b	-	Sri Lanka	-	Partial skull
<i>Stenella attenuata</i>	c	-	Sri Lanka	-	Partial skull
<i>Stenella longirostris</i>	92 D, 92 E	23-Jan-1954	Sri Lanka	DFAR	-
Delphinid sp.	-	1881	Colombo	A. Haly	Skeleton
Delphinid sp.	-	1883	Negombo	A. Haly	Skin
<i>Dugong dugon</i>	-	1883	Matara	A. Haly	Skeleton, complete
<i>Dugong dugon</i>	-	1893	Sri Lanka	-	Male, female + juv.
<i>Dugong dugon</i>	-	1895	Colombo	A. Haly	Skeleton, complete
<i>Dugong dugon</i>	-	1905	Kayts, Jaffna	A. Willey	Adult Female
<i>Dugong dugon</i>	-	1905	-	A. Willey	A. male & juvenile
<i>Dugong dugon</i>	-	11-Oct-1952	Sri Lanka	-	Skull (lost)
<i>Dugong dugon</i>	94C	10-Aug-1961	Pannai, Jaffna	-	-
<i>Dugong dugon</i>	94D	22-Aug-1961	Jaffna	-	Male fetus
<i>Dugong dugon</i>	-	1995	Kayts	-	Exhibited
<i>Dugong dugon</i>	-	-	Sri Lanka	-	2.7m, stuffed skin
<i>Dugong dugon</i>	-	-	Sri Lanka	-	1.1m, stuffed skin

V. Sri Lanka Marine Mammal Source Materials

Works on Marine Mammals of Sri Lanka

Known literature and other works (published and unpublished) directly relating to marine mammals of Sri Lanka are listed below in chronological order by year. This list of works were collated and compiled during the course of researching for this technical report. Any of these works that were referenced to produce this report are included in Volume I Bibliography. Some works listed here may be anecdotal in nature but are included due to their subject relevance and endeavour to provide an all inclusive list. Promotional articles related to marine mammals and whale watching are listed separately on page 70.

1850-1949

1850's

Kelaart, E.F. 1850. 'Catalogue of the Mammalia of Ceylon'. *Proceedings of the Zoological Society of London*, pp. 155-159.

Kelaart, E.F. 1852. *Prodromus Fauna Zeylonica*. Museum of Zoology, Colombo Museum, Ceylon, pp. 89-90.

Blyth, E. 1859. 'On the great orqual of the Indian Ocean, with notices of other cetals, and of the Syrenia or marine pachyderms'. Calcutta, *Journal of the Asiatic Society of Bengal*, 28: 481-498.

Tennent, Sir James Emerson. 1859. *Ceylon*. Vol. 1 and 2, Longman, Green and Roberts, London, Vol. 1, 3rd Edition p158; Vol. 2, 3rd Edition pp. 557-558.

1870's

Holdsworth, E.W.H. 1872. 'Note on a Cetacean observed on the West Coast of Ceylon'. *Proceedings of the Zoological Society of London*, pp. 583-586.

Anonymous. 1876. Officer (an) Late of the Ceylon Rifles: *Ceylon a General Description of the Island, Historical, Physical, Statistical*. Containing the Most Recent Information, Vol. 2., pp. 86-200. Chapman & Hall, London. (the preface is signed 'H.S.' (Horatio Suckling) see "Horatio John Suckling" by John Ferguson Tropical Agriculturist (L.R. Supplement) pp. 7-8).

1880's

Haly, A. 1882. 'Administration Report of the Director of the Colombo Museum for 1881'. Colombo, National Museum of Sri Lanka, pub.

Haly, A. 1884. 'Administration Report of the Director of the Colombo museum for 1883'. Colombo, National Museum of Sri Lanka, pub.

Sterndale, R.A. 1884. *Natural History of the Mammalia of India and Ceylon*. Thacker, Spink & Co., London. pp. 260-269.

Nevill, H. 1885. 'Dugong'. *Taprobanian*, 1(1): 2.

Haly, A. 1887. 'Administration Report of the Director of the Colombo Museum for 1886'. Colombo, National Museum of Sri Lanka, pub.

Nevill, H. 1887. 'Aelian's account of the dolphins of Taprobane'. *Taprobanian*, 2(1): 1.

1890's

Haly, A. 1890. 'Administration Report of the Director of the Colombo museum for 1889'. Colombo, National Museum of Sri Lanka, pub.

Blanford, W.T. 1891. *The fauna of British India including Ceylon and Burma*. Taylor and Francis, London. pp. 564-594.

Haly, A. 1892. 'Administration Report of the Director of the Colombo museum for March to December 1891'. Colombo, National Museum of Sri Lanka, pub.

Haly, A. 1895. 'Administration Report of the Director of the Colombo museum for 1894'. Colombo, National Museum of Sri Lanka, pub.

Haly, A. 1896. 'Administration Report of the Director of the Colombo museum for 1895'. Colombo, National Museum of Sri Lanka, pub.

1900's

Willey, A. 1905. Colombo Museum guide to the antiquities, minerals and natural history collections in the Colombo Museum. Ceylon Museum, Colombo, pp. 28-39.

1910's

Fernando, H.F. 1912 'Whales washed ashore on the coast of Ceylon from 1889 to 1910'. Colombo museum, *Spolia Zeylanica*, 8(29): 52-54.

VI. Marine Mammal Records

The CRIOMM MMDD containing all the sighting records has about 60 record fields. For the purpose of this publication only a selection of record fields are included due to space limitations. Further details may be obtained from the reference source(s) identified at the end of each sighting record.

The data dictionary for the sighting records in this publication are *explained* below. Fields that contain a dash ‘-’ means unknown, and in some cases it may not be applicable.

TABLE 4: MMDD data dictionary

<i>Database Field</i>	<i>Description or Definition</i>
SN	Unique serial number of sighting record assigned in the MMDD.
Date(s)	Date or period of record. <dd-mmm-yyyy>
Platform	Observation platform; whether land-based, air-based or sea-based. For vessel-based sightings; vessel prefix and name of vessel or type of vessel. FORV = Fishery Oceanographic Research Vessel, RV = Research Vessel, RY = Research Yatch, SRV = Sailing Research Vessel, FV = Fishing Vessel, WV = Whale-watching Vessel, MV = Merchant Vessel, TV = Training Vessel
Cat	Category of sighting record depicted by the following abbreviations: <ul style="list-style-type: none"> • Live = Live sighting at sea (excludes live stranding at sea) • Fish = Incidental fisheries catch or bycatch • Spec = Specimen record, can be from fisheries or stranding • Str = Stranding (live strandings are denoted by ‘Str-L’)
Type	MS = Museum Specimen
Area	Geographical area of sighting depicted by abbreviations. NMP = Northern Maritime Province, EMP = Eastern Maritime Province, SMP = Southern Maritime Province, WMP = Western Maritime Province, NWMP = Northwestern Marine Province, SL = Sri Lanka waters. Boundary details in Volume I page 2. TN = Tamil Nadi, AP = Andhra Pradesh, OD = Odisha, WB = West Bengal, KE = Kerala, KA = Karnataka, GA = Goa, MH = Maharashtra, GU = Gujarat, AN = Andaman & Nicobar Islands, LI = Laccadive Islands, IN = India. MI = Maldive Islands, IA = Indonesia, MA = Malaysia, TD = Thailand, MR = Myanmar, BH = Bangladesh, PN = Pakistan, IR = Iran, PG = Persian Gulf (<i>Arabian Gulf</i>), ON = Oman, YN = Yemen, DJ = Djibuti, Gulf of Aden, RS = Red Sea, SA = Somalia, BOB = Bay of Bengal, ANS = <i>Arabian Sea</i> , NIO = Northern Indian Ocean.
Location	GPS location of sighting or nearest geographic location area.
Dist	Distance in nautical miles (nm) from nearest shoreline.
ST	Start time of first sighting in hh:mm.
Dur	Duration of sighting in dd:hh:mm.
NS	Number of sightings.
Qty	Quantity. Best estimate of the number of animals observed (subjective to the observer).
TL	Total length of animal in meters. Small cetaceans are in centimetres.
Head	Animal(s) heading preference, if any (in degrees or compass rose). Log = logging, Var = Variable movement, No = No preferred heading.
P/V	Photo/Video: Indicates if a photograph and/or video was taken of the marine mammal.
BS	Sea state expressed as BS (Volume I Table 1 on page viii).
Depth	Spot depth of sea (bathymetry) in meters recorded or derived from GPS location at the time of first sighting.
SCL	Confidence level of the species identified. Post = positive, Prob = probable, Poss = possible.
References	Source(s) for the sighting record (Only the first six references). See Table 4 below to cross-reference to in the Bibliography where recorded details were obtained from.

Table 5: List of sources referenced in MMDD sighting records

1	Kelaart, 1852	77	Alling, 1984b	150	Bröker & Ilangakoon, 2008	223	HiruFM, 2013
2	Blyth, 1859	78	Alling, 1985a	151	CMFRI, 200?	224	Williams-Grey, 2013
3	Tennent, 1859	79	Gunaratna & Gunewardene, 1985	152	Afsal <i>et al.</i> , 2008	225	de Silva Wijeyeratne, 2013c
4	Holdsworth, 1872	80	Leatherwood, 1985	153	Yousuf <i>et al.</i> , 2008	226	Little Adventures, 2013
5	Anonymous, 1876	81	Weilgart & Whitehead, 1986	154	Abeyratne, 2008	227	Heinrichs, 2013a
6	Haly, 1882	82	Alling, 1986	155	Anderson, 2008	228	Heinrichs, 2013b
7	Haly, 1884	83	NARA, 1987b	156	JEH, 2008	229	Heinrichs, 2013c
8	Sterndale, 1884	84	de Silva, 1987	157	Ilangakoon, 2008	230	de Vos <i>et al.</i> , 2013a
9	Nevill, 1885	85	Gordon, 1987a	158	Makara Resorts, 2009	231	Gunaratne, 2013
10	Nevill, 1887	86	Gordon, 1987b	159	Anderson, 2009a	232	de Silva Wijeyeratne, 2013f
11	Haly, 1890	87	Gilpatrick <i>et al.</i> , 1987	160	Anderson, 2009b	233	Yapa & Ratnavira, 2013
12	Blanford, 1891	88	Wilson <i>et al.</i> , 1987	161	Baby, 2009	234	Gemmell <i>et al.</i> , 2014
13	Haly, 1892	89	Alling, 1988	162	Afsal <i>et al.</i> , 2009	235	SLCG, 2014a
14	Haly, 1895	90	CMFRI, 1988	163	de Silva Wijeyeratne, 2009	236	Dalebout <i>et al.</i> , 2014
15	Haly, 1896	91	Muthiah <i>et al.</i> , 1988	164	Rajasuriya, 2009	237	de Vos <i>et al.</i> , 2014
16	Willey, 1905	92	Vedavysya Rao <i>et al.</i> , 1989	165	de Silva Wijeyeratne, 2010a	238	Randage <i>et al.</i> , 2014
17	Fernando, 1912	93	Leatherwood & Reeves, 1989	166	de Silva Wijeyeratne, 2010b	239	Wu, 2014
18	Millett, 1914	94	Ilangakoon <i>et al.</i> , 1990	167	Ilangakoon <i>et al.</i> , 2010	240	Jefferson & Rosenbaum, 2014
19	Pearson, 1931a	95	Leatherwood & Reeves, 1991	168	Rodrigo, 2010	241	Baumgartner & Stafford, 2014
20	Pearson, 1931b	96	Leatherwood <i>et al.</i> , 1991	169	Anderson, 2010	242	Nanayakkara <i>et al.</i> , 2014a
21	Deraniyagala, 1932	97	Chantrapornsyl <i>et al.</i> , 1991	170	Jayatilake, 2010	243	Nanayakkara <i>et al.</i> , 2014b
22	Phillips, 1935	98	Kasuya & Wada, 1991	171	de Silva Wijeyeratne, 2010c	244	Nanayakkara <i>et al.</i> , 2014d
23	Daily News, 1939	99	Reeves <i>et al.</i> , 1991	172	Priyankara, 2010	245	Thilakarathne <i>et al.</i> , 2015a
24	Osman Hill, 1939	100	Alling <i>et al.</i> , 1991	173	CRIOMM, 2010	246	Thilakarathne <i>et al.</i> , 2015b
25	Deraniyagala, 1940	101	Lal Mohan, 1992	174	Times, 2010	247	WDC, 2015
26	Deraniyagala, 1945	102	Noble & Nasser, 1992	175	Dhayarathne, 2010	248	Anderson, 2015
27	Moses, 1947	103	Ganapathy, 1992	176	Weerasinghe, 2010	249	de Vos, 2015
28	Deraniyagala, 1948	104	Dayaratne & Joseph, 1993	177	Karunarathna <i>et al.</i> , 2011	250	Goonewardena, 2015
29	Daily News, 1949	105	Nammalwa <i>et al.</i> , 1994	178	NARA, 2011	251	Gemmell <i>et al.</i> , 2015
30	Deraniyagala, 1950	106	Carwardine, 1994	179	Martin & Web, 2011	252	SLA, 2015
31	Gibson-Hill, 1950	107	Miller, 1995	180	Nizam, 2011	253	Kapilan, 2015
32	Deraniyagala, 1951	108	Dayaratne <i>et al.</i> , 1995	181	Rodrigo, 2011a	254	Priyadarshana <i>et al.</i> , 2016b
33	de Zylva, 1954	109	Ballance <i>et al.</i> , 1996	182	Rodrigo, 2011b	255	NIOKWA, 2016
34	Lantz & Gunasekara, 1955	110	Ilangakoon, 1997	183	SLN, 2011	256	Yatawara, 2016
35	Crowe, 1956	111	Pitman <i>et al.</i> , 1999	184	Rodrigo, 2011c	257	Anderson, 2016
36	Brown, 1957	112	Bose, 2000	185	Times, 2011	258	De Vos, 2016
37	Spittel, 1959	113	De Silva, 2000	186	Jayaruk, 2011	259	de Vos <i>et al.</i> , 2016
38	Deraniyagala, 1960a	114	Ilangakoon <i>et al.</i> , 2000a	187	de Silva Wijeyeratne, 2011	260	Martenstyn, 2016a
39	Jonklaas, 1960	115	Ilangakoon <i>et al.</i> , 2000b	188	Chandrarathne, 2011	261	Gemmell <i>et al.</i> , 2016
40	Norris, 1960	116	Ballance <i>et al.</i> , 2001	189	Jeyabaskaran <i>et al.</i> , 2011	262	Ilangakoon & Alling, 2016
41	Silumina, 1960a	117	Balasubramanian, 2001	190	De Vos <i>et al.</i> , 2011	263	Priyadarshana, 2016
42	Observer, 1960b	118	Karuppiah <i>et al.</i> , 2001	191	Martenstyn, 2011	264	SLN, 2016
43	Deraniyagala, 1961	119	Gandhi & Kasinathan, 2002	192	Ilangakoon & Sathasivam, 2012	265	Wijesekera <i>et al.</i> , 2016
44	Jonklaas, 1961	120	Nammalwar <i>et al.</i> , 2002	193	Clark <i>et al.</i> , 2012	266	DFAR, 2016
45	Clarke, 1961	121	Ilangakoon, 2002	194	SLN, 2012a	267	Martenstyn, 2016b
46	Lankadipa, 1962	122	Hemachandra, 2003	195	Ilangakoon, 2012a	268	Dias, 2017
47	Kulatunge, 1962	123	Ilangakoon, 2003	196	Joensson, 2012	269	Hoare, 2017
48	Deraniyagala, 1963a	124	Johnson, 2003a	197	Bijukumar <i>et al.</i> , 2012	270	Rodrigo, 2017a
49	Deraniyagala, 1963b	125	Johnson, 2003b	198	Cairn, 2012	271	Anderson, 2017
50	Deraniyagala, 1964	126	Johnson, 2003c	199	Alexandria, 2012	272	Gemmell & de Silva Wijeyeratne, 2017
51	Slijper <i>et al.</i> , 1964	127	Madsen, 2003	200	SLN, 2012b	273	Mirror, 2017
52	Deraniyagala, 1965a	128	Johnson, 2003d	201	Times, 2012b	274	Alagiyawanna, 2017
53	Deraniyagala, 1965b	129	Johnson, 2003e	202	Kemp, 2012	275	De Vos, 2017
54	Deraniyagala, 1965c	130	Johnson, 2003f	203	Peeris, 2012	276	Rodrigo, 2017b
55	Mörzer Bruyns, 1971	131	Johnson, 2003g	204	de Silva Wijeyeratne & JEH, 2012	277	MMCNI, 2017
56	Alagarswami <i>et al.</i> , 1973	132	Johnson, 2003h	205	Wu, 2012	278	Goonewardena, 2017
57	Khajuria <i>et al.</i> , 1977	133	Johnson, 2003i	206	Dalebout <i>et al.</i> , 2012	279	Nanayakkara & Herath, 2017
58	de Silva, 1977	134	Johnson, 2003j	207	Nanayakkara, 2012	280	Ilangakoon, 2017
59	Fernando, 1981	135	Ocean Alliance, 2003	208	IWC, 2012	281	Nanayakkara <i>et al.</i> , 2017
60	Alling <i>et al.</i> , 1982	136	Whitehead, 2003	209	Srividya, 2012	282	Harvard University, 2018
61	Wray & Martin, 1983	137	Jayewardene, 2003	210	Colombo Page, 2012	283	MWS, 2019
62	Alling, 1983a	138	Nair <i>et al.</i> , 2004	211	Jayathilaka & Arulananthan, 2012	284	Martenstyn, 2019
63	Joseph <i>et al.</i> , 1983	139	Madsen <i>et al.</i> , 2004a	212	Mirror, 2012		
64	Leatherwood <i>et al.</i> , 1983b	140	Madsen <i>et al.</i> , 2004b	213	Martenstyn, 2012a		
65	Santerre & Santerre, 1983	141	Sathasivam, 2004	214	De Vos <i>et al.</i> , 2012		
66	Whitehead, 1983a	142	Sutaria & Jefferson, 2004	215	Allen <i>et al.</i> , 2012a		
67	de Silva, 1983	143	NARA, 2005	216	Allen <i>et al.</i> , 2012b		
68	Alling <i>et al.</i> , 1983	144	Anderson, 2005	217	Anderson <i>et al.</i> , 2012a		
69	Whitehead <i>et al.</i> , 1983	145	Anderson <i>et al.</i> , 2006	218	Anderson <i>et al.</i> , 2012b		
70	Jonklaas, 1983	146	Ilangakoon, 2006a	219	Tammita-Delgodra, 2012		
71	Jones, 1983	147	LGL, 2007	220	Martenstyn, 2012b		
72	Leatherwood <i>et al.</i> , 1984	148	Branch <i>et al.</i> , 2007	221	CRIOMM & BF, 2012		
73	Phillips, 1984	149	Herath, 2007	222	Alling & Martenstyn, 2013		
74	Alling <i>et al.</i> , 1984						
75	WWF, 1984						
76	Alling, 1984a						

7337	27-Mar-2018	WV Dinghy	Live	-	NW	N8 02.535 E79 40.105	-	08:14	-	1	1	-	No	1	120	-	284	
7372	04-Apr-2018	RV Dinghy	Live	-	E	N8 51.611 E81 14.696	-	12:23	-	1	1	-	-	1	400	-	284	
7409	08-Apr-2018	FV Dinghy	Live	-	N	Kokkilai	-	09:29	-	1	1	-	Yes	2	700	-	284	
7495	15-Jul-2018	Land-based	Str	-	NW	Alankuda, Kalpitiya	0	PM	-	1	1	-	Yes	-	-	-	284	
7540	19-Dec-2018	Land-based	Str	-	S	Talalla, nr Gandara	0	-	-	1	1	-	Yes	-	-	-	284	
IN002	1757	-	Spec	-	TN	Pondichery	-	-	-	1	1	-	-	-	-	-	27	31
IN052	Jan-1923	-	Spec	-	IN	Madai (Malabar)	-	-	-	1	1	-	-	-	-	-	27	
IN069	Mar-1935	-	Str	-	KE	Vadanapalli (Malabar)	-	-	-	1	1	-	-	-	-	-	27	
IN070	1935	-	Spec	-	KA	Anjuna, Goa	-	-	-	1	1	-	-	-	-	-	27	
IN071	Feb-1937	-	Str	MS	KE	Pullam, Travancore	-	-	-	1	1	-	-	-	-	-	27	
IN087	12-Apr-1949	-	Fish	-	MH	Mumbai	-	-	-	1	1	-	-	-	-	-	31	
IN409	Oct 2003-Feb 2007	FORV <i>Sagar Sampada</i>	Live	-	TN	N11.09 E80.05	-	-	-	1	2	-	-	3	176	-	151	152
M038	20-Apr-1995	RV <i>Malcolm Baldrige</i>	Live	-	MI	N7 31.800 E72 37.200	-	15:23	-	1	2	-	-	1	-	-	109	
M111	2-21-Apr-1998	RV, 18m motor vessel	Live	-	MI	North Maldives	-	-	-	16	-	-	-	-	-	-	116	144
N016	1952-56	Merchant Vessel	Live	-	NIO	Northern Indian Ocean	-	-	-	-	-	-	-	-	-	-	36	
N163	Oct 2003-Feb 2007	FORV <i>Sagar Sampada</i>	Live	-	BOB	N7 01.800 E86 16.800	262	-	-	1	2	-	-	2	3,000	-	151	152
N201	11-Dec-2013	RV <i>Roger Revelle</i>	Live	-	BOB	Bay of Bengal	-	-	-	-	-	-	-	-	-	-	241	

Table 7: Blue whale (*Balaenoptera musculus*) sighting records

SN	Date	Platform	Cat	Type	Area	Location	Dist	ST	DS	NS	Qty	Head	P/V	BS	Depth	SCL	References	
0062	pre-1891	-	Live	-	SL	Coasts of Ceylon	-	-	-	-	-	-	-	-	-	-	12	84
0067	Sep-1894	Land-based	Str	MS	S	Ambalangoda	0	-	-	1	1	-	Yes	-	-	-	14	16 17 24 38 58
0073	Aug-1910	Land-based	Str	-	NW	Deduru Oya, Chilaw	0	-	-	1	1	-	-	-	-	-	17	38 65 80 84 121
0083	26-May-1932	Land-based	St-L	-	E	Tambalagam Bay, Trinco	0	14:00	-	1	1	-	Yes	-	1	-	21	24 38 54 65 73
0085	30-May-1932	-	Str	-	E	Koddiyar Bay, Trinco	0	-	-	1	1	-	-	-	-	-	38	73 84 121
0086	30-Jun-1932	-	Live	-	E	Koddiyar Bay, Trinco	-	-	-	1	-	-	-	-	-	-	80	
0087	1932	-	Str	-	E	Nirodumunai	0	-	-	1	1	-	-	-	-	-	27	31 84 121
0088	06-Feb-1934	Land-based	Str	-	S	Polhena, near Matara	0	-	-	1	1	-	Yes	-	-	-	27	28 38 80 84 121
0089	Feb-1934	Land-based	Str	-	W	Bambalapitiya, Colombo	0	-	-	1	1	-	-	-	-	Post	38	84
0108	10-Jan-1939	Land-based	Str	-	S	Dodanduwa, Hikkaduwa	0	-	-	1	1	-	-	-	-	Post	25	54 65 80 84 121
0116	23-Jan-1946	Vessel-based	St-L	-	E	Trincomalee harbour	0	-	-	1	2	-	-	-	1	Post	28	38 51 54 73 80
0121	1932-1948	-	Str	-	SL	Sri Lanka	0	-	-	5	5	-	-	-	-	Post	28	
0122	1932-1948	-	Live	-	SL	Close to land, Sri Lanka	-	-	-	-	2	-	-	-	-	Post	28	
0125	08-Apr-1949	Land-based	Str	MS	W	Bambalapitiya, Colombo	0	-	-	1	1	-	-	-	-	Prob	30	38 54 73 80 84
0126	01-Jun-1949	-	Str	-	W	Bambalapitiya, Colombo	0	-	-	1	1	-	-	-	-	Prob	54	121
0127	07-Jun-1949	Land-based	Str	MS	N	Ariyalai, Jaffna	0	-	-	1	1	-	-	-	-	Prob	30	32 38 30 79 83
0128	1949	Land-based	Str	-	S	Matara	0	-	-	1	1	-	-	-	-	Post	30	
0611	03-Apr-1965	-	Str	-	W	Wellawatte, Colombo	0	-	-	1	1	-	-	-	-	Post	80	84 121
0612	14-Apr-1965	-	Str	-	N	Kokkilai	0	-	-	1	1	-	-	-	-	Post	53	54 65 80 84 121
0629	Mar-1976	-	Str	-	W	Galle Face, Colombo	0	-	-	1	2	-	-	-	-	Post	80	84 121
0734	05-Feb-1983	SRV <i>Tulip</i>	Live	-	E	N6 59.0 E82 03.0	10.9	14:41	1:15	1	2	-	-	-	800	Post	77	

SN	Date	Platform	Cat	Type	Area	Location	Dist	ST	DS	NS	Qty	Head	P/V	BS	Depth	SCL	References
0740	07-Feb-1983	SRV Tulip	Live	-	E	N8 15.2 E81 39.9	14.6	07:33	0:12	1	2	-	-	-	1,000+	Post	77
0754	13-Feb-1983	SRV Tulip	Live	-	E	N8 41.9 E81 19.1	6.2	08:00	1:58	1	4	-	-	-	1,000+	Post	77 100
0755	13-Feb-1983	SRV Tulip	Live	-	E	N8 39.3 E81 18.7	5.2	10:34	0:02	1	1	-	-	-	1,000+	Post	77
0757	13-Feb-1983	SRV Tulip	Live	-	E	N8 37.7 E81 22.2	7.7	14:14	0:09	1	1	-	-	-	1,000+	Prob	77
0759	14-Feb-1983	SRV Tulip	Live	-	E	N8 53.4 E81 15.3	9.7	06:45	-	1	2	-	-	-	730	Post	77
0760	14-Feb-1983	SRV Tulip	Live	-	E	N8 52.4 E81 16.6	9.9	07:12	-	1	1	-	-	-	875	Post	77
0761	14-Feb-1983	SRV Tulip	Live	-	E	N8 51.6 E81 17.7	10.5	07:26	-	1	1	-	-	-	1,000+	Post	77
0762	14-Feb-1983	SRV Tulip	Live	-	E	N8 51.4 E81 13.8	7.5	08:29	-	1	4	-	-	-	135	Post	77
0765	15-Feb-1983	SRV Tulip	Live	-	E	N8 41.7 E81 20.2	7.4	13:56	-	1	3	-	-	-	1,000+	Post	77
0766	15-Feb-1983	SRV Tulip	Live	-	E	N8 39.1 E81 19.8	6.1	14:16	1:36	1	2-3	-	-	-	1,000+	Prob	77
0770	16-Feb-1983	SRV Tulip	Live	-	E	N8 43.5 E81 20.1	7.7	-	-	1	1	-	-	-	1,000+	Post	77
0773	18-Feb-1983	SRV Tulip	Live	-	E	N8 34.9 E81 27.0	7.7	16:33	-	1	1	-	-	-	545	Post	77
0774	18-Feb-1983	SRV Tulip	Live	-	E	N8 33.0 E81 28.1	7.6	16:43	-	1	1	-	-	-	300	Post	77
0775	18-Feb-1983	SRV Tulip	Live	-	E	N8 33.5 E81 28.1	7.9	17:00	-	1	1	-	-	-	500	Post	77
0776	18-Feb-1983	SRV Tulip	Live	-	E	N8 36.5 E81 23.6	8.9	18:15	-	1	2	-	-	-	950	Post	77
0778	19-Feb-1983	SRV Tulip	Live	-	E	N8 39.3 E81 21.3	7.6	07:22	-	1	3	-	-	-	1,000+	Post	77
0779	19-Feb-1983	SRV Tulip	Live	-	E	N8 34.2 E81 25.0	5.8	11:40	0:22	1	3-4	-	-	-	175	Post	77
0781	19-Feb-1983	SRV Tulip	Live	-	E	N8 37.0 E81 21.0	6.5	13:46	-	1	1	-	-	-	755	Post	77
0782	19-Feb-1983	SRV Tulip	Live	-	E	N8 37.6 E81 20.7	6.5	14:44	-	1	1	-	-	-	925	Post	77
0788	23-Feb-1983	SRV Tulip	Live	-	E	Trincomalee area	-	-	-	-	16	-	-	-	-	Post	79 83 84
0799	28-Feb-1983	SRV Tulip	Live	-	E	N8 34.0 E81 19.6	2.5	07:00	1:00	1	2-3	-	-	-	90	Post	77 80
0800	28-Feb-1983	SRV Tulip	Live	-	E	N8 34.1 E81 19.5	2.5	08:10	-	1	2	-	Yes	-	75	Post	77 80 100
0801	28-Feb-1983	SRV Tulip	Live	-	E	N8 34.6 E81 18.6	3.1	09:03	-	1	1	-	-	-	96	Post	77 80
0802	28-Feb-1983	SRV Tulip	Live	-	E	N8 35.3 E81 20.9	4.1	09:36	-	1	3	-	-	-	225	Post	77 80
0803	28-Feb-1983	SRV Tulip	Live	-	E	N8 35.5 E81 20.5	5.7	09:55	-	1	1	-	-	-	225	Post	77 80
0804	28-Feb-1983	SRV Tulip	Live	-	E	N8 36.2 E81 19.3	4.6	10:45	-	1	1	-	-	-	200	Post	77 80 100
0805	28-Feb-1983	SRV Tulip	Live	-	E	N8 37.2 E81 15.9	2.3	16:00	-	1	1	-	-	-	70	Post	77 80
0806	28-Feb-1983	MV Mahasen	Live	-	E	Trincomalee	-	-	-	9	16	-	-	-	-	Post	70 72 80 84
0814	02-Mar-1983	SRV Tulip	Live	-	E	N8 34.0 E81 18.7	2.4	10:38	0:33	1	1	-	-	-	55	Post	77 100
0815	02-Mar-1983	SRV Tulip	Live	-	E	N8 37.8 E81 19.8	5.7	15:44	-	1	1	-	-	-	930	Post	77
0820	03-Mar-1983	SRV Tulip	Live	-	E	N8 37.8 E81 15.2	1.6	06:30	-	1	3	-	-	-	35	Post	77
0821	03-Mar-1983	SRV Tulip	Live	-	E	N8 37.2 E81 16.2	2.2	07:04	-	1	2	-	-	-	92	Post	77 100
0822	03-Mar-1983	SRV Tulip	Live	-	E	N8 37.4 E81 15.9	2.3	07:40	-	1	1	-	-	-	75	Post	77 100
0823	03-Mar-1983	SRV Tulip	Live	-	E	N8 35.8 E81 20.3	5.5	08:46	-	1	1	-	-	-	265	Post	77
0824	03-Mar-1983	SRV Tulip	Live	-	E	N8 35.0 E81 20.0	3.5	10:14	-	1	2	-	-	-	102	Post	77
0825	03-Mar-1983	SRV Tulip	Live	-	E	N8 36.2 E81 21.3	6.5	12:30	-	1	1	-	-	-	520	Post	77
0826	03-Mar-1983	SRV Tulip	Live	-	E	N8 36.0 E81 15.0	0.8	15:32	-	1	3	-	-	-	40	Post	77
0850	04-Mar-1983	SRV Tulip	Live	-	E	N8 33.0 E81 23.0	3.6	09:32	-	1	1	-	-	-	50	Post	77
0859	05-Mar-1983	SRV Tulip	Live	-	E	N8 34.3 E81 15.8	1.2	07:55	0:32	1	2-3	-	-	-	165	Post	77 100
0881	12-Mar-1983	SRV Tulip	Live	-	E	N8 34.992 E81 18.536	3.7	-	-	1	-	-	-	-	204	Post	68 217

VII. Cetacean Sighting Recording Form

Record No.:.....

Name:..... E-Mail:..... Phone:.....

Watching from: [] land [] vessel. Vessel type/name: Boat operator:

No. of Pax Pax Names:

SIGHTING DETAILS: Record as much as possible, but even partial data is helpful!

Day/Month/Year Depart Time Return Time

Time 1st Seen Time Last Seen Distance Travelled

Latitude°' N Longitude°' E Time

Latitude°' N Longitude°' E Time

Latitude°' N Longitude°' E Time

Latitude°' N Longitude°' E Time

Record every 15 minutes or when cetacean changes direction

Location Photo/Video taken? Yes [] No []

OR if Lat/Long not available, give description, distance to local landmarks or grid reference to pinpoint Lat/Long

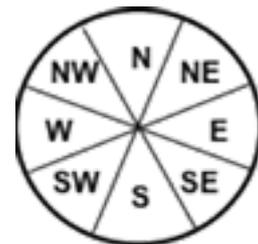
Group size: best estimate minimum maximum Length estimatemetres

No. Adults: No. Juveniles (c. 75% Adult Size): No. Calves (c. 30% Adult Size):

Behaviour (tick one or more):

- Blow: spout seen
- Slow/normal swim: leisurely surfacing with no splash
- Fast swim: rapid surfacing, poss. with white water around perimeter
- Feeding: prey seen in vicinity or animal changing direction as if in pursuit
- Leap/Splashing: leaping out of the water, tail or fin slapping
- Spinning: leaping out of the water & spin
- Head-over-tail: mid-air somersault
- Head slaps: lifting head out of the water & pounding onto surface
- Bow-ride: coming to boat and riding bow wave
- Rest/milling: lying motionless at surface or slow, synchronous surfacing
- Sexual: close body contact between mammals
- Other:

Direction of movement:
Mark cetaceans direction of travel (Δ) and boat heading (•) separately



Associates: Animal's Direction Variable: Yes [] No []

SPECIES DESCRIPTION

Estimate body size, if appropriate by comparison with boat length. If seen, describe head shape and presence of beak. Note shape, height and position of dorsal fin relative to mid point of body. Note colour and any stripes or patterns. Describe blow if visible, no. of blowholes, location. Make sketches, if appropriate.

Species [] Positive [] Probable [] Possible

ENVIRONMENTAL DATA

Sea State:

0 calm; mirror calm 1 slight ripples; no foam crests 2 small wavelets; glassy crests, no whitecaps

3 large wavelets; crests begin to break; few whitecaps 4 small waves; many whitecaps

5 moderate waves of longer form; some spray 6 large waves; many whitecaps everywhere

Swell Height: 0 Light (0-1m) 1 Moderate (1-2m) 2 Heavy (>2m)

Water Temperature:°C Wind Direction: Current Direction: Tide Level: