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Abstract

Large dead whales have been recorded from the Sri Lankan coast since 1832 (Blyth 1859). Between 1889 and 2004, there were records of 67 large whales stranded around Sri Lanka (Ilangakoon 2002, 2006). We compiled additional records for 54 large whales that stranded in the region over the next ten years (2005 through 2014), plus a few earlier ones, for a new total of 121 individuals. The larger number of records over the more recent 10-year period reflects better reporting. Our new combined list consists of the following species and individuals: 38 blue whales, *Balaenoptera musculus*; 5 Bryde's whales, *B. edeni*; 2 humpback whales, *Megaptera novaeangliae*; 33 sperm whales, *Physeter macrocephalus*, 28 unidentified baleen whales, and 15 unidentified large whales. The first two large whales that were confirmed deaths from ship strikes were in July 2002 and November 2003. We were unable to determine the cause of death for any stranded individual before 2002, except for one humpback whale entangled in fishing gear in 1981. We could determine the cause of death for only two of the 54 strandings after 2004 and both were ship strikes. There were 12 additional deaths that were reported as ship strikes but these could not be confirmed due to the limited available details. However, the true number of whales killed from vessel strikes must be much greater than the number we have confirmed. Stranded individuals reported by Ilangakoon (2002) as either fin, *B. physalus* (9) or minke whales, *B. acutorostrata* (8) before 2005 were misidentified. The fin whales were most likely blue or Bryde's whales and the minke whales were likely Bryde's whales, or perhaps Omura's whales, *B. omurai*. There are no confirmed records of fin, sei, *B. borealis*, or minke whales from Sri Lankan waters, nor from the Northern Indian Ocean (Arabian Sea). Also, some of the very small specimens reported by Ilangakoon as sperm whales could have been misidentified as all were examined by experts.and the smaller whale could have been one or more of the four species of beaked whales known from Sri Lankan waters.

Introduction

The first English language report of a stranded large whale from Sri Lanka is a specimen from Mount Lavinia, found near Colombo around 1832 and deposited in the Colombo museum (Kelaart 1852). No details were provided on this stranding. Blyth (1859) reported that two "great whales" stranded in 1859, one from near Galle on the west coast and one near Trincomalee on the northeast coast. The first large whales stranded in Sri Lanka that were identified to species were a sperm whale in 1889 and a blue whale in 1894, followed by two more sperm whales in 1904 and another blue whale in 1910 (Fernando 1912). Fernando (1912) reported that the skull of the 1889 specimen was damaged and suggested that "the whale received a blow from some large vessel" or that it was caused by a harpoon.

Ilangakoon (2002) summarized scattered stranding records for 58 large whales from around Sri Lanka from 1889 to 2000, starting with the ones reported by Fernando (1912). She added 8 new records for the period 2001-2004 for a total of 67 large whales (Ilangakoon 2006). We re-examined all available records since 1889 and added new records for stranded large whales from around Sri Lanka between 2005 and 2014 that had not been previously reported. We attempted to confirm species identification and cause of death whenever possible from the available information.

Methods

Sri Lanka covers about 1,340 km of coastline (Fig. 1) between about 05°55'N - 09°50' N and 79°42'E - 81°53'E in the middle of the northern Indian Ocean, off the southeast coast of India. Skeletons from stranded cetaceans in Sri Lanka have been collected since the end of the 19th century and deposited in the Colombo National Museum (CNM) and more recently at the National Aquatic Resources Agency (NARA) and other institutions, including universities. Many cities, towns, and villages are scattered along the entire coastline and large animals like whales, whale sharks, marine turtles and manta rays taken in fisheries as bycatch or directly hunted are frequently reported to the CNM, NARA or the news media. In recent years, many of these events have been reported on social media.

Our starting point was the list of stranded large whales from around Sri Lanka compiled by Ilangakoon (2002, 2006), which covered the period 1889 to 2004. We had to reconstruct her last eight strandings as the only detail she provided was species. We also added a few additional records to the base period including some before 1889. We then collected stranding information for large whales for the ten-year period 2005 to 2014. No new records are included after 31 December 2014. We recorded live strandings when the whales were documented as coming ashore but then refloated on their own or with human help. Where possible, we recorded for each stranding: date, location, total body length, sex, and the presence or absence of body markings that might indicate anthropogenic mortality (e.g. fishery bycatch or ship strike). Regardless of species, some whales were cut open by the local people looking for ambergris (Kemp 2012). Ilangakoon (2002) reported two baleen whales taken as bycatch: (1) a humpback on 22 January 1981 from Chilaw and (2) a "fin" whale in August 1985 from Negombo. The humpback is listed in her Appendix I of documented strandings from Sri Lanka but not the fin whale because it did not actually strand (Ilangakoon 2002).

Whales stranded on a beach can be difficult to identify to species level. This is partly because they are usually found head down and ventral surface up making it impossible to see the dorsal side of the head, the presence or absence of ridges on the rostrum, and the shape of the dorsal fin. Also, total length is rarely measured and is often an inaccurate guess. Other key characters to identify baleen whales include the number of ventral groves and whether they end before, at, or past the umbilicus but these features are very rarely recorded when stranded specimens are examined.

We assumed that any whale identified with three ridges on its rostrum was a Bryde's whale, *Balaenoptera edeni*. We followed the Society for Marine Mammalogy Taxonomy Committee

(2016) and did not recognize *B. brydei* as a species, but as a subspecies *B. e. brydei*. While Omura's whale, *B. omurai*, has not been previously recorded in Sri Lanka or India, nor the northern Indian Ocean (Kumarran 2012, Kershaw *et al*. 2013), it was recently reported from Iran and Madagascar (Cerchio *et al*. 2015, Ranjbar *et al*. 2016).

Results

Ilangakoon (2006) reported that 67 large whales stranded around Sri Lanka between 1889 and 2004. These consisted of the following: blue whales (22.7%, n=16), fin whales (13.6%, n=9), Bryde's whales (4.5%, n=3), minke whales (12.1%, n=8), humpback whales (3.0%, n=2), sperm whales (31.8%, n=21), and unidentified large whales (12.1%, n=8). Most of these strandings (1889 to 2001 n=55) were from published records summarized by Ilangakoon (2002) and 11 new strandings for the period 2002 to 2004. We found an additional a few stranding records before 1889. All these records are provided in Appendix 1 along with the base records with all available data we could locate for each individual.

We compiled new records for 54 large whales that stranded around the Sri Lankan coast between 2005 and 2014These were blue whales (n=21), Bryde's whales (n=2), sperm whales (n=12), and unidentified large whales (n=19), seven of which were baleen whales. Another 27 whales (22.3%) could not be identified, but based on their reported total lengths we considered them to be large whales. Eleven of these 27 large whales were confirmed as baleen whales. Sperm whales appeared to be correctly identified, but all fin and minke whales or 26% of the pre 2005 strandings could not be confirmed, except the 1910 stranding that has subsequently been re-identified as a blue whale. We believe all fin whale specimens were misidentified and were possibly blue but more likely Bryde's whales based on their characteristic features. Based on the reported total lengths, all minke whales were either Bryde's whales or possibly Omura's whales.

There are no confirmed records of fin, sei (*B. borealis*), or minke whales from Sri Lankan waters, or from the Northern Indian Ocean (Arabian Sea). The two humpback whales were re-confirmed as correctly identified. Also some of the very small specimens reported as sperm whales could have been misidentified. These few specimens were most likely one of the four species of beaked whales known from Sri Lankan waters.

All of these records (1889 through 2014) are listed in Appendix 1. Our total combined list of large whale strandings is 121 individuals and consists of four confirmed species: (1) blue whales (30.6%, n=38), (2) Bryde's whales (0.04%, n=5), (3) humpback whales (0.02%, n=2) and sperm whales (27.3%, n=33). Unidentified large whales included 28 baleen whales and 15 other large whales.

Below we review the available reports for 16 large whale that reported to have died from ship strikes. Our finding for each case are as follows:

1. On 22 July 2002, a 20 to 25 ft sperm whale stranded at Beruwala. Photographs examined by one of us (ADI). ***Conclusion:*** **ship strike**.

2. On 3 November 2003, a 43 ft Bryde's whale was found lodged dead on the bow of the *APL Cyprine* (275 metre long American President Lines container vessel) when it arrived in the Port of Colombo. When the *APL Cyprine* was berthed at the Jaye Container Terminal, the carcass floated free. The species identification was genetically confirmed by Herath (2007). ***Conclusion,*** **we accept this as a well-documented death from a ship strike**

3. On 22 July 2010, a 22 m female blue whale stranded at Hikkaduma. Details provided on cause of death were – "lesion on rostrum and the lower jaw was damaged" – (L. Peiris). This could be a possible ship strike but it it cannot be confirmed based on the limited data. [What does lesion and damage mean? No way for me to judge]. Ref. Peiris ***Conclusion:*** **based on the available evidence it is unlikely that ship strike was the cause of death but instead it was likely due to entanglement.**

4. 17 Sept 2010, a 19.5 m female blue whale stranded at Mt. Lavinia. Details provided on cause of death were that "damaged vertebrae" were observed (L. Peiris). – Based on these limited observations we cannot verify that ship strike was the cause of death. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

5. 28 Aug. 2010, a 21 m blue whale stranded at Kahawa. Details provided on cause of death were – "severed in half" and "aft the dorsal fin had a series of six parallel vertical slashes along its right side." (L. Peiris) This is unlikely to be a ship strike based on the very limited data presented. Also a ship cannot cut a 21 meter whale in half. It is possible that this whale was examined after it has been cut in half for disposal. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

6. 17 Oct. 2010 a 20.8 m blue whale stranded at Chilaw. The only details provided on cause of death were – "damaged rostrum"– (L. Peiris) This could be a ship strike but it is impossible to confirm based on the limited information available (L. Peiris) ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

7. On 27 September 2010, a 7 m sperm whale stranded at Pinwatte and it was reported that the specimen had a "lesion on caudal peduncle" and that the carcass was mummified. (L. Peiris). The available information on this whale is very limited and therefore we cannot confirm that death was the result of a ship strike. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

8. On 12 January 2011, a 9.14 m sperm whale stranded at Payagala, and was reported to have "damaged vertebrae" (L. Peiris) –details are lacking to confirm if this is a ship strike case ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

9. On 4 July 2011, a Bryde's whale, stranded at Uswetakeiyawa with part of the fluke missing with clear lesion (L. Peiris). ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

10. 24 Nov. 2011, a blue whale 19 m unknown sex from Matara. Details provided on cause of death were – "the vertebrae was severely damaged" (L. Peiris) – it might be a ship strike but we

cannot confirm based on the limited available data. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

11. On 20 March 2012, a container ship (*Quartz*, 258 m long) entered Colombo Harbour with a blue whale draped over its bulbous bow (de Vos *et al*. 2013). It was towed out to sea but then stranded on the south coast a few days later. ***Conclusion,*** **we accept this as a well-documented death from a ship strike.**

12. On 2 April 2012, a blue whale was found floating at sea off Mirissa with large gashes on its side, but the carcasses was never reported stranded (de Vos *et al*. 2013). ***Conclusion,*** **we accept this as a well-documented death from a ship strike.**

13. 23 Sept. 2012, 15 m female from Wellamadama. Details provided on cause of death were – "blunt trauma aft of the dorsal fin" (L. Peiris) – could be ship strike but impossible to confirm based on the limited data provided. The species ID is likely wrong. A 15 m female blue whale would be a yearling and therefore immature. If total length is nearly correct this one could be a Bryde's whale. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

14. 23 Sept. 2012, 7.5 m blue male stranded near Wellamadama (L. Peiris). Based on the limited details related to its death – "blunt trauma before the dorsal fin",– it appears that ship strike might have been the cause of death, but it is impossible to confirm. Also the species identification is likely wrong in that the whale was reported to have a total length of just 7.5 m, which is the approximate length of a newborn blue whale. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

15. On 1 February 2014, a "large" blue whale off Mirissa was "dead due to ship strike and floating out to sea in the shipping lane" (Randage 2014). Based on the limited available description, it is not possible to determine the cause of death. ***Conclusion,*** **unable to determine cause of death based on insufficient details.**

16. On 25 May 2014, a blue whale stranded off Mirissa with " a broken dorsal fin and wounds around the blowhole and along the spine to the flukes" (Randage 2014). ***Conclusion,*** **ship strike.**

The above records (except nos. 1, 2, 11, 12) were provided by Dr. Lakshman Peiris at the Department of Wildlife Conservation, Colombo, Sri Lanka to IWC so they could be examined by the ship strike group (Fabian Ritter).

Discussion

The identification of large dead whales can be difficult for a number of reasons, including poor reporting of critical details, degree of decomposition, and positions of the whale on the beach that can make it impossible to see the key characteristics to identify species. We found many errors in the basic dataset in both the identification of species and total length reported for individual whales that stranded between 1889 and 2014. In general, media reports tend to report a total length that is longer than the actual total length. Problems with incorrect species identifications are described below.

Blue whale. – Blue whales are well known in the northern Indian Ocean, mainly from the western side (Arabian Sea). Blue whales are much less common in the eastern Indian Ocean (Bay of Bengal). However, Blyth (1859) described a specimen of a large baleen whale 84 feet in total length from Jusgoo or Amberst Islets off the southern end of Ramri Island (18°47'N, 93°58'E) in the Arakan District of Myanmar (Bay of Bengal) as *Balaenoptera indica*. This species was later confusingly called the Great Indian fin whale (Fernando 1912), which led some authors to report it as a fin whale. Fernando (1912) reported two early strandings of *B. indica* one in September 1894 from Ambalangoda, and the other in August 1910 from Chilaw. However, the type specimen of *Balaenoptera indica* is clearly recognized today as a blue whale and usually as the northern Indian Ocean subspecies *B. musculus indica* (Brownell and Donahue 1994, Rice 1998). No specimen was collected from the whale that stranded off Chilaw in 1910 but Fernando (1912) noted that it was the same species as the Ambalangoda whale. He reported its total length as 66 feet and its mandible length as 19 feet. True (1904) reported that a 66-foot fin whale from Newfoundland had a straight line mandible length of 14 feet 9 inches and a curved length of 15 feet 2 inches. Therefore, based on the ratio of the mandible length to the total length, and assuming the 19-foot mandible from the Chilaw whale was correctly measured, the whale would have had a total length of around 85 feet. Based on size alone it was a blue whale.

The first confirmed blue whale was actually the Ambalangoda specimen noted above that was reported a fin whale. One of us (RLB) examined the skeleton in the CNM and found that it had been correctly identified. In total, we recorded 37 stranded blue whales from the Sri Lankan coast including some whales discussed below that were first reported as fin whales.

Fin whale. – Fin whales are generally considered to occur worldwide in all oceans. However, Rice (1998) noted that there is only a single well-documented fin whale record from the northern Indian Ocean. It was from the Persian Gulf [=Arab Gulf] but he did not cite a specific specimen. D. W. Rice (pers. comm. to RLB) stated that this record is the specimen reported by Baloutch (1972). This specimen was reported as a 19 m long fin whale stranded on 21 April 1973 at Sorou, 30 km from Bandar Abas, in the Persian Gulf. The skeleton was deposited as number 636B in the Musee de Zoologie de la Faculte des Sciences de Teheran (Baloutch 1972). The only character from the Baloutch (1972) report that can be used to identify this specimen as a fin whale is its total length. However, it is not clear who determined or estimated that the total length of the whale was 19 m and whether this measurement is accurate. There are a few other specimens reported to be fin whales from the Arab Gulf (Al-Robaae 1982, Baldwin 1995). However, there are no details provided in these papers to confirm that the specimens were fin whales.

Five stranded fin whales were reported from Sri Lanka (Deraniyagala 1960). These same five plus four more fin whale strandings were reported by Ilangakoon (2002), plus one more taken as by-caught whale in 1985 and one sighting from Sri Lankan waters. The same nine stranded fin whales were again noted in Ilangakoon (2006). After 1971, none of the over 80 large whales that stranded around Sri Lanka were ever identified as fin whales.

Part of the early confusion about identifying blue and fin whales stemmed from the scientific name used for the blue whale at the end of the 19th century. True (1899) reviewed the usage of

the baleen whale names, at the turn of the century, given to species by Linnaeus and found that the name *B. musculus* was being applied to the fin whale. At that time,Blue whales were usually called *B. sibbaldii* following Gray 1847. We were able to determine that two of the early specimens reported as fin whales were in fact blue whales. First, the 1894 whale from Ambalangoda was identified as a fin whale (Haly 1894, Fernando 1912), and the specimen was collected and deposited in the CNM. De Silva (1977) referred to this specimen as a fin whale *B. physalus*, but subsequently it has been accepted as a blue whale by various authors (de Silva 1987, Ilangakoon 2002). Second, the scientific name given for the Chilaw fin whale in August 1910 was B. indica which is now a synonym for B. musculus and Fernando (1912) reported that is was the same sepecies as the Amblangoda specimen noted above.

The nine strandings commonly referred to as fin whales by various authors are the following:

1. Fernando (1912) was a stranding from Chilaw in August 1910 that he identified as a "Greater Indian fin whale", *B. indica*;

2. a whale stranded February 1934 at Bambalapitiya and was identified as a fin whale (Deraniyagala 1960);

3. a specimen from Polhena near Matara that stranded on 6 February 1934 with a total length of 49 feet 8 inches (= 15.14 m) (Deraniyagala 1948, 1960) and was "skeletonized (de Silva 1977);

4. a specimen from Bambalapitiya, Colombo stranded on 1 June 1934 (de Silva 1983, citing Deraniyagala 1960 [CHECK]). This third 1934 stranding was not listed in Deraniyagala (1948) or de Silva 1977);

5. in August 1934, a whale stranded at Chilaw and was called a fin whale (deSilva 1987);

6. a specimen stranded April 1949 at Colombo was reported as a fin by Deraniyagala (1960);

7. a specimen reported as a fin whale stranded at Bambalapitiya, Colombo on 1 June 1949 and "the museum [National Museum Colombo] secured the head of a razor-backed rorqual" (de Silva 1977)

8. de Silva (1977) reported that a "skeletonized … rorqual" was collected from a whale that stranded on 7 June 1949 at Ariyalai, Jaffna.

9. on 11 August 1971, a 45 foot long whale reported as a fin stranded at Uswetikeiyawa (de Silva).

No additional specimens of fin whales have been reported from Sri Lanka since 1971 with the exception of a 7.5 m whale taken in fishing gear landed at Negombo in August 1985 (for photographs see Leatherwood and Reeves 1989:104, figs. 27b and 27c and Ilangakoon 2002:26). Both Leatherwood and Ilangakoon examined this specimen after it was landed on the beach and flensed. Since the Omura's whale, *B omurai*, was described in 2003, we have reviewed all the details of the Negombo whale and we believe it was actually a specimen of *B. omurai* for several reasons: its small size, baleen plates that are white for anterior 20-25% and then all black do not fit with either fin or Bryde's whales.

Additional evidence that blue whales were often misidentified as fin whales prior to the 1970s is provided by a large whale that entered Trinocomalee Harbour on 23 January 1946 and stranded. It gave birth in the harbor. Deraniyagala (1948: 62-63), Deraniyagala (1960) identified this specimen as a fin whale. Ilangakoon (2002:25) followed Deraniyagala and also reported it as a fin whale, but she did not list it in Appendix I because it stranded live and was returned to the sea. This specimen was clearly a blue whale based on plate I in Deraniyagala 1948 but its total length was underestimated given that it was old enough to give birth. This specimen is not cited in Leatherwood and Reeves (1989) and we did not include it in our provisional list of strandings because it returned to the sea.

In sum, we re-examined all of the available specimens, data and original papers related to the nine fin whale strandings summarized by Ilangakoon (2002, 2006) from Sri Lanka between 1894 and 1971 and rejected the fin whale identification for all these records.

Bryde's whale. – Bryde's whales have been reported live and as stranded individuals over a large part of the Arabian Sea coastline and were taken in large numbers during the late 1960s in the Arabian Sea by illegal Soviet pelagic whaling operations (Mikhalev 2000). Surprisingly few of the 121 stranded whales were reported as this species. The first confirmed individual was not until 1999 and since that time there have been just four more confirmed strandings of this species. The reason for this is that dead decomposing baleen whales are difficult to identify to species and in Sri Lanka large whale strandings are not always examined by biologists with knowledge of species characteristics. The first genetically confirmed Bryde's whale was a ship strike in 2003 (Herath 2007). Another stranded Bryde's Whale from the Gulf of Mannar (south-east coast of India across from the northern coast of Sri Lanka) was identified as *B. edeni* based on genetic evidence from mtDNA (Jayasankar *et al*. 2009). Therefore, it is likely that some of the unidentified stranded baleen whales are in fact Bryde's whales.

Minke whale. – Two species of minke whales, *B. bonaerenisis* and *B. acutorostrata*, are known to occur worldwide in all oceans. However, records of minke whales are extremely rare from the northern Indian Ocean (Deraniyagala 1948,1963; Leatherwood *et al*. 1994; Ilangakoon 2002; Bröker and Ilangakoon 2008). Deraniygala (1963) reported a new subspecies of minke whale, *Balaenoptera acutorostrata thalmaha*, but Rice (1998) noted that this subspecies "remains enigmatic; the unique color pattern of its baleen plates Deraniygala (1963), if not aberrant, leaves doubt whether it is really a minke whale." In addition, Rice (1998) did not include any records for either species of minke whale from the northern Indian Ocean. In the case of the first two records. no specimens were examined. The first one was from Mannar on 19 May 1937. The second one was from Chempianpattu on 28 January 1954. The next five were reported from July 1962 all from the coast of the Jaffna Peninsula, and one of these was designated as the holotype for the new *B. a. thalmaha* (Deraniygala 1963). The last one was a whale that stranded on 12 January 1994 from Payagala. A black baleen plate from this individual was illustrated in Ilangakoon (2002:30). In that both species of minke whales have creamy white colored baleen, it is certain that the Payagala specimen and those from 1962 are not minke whales.

In 2009, one of us (RLB) examined the type of *B. a. thalmaha* at the museum in Colombo. The skull was not articulated and some bones were missing. Deraniyagala (1963) reported the CBL

was 160 cm and the length of the mandible was 160 cm. Key to the identification of baleen whales is the vertex region of the skull and the nasal bones which were missing from the type and from the original description of the subspecies. Based on the total length of these whales,, the number of baleen plates and the coloration of the baleen, the type specimen and the others referred to as *B. a. thalmaha* are most likely Bryde's whale.

Seven minke whale strandings are known from the coast of Sri Lanka (Deraniyagala 1948, 1960), and one additional stranding was reported from 1994 (Ilangakoon 2002). In addition to these eight strandings, there are seven sightings reported as minke whales (inside Clappenberg Bay in 1983, off Thalawila in 1986 and off Negombo in September 1994 (Leatherwood *et al*. 1994, Ilangakoon 2002) and three additional sightings of single minke whales in the Bar Reef Sanctuary, on the northwestern coast, between April 2004 and March 2005 (Bröker and Ilangakoon (2008). There are no individual reports of any minke whales entangled as bycatch (Ilangakoon 2002). No photographs or field details are available to determine how these sightings were identified as minke whales, but one of us (ADI) who observed these whales noted they looked smaller and sleeker than Bryde's whales previously observed in Sri Lankan waters Also, Omura's whale were just described as a new species in late 2003 and their external fetures were still poorly known in 2005. There are no confirmed specimens of any species of minke whales in the Arabian Sea or from the Bay of Bengal (Rice 1998). Therefore, we do not accept as valid the identification of these strandings and sightings of minke whales from Sri Lanka. It is most likely that all these smaller baleen whales were Bryde's or Omura's whales.

Humpback whale. – Only two humpback whales stranded; one in 1981 and the other in 1990. The specimen that stranded in 1981 was taken as bycatch and died (de Silva 1983,1987). The cause of death for the 1990 humpback whale is unknown.

Sperm whale. – This species is the second most commonly reported dead large whale in Sri Lanka after blue whales with 33 records. The first recorded stranding of this species in Sri Lankan waters was in September 1889 from the northwest coast of Mannar and followed by two more in 1904 (Fernando 1912). The sperm whale is the easiest of the large whales to identify correctly but some of the very small specimens reported as sperm whales could have been misidentified because their identification was not confirmed by experts and/or photographs were not available. Any of the unconfirmed sperm whales could have been one or more of the four species of beaked whales (*Ziphius cavirostris, Mesoplodon densirostris, M. hotaula, and Indopacetus pacificus*) known from Sri Lankan waters.

Unknown large whale – There were 43 unidentified large whales more than half of which (n=28) could be identified as baleen whales. Some of the unidentified baleen whales were likely Byrde's whales as they are so underreported in our data set, and/or a small number could also have been Omura's whales.

Conclusions

The cause of death was not determined for any stranded individual before 2002, except for a humpback whale known to have been entangled in fishing gear in 1981. The first two large whales that were confirmed ship strikes were not until July 2002 and November 2003. Of the 54

new individuals that have stranded after 2004, we were only able to confirm the cause of death for two individuals and both were ship strikes. There are 12 additional reports of ship strikes, but from the limited available data, we were not able to confirm these cases and no additional deaths were confirmed from entanglement. However, the true number of whales killed from vessel strikes must be higher than our data suggest by some unknown factor. The proportion of dead large whales that actually strand is consistently low across different regions and species (<1% to 33%), highlighting that the number of strandings underestimates the number of deaths (see Carretta *et al*. 2016, Krauss *et al*. 2005, Prado *et al*. 2013, Wells *et al*. 2015, Williams *et al*. 2011). In 2012, during the same season two blue whales struck by ships were known to have been floating at sea during the same time period (March and April), but only one of them was reported to have stranded on Sri Lanka.

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Appendix 1. List of stranded large whales (baleen and sperm whales) around Sri Lanka. [not attached, but available at the SC meeting]