Using a Crew-Based Observer Programme as a Platform of Opportunity for Understanding the Distribution of Whales in the Northern Arabian Sea

Results of the 2017 fishing season

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ABSTRACT

Sightings of baleen whales made by observers posted on tuna gillnet vessels operating along Pakistan's coast were previously reported to the 2017 Scientific Committee meeting (SC_67A_CMP_05). WWF Pakistan's crew-based observer programme has continued over the past year during which a total of 95 whale sightings were reported, including 42 sightings of Arabian Sea humpback whales, 13 sightings of blue whales, 5 sightings of Bryde's whales, 4 sightings of sperm whales, 1 sighting of killer whales and 30 sightings of baleen whales that could not be identified to species level due to lack of adequate photographic or video evidence. The data also revealed three areas of main concentration: between Ormara and Phor; southwest of Karachi, and the Indus Canyon area. Further studies including dedicated whale surveys are recommended for the area. The authors strongly recommend that the crew-based observer programme, for which funding expires in December 2018, should be continued, as it is an important source of information about whales in the Arabian Sea.

INTRODUCTION

The presence of diversified whale fauna (including both baleen and toothed whales) in the Arabian Sea has been documented through a number of studies including but not limited to Gore et al. (2012), Kiani and Siddiqui (2009), Kiani (2014)(2015a, 2015b), Mikhalev (1997; 2000), Minton et al. (2015) and Moazzam and Nawaz (2017). Arabian Sea humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*), Bryde's whales (*Balaenoptera brydei*), sperm whales (*Physeter macrocephalus*), killer whales (*Orcinus orca*), dwarf sperm whales (*Kogia sima*), Longman's beaked (or tropical bottlenose (*Indopacetus pacificus*) and Cuvier's beaked whales (*Ziphius cavirostris*) are known to occur in Pakistan. Moazzam and Nawaz (2017) provided details of the occurrence of baleen whales occurring along the Pakistan coast during the year 2016 (see SC_67A_CMP_05). Baleen whale sightings reported from 2016 included 47 sightings of baleen whales, including 12 confirmed sightings of Arabian Sea humpback whales, three sightings of Bryde's and 32 sightings of baleen whales that could not be identified to species level (See SC_67A_CMP_05). This paper provides an update on sightings recorded by crew-based observers during the 2017 fishing season.

MATERIAL AND METHODS

In 2012, WWF-Pakistan initiated a crew based observer programme to collect information about catches of tuna and tuna-like species as well as of the bycatch non-target species (including cetaceans) in the tuna gillnet fisheries of Pakistan (Moazzam and Nawaz, 2017/ SC_67A_CMP_05.). This programme has continued, with a growing number of participating fishing crews, each year since 2012. Fishing operations take place throughout the year except during June and July, which is closed season, coinciding with rough sea conditions generated by the southwest monsoon. The tuna vessels generally set 6-8 km long gillnets before sunset and retrieve them the next morning after a soak time of about 12 hours. Vessels operate predominantly in offshore waters, with some effort applied on the continental shelf as well.

During the 2017/18 season, WWF-Pakistan assigned 85 crews to collect information using a standardized data sheet to record the quantity and species of fish that are caught. They also recorded information about bycatch, including that on non-target megafauna. The observers were additionally asked to note the presence of cetaceans and were provided with digital cameras to take photographs and/or video clips of cetaceans. Observers were trained to identify other baleen whale species using photographs, posters and illustrations. However, final species identification was always confirmed by the authors through the examination of photographic or video and other supporting evidence. On completion of each fishing trip, the observers were interviewed and during this debriefing, detailed information about whale sightings was recorded.

RESULTS

During the 2017 fishing season, crew-based observers reported 42 sightings of Arabian Sea humpback whales, 13 sightings of blue whales, 5 sightings of Bryde's whales, 4 sightings of sperm whales, 1 sighting of killer whales and 30 sightings of baleen whales that could not be identified to species level due to lack of adequate photographic or video evidence.

Arabian Sea humpback whales

Arabian Sea humpback whales were mainly sighted on the continental shelf and slope area along the coast of Pakistan (Fig. 1). The areas where sightings were concentrated included Astola Island, between Ormara and Phor, southwest of Karachi and in the Indus Canyon area. Humpback whales are also found in the offshore waters with a sighting of one animal recorded about 325 km southwest of the Indus Canyon. This species seems to be more abundant along the Balochistan coast than along the Sindh Coast. Moazzam and Nawaz (2017) reported feeding on planktonic shrimp and sardinellas in waters along the coastline. It should be noted that some of the unidentified baleen whales reported here may also include Arabian humpback whales (Fig. 3).

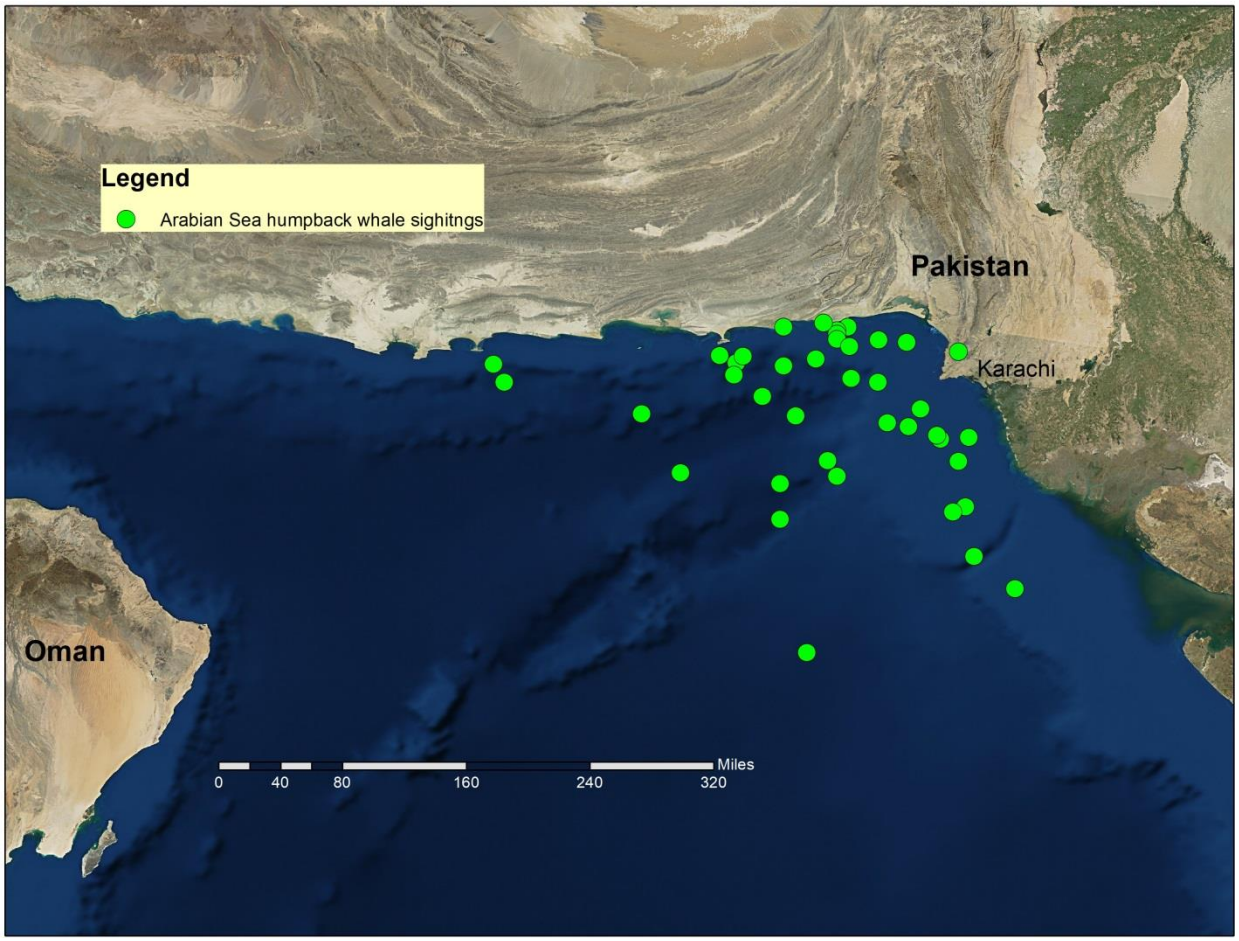


Fig. 1. Sighting locations of Arabian humpback whales along Pakistan coast during 2017.

Blue whales

Blue whales were sighted mainly along the Balochistan coast. Sightings were concentrated between Phor and Ormara, around Churna Island and in the southwest of Karachi (Fig.2). In addition, some of the baleen whale sightings in this study that could not be assigned to species level may include blue whales (Fig. 3). Blue whale sightings in this study coincided with areas where planktonic shrimp and sardinellas are known to be abundant.

Bryde's whales

Bryde's whales were less frequently observed in this study, although given that their behaviour is less conspicuous than that of humpback whales or (to some extent) blue whales, it is likely that at least some of the baleen whale sightings that could not be assigned to any specific whale species include Bryde's whales (Fig. 2). Furthermore, there is a possibility of misidentification of this whale with Omura's whales (*Balaenoptera omurai*) which are known to occur in the region (Dakteh *et al.*, 2017).

Sperm whales

Sperm whales were sighted on four occasions along the Balochistan coast (Fig. 2). On two occasions more than two sperm whales were sighted together. Sperm whales sightings were made in off Sapat-Ormara and Gwadar areas.

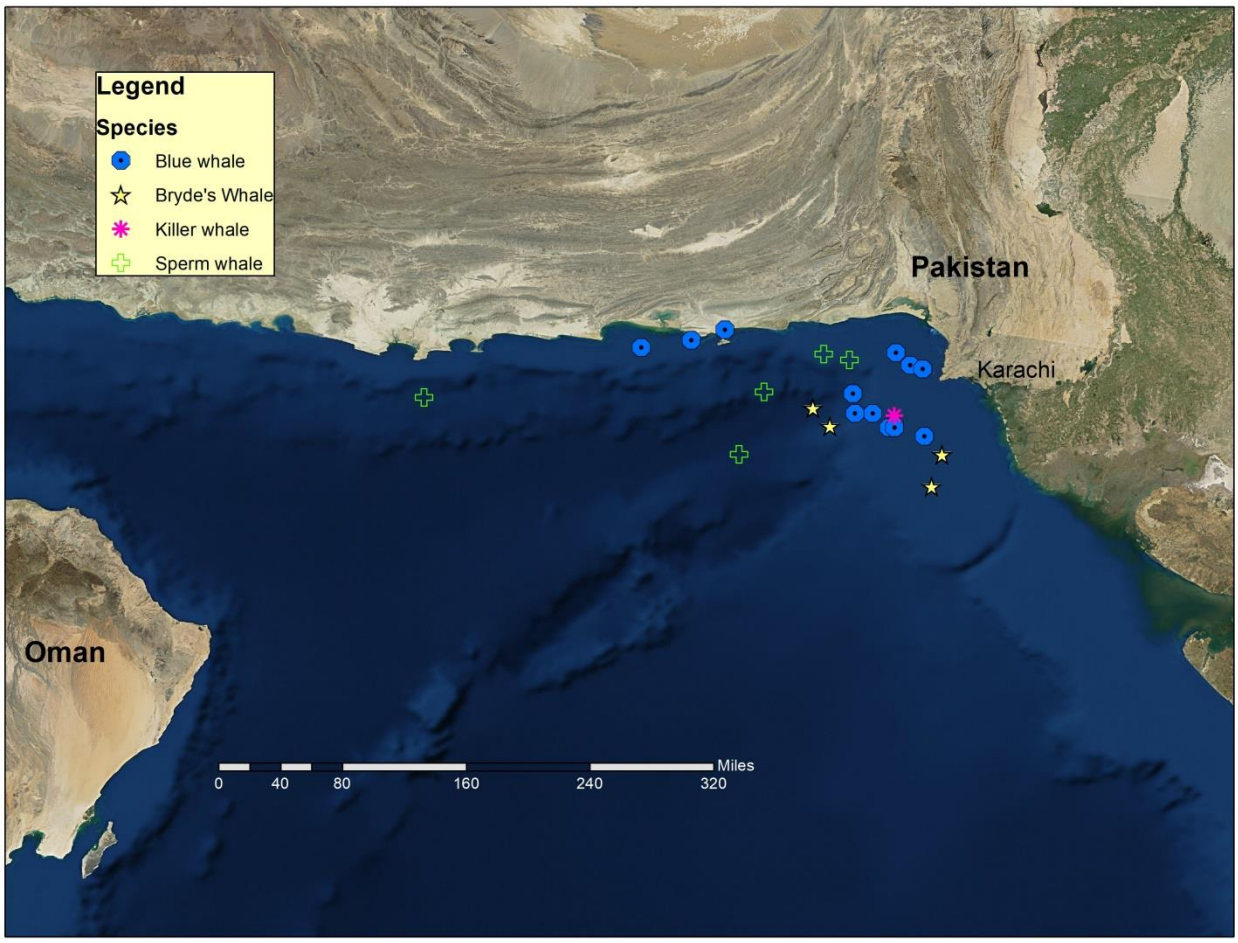


Fig. 2 Sighting locations of Sperm, Bryde's, blue and killer whales .

Unidentified baleen whales

During the study period, a number of baleen whales were sighted but could not be assigned to any specific whale species because of their distance from the boat and/or lack of photographic/video evidence. In some cases, these were sighted but the whale disappeared from view before a photograph or video could be taken. Most of these sightings were made from Phor-Ormara, southwest of Karachi and in the Indus canyon area. In most cases, whale blows were sighted and/or photographed which confirmed them to be baleen whales (and distinguished from sperm whales).

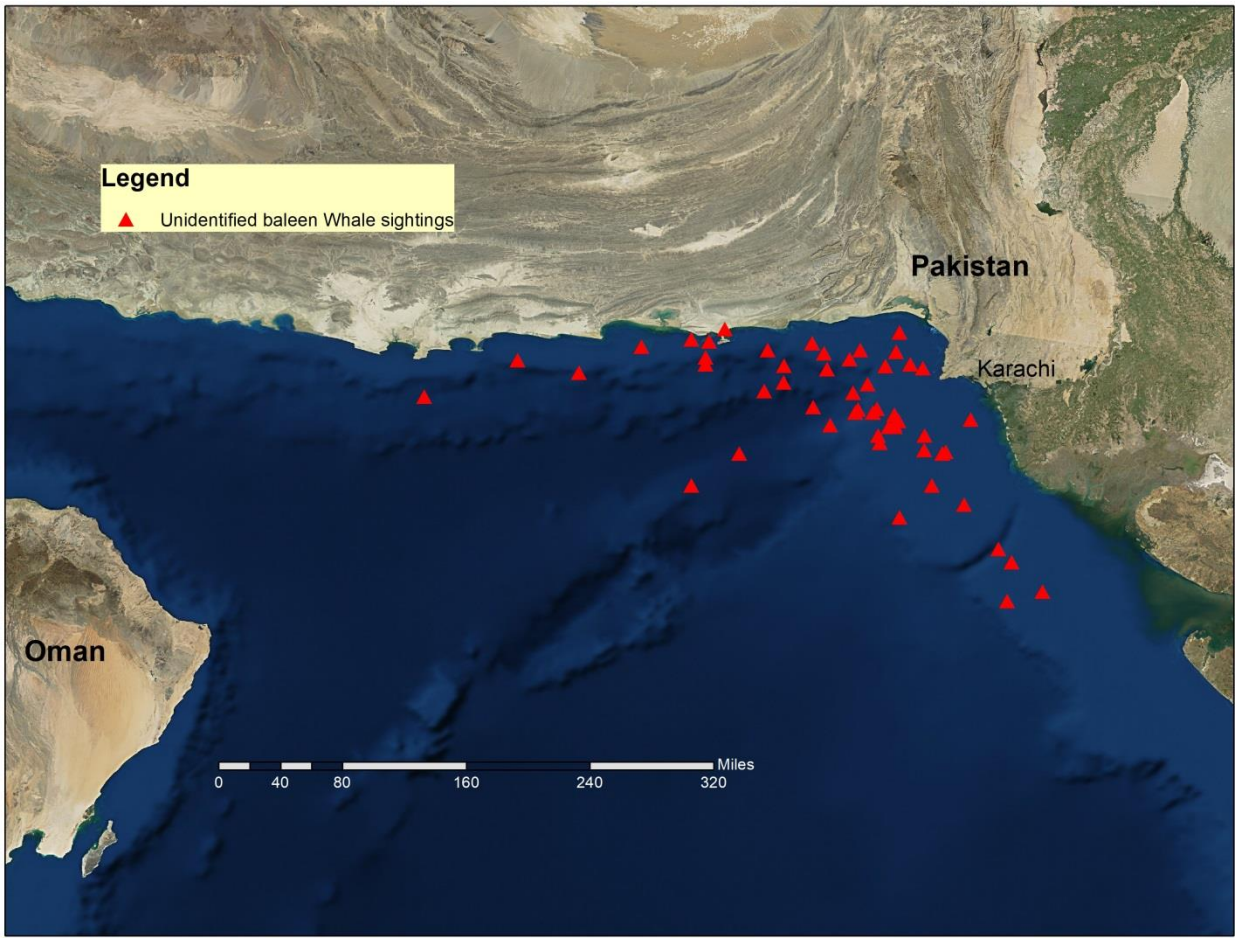


Fig. 3. Sighting locations of unidentified baleen whales along Pakistan coast.

Other whales

Crew based observers during this study period also recorded sightings of killer whales, dwarf sperm whales and beaked whales. A group of three killer whales was sighted near Churna island in November 18, 2017. These were observed to be feeding on school of Talang queenfish (*Scomberoides commersonnianus*).

One specimen of Longman's beaked whale was entangled in tuna gillnets on October 14, 2017 off Ghora Bari area (Indus Canyon). The fisherman was able to safely release the whale. On March 11, 2017, an adult dwarf sperm whale was recovered entangled in a tuna gillnet roughly 180 km southwest of Karachi. The animal was dead and was discarded by the crew.

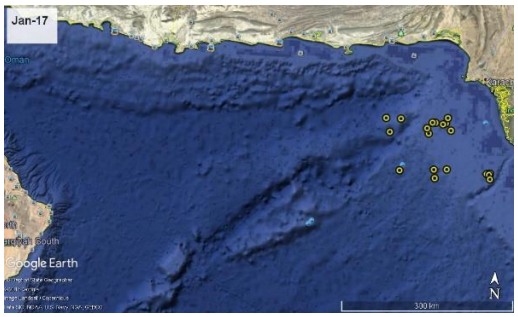
DISCUSSION

The 90 baleen whale sightings reported in the 2017 fishing season represent a near-doubling of baleen whale records since 2016 (n=47). This is thought to be due to increased awareness and effectiveness of the observers involved in the programme, who are constantly interviewed and

reminded by WWF-Pakistan staff of the value of their observations and documentation of their sightings. There is an apparent seasonal trend in the sightings, with the majority of sightings (50 out of 95) recorded during the post-southwest monsoon period (September-November). Only 23 sightings were recorded during the northeast monsoon (December-February) and 23 during the pre-southwest monsoon period (March-April). No information is available for southwest monsoon (mid-May to August) because of the voluntary closed season observed by the fishermen engaged in tuna gillnetting.

Distribution of effort

The observer programme of WWF-Pakistan is primarily focused on the collection of information about catches of target species - tuna and tuna-like fishes, as well as bycatch in those fisheries. As such, the crews are mainly focused on their fishing operations, and whale observations are made opportunistically rather than through dedicated search effort. While effort cannot be quantitatively assessed in this study, Figure 6 provided below provide some insight into the areas covered seasonally by the fishing fleet along the continental shelf along Pakistan coast as well as offshore waters beyond Pakistan's EEZ. Figure 6 shows the fishing grounds used by one fishermen (Saeed Zaman) during 2017, indicating that his vessel fished mainly done in offshore waters along the Sindh coast, but during months of April and August tuna fishing was concentrated along coastal and offshore waters of Balochistan. His fishing effort is broadly reflective of the fishing patterns of the fleet.



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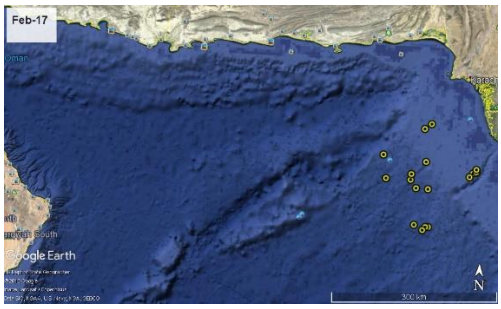

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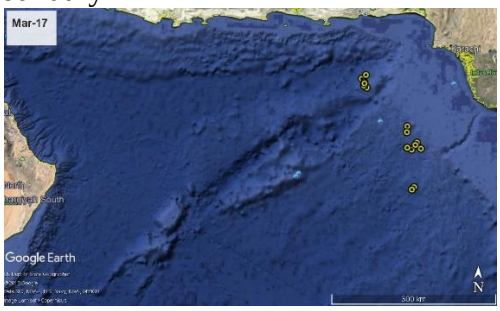

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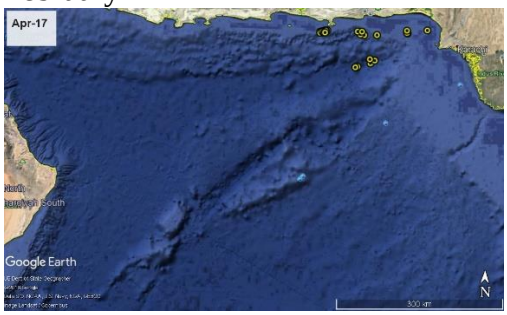

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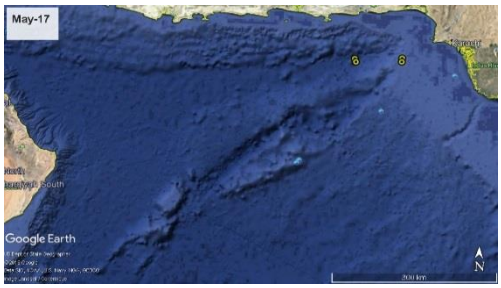
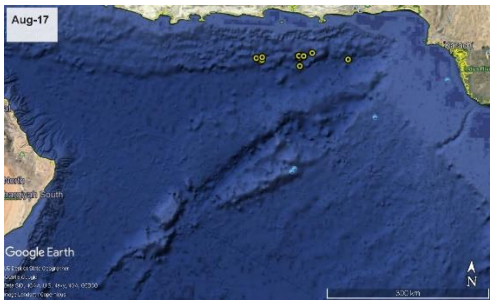


May



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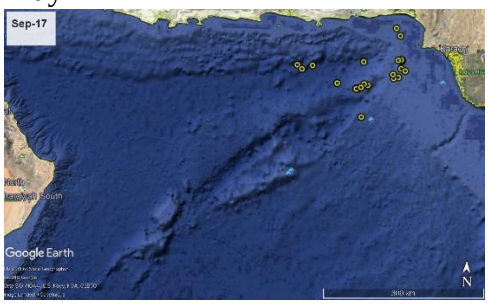

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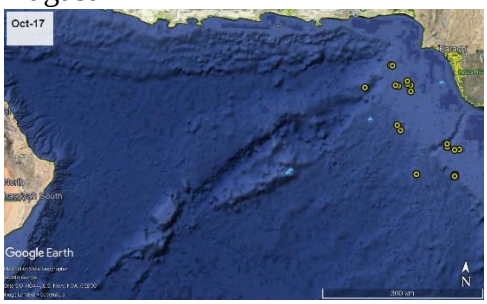

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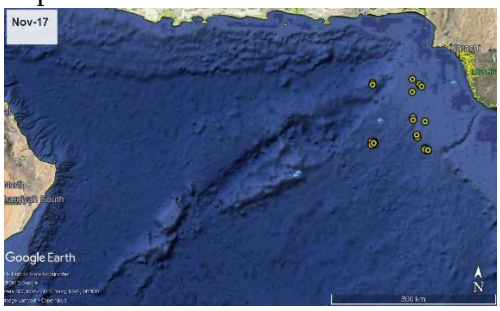

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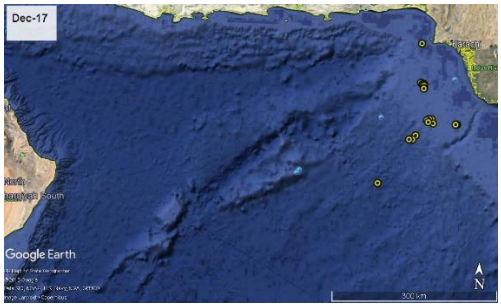

December

Fig. 6. Fishing grounds being used by one fishermen (Mr. Saeed Zaman) for tuna fishing during 2017

Scientific value of sightings

New records of the Arabian Sea humpback whale off the coast of Pakistan are clearly very valuable. However confirmed sightings of some of the toothed whales is also of great interest, as very little information is available on their distribution in the northeastern portion of the Arabian Sea. Sperm whales are known to feed primarily of oceanic squids (Clarke and Young, 1998; Smith and Whitehead, 2000; Evans and Hindell, 2004). Dense populations of purple back flying squid (*Sthenoteuthis oualaniensis*) are reported from the northern Arabian Sea (Tian *et al.*, 2006). The presence of killer, dwarf sperm and Longman's beaked whales is also of great interest as it indicates diversity of cetacean fauna in the Arabian Sea.

Implications for conservation and management

The Arabian Sea humpback whale sub-population is considered to be a genetically isolated with a unique year-round residency in sub-tropical waters of the Arabian Sea (Minton *et al.*, 2008; Minton *et al.*, 2011; Pomilla *et al.*, 2014). The most recent abundance estimate for this population, based on photo-identification and mark-recapture studies off the coast of Oman

through 2004, is 82 individuals (95% CI 60-111) (Minton *et al.*, 2008). However, this estimate did not account for population's suspected continued presence of India and Pakistan, where a relatively large proportion of the Soviet whaling catches were recorded (Mikhalev, 1997; Mikhalev, 2000). These new sightings records, together with those presented in 2017 (see SC_67A_CMP_05) provide strong evidence that the species is likely present off the coast of Pakistan and in the EEZ beyond Pakistan's borders throughout the year (data is not available from the southwest monsoon months of May-August). These data make a strong case for targeted vessel-based surveys off the coast of Pakistan with a view to gathering data that can inform a more accurate regional assessment of the abundance and conservation status of Arabian Sea humpback whales in Pakistan and to improve population level assessments of things like abundance and habitat use.

Similarly blue whales are also likely to be present throughout the year and merit significant further study to understand their distribution along the Pakistan coast as well any linkages of these whales to other areas of the Arabian Sea and possibly beyond.

Bryde's whales appear to be the least frequently reported and most poorly understood baleen whale species along Pakistan's coast. This may reflect a lower slighting probability linked to their inconspicuous surfacing behavior. Some of these sightings may also include Omura's whales which have been reported from the Arabian Sea, Red Sea and Sri Lanka (see SC/67A/NH 12).

We strongly recommend that these data be used to inform further studies, including dedicated surveys to more accurately describe the seasonal distribution of large whale species and to obtain photo-ID and genetic data that will allow comparison of whales present off the coast of Pakistan with those that are studied in Oman (see SC/67B/CMP 13 Rev1). Recent Arabian Sea humpback whale sightings off the coast of India (see SC/67B/CMP/15) suggest that the possibility of also comparing data between Pakistan and India. The authors also strongly recommend the continuation of the crew based observer programme, as it is clearly a critically important source of information about whales of the Arabian Sea. Currently this programme will be completed in December 2018.

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