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ABSTRACT

We critically review the evidence for humpback whale presence in the Persian Gulf. Five specimen records, assumed to belong to the endangered Arabian Sea population, are confirmed in the period 1883- 2017: Bassore Bay, Iraq; Doha, Qatar; Kuwait Inner harbour, Kuwait; Qeshm Island, Iran; and Akhtar, Bushehr Province, Iran. The two Iranian cases, both juveniles, are newly recorded. With accumulating reports, an alternate hypothesis to 'rare stragglers' deserves consideration, one in which Arabian Sea humpback whales may enter the Persian Gulf with some regularity, perhaps as normal visitors, if not permanent residents. Deficiency of records may reflect a general sparsity of whale research effort in the Persian Gulf. The historical description of *Megaptera indica* Gervais, 1883 is translated from French.

INTRODUCTION

An unique, because non-migrating, population of humpback whales *Megaptera novaeangliae* inhabits year-round the northern Arabian Sea, including the Gulf of Oman (Baldwin and Salm, 1994; Baldwin, 1998; Baldwin *et al.*, 1999; Mikhalev, 1997; Papastavrou and Van Waerebeek, 1998). The Arabian Sea humpback whale forms a highly discrete stock that may have been reproductively isolated from other populations for some 70,000 years (Pomilla *et al.*, 2014). However, the distributional boundaries of that population are poorly known. We here review its presumed rare occurrence in the Persian Gulf, describe two new (recent) records in Iran, and suggest possible implications for management.

Off the coast of the Sultanate of Oman, the geographic distribution of humpback whales seems to be centred off the Islands of Masirah and Halaniyat in the Arabian Sea, considering that greatest numbers of records are from that area (Baldwin *et al.*, 1999). In waters off the eastern coast of the United Arab Emirates (UAE) in the western Gulf of Oman, the most northerly report is of an individual at Khor [Khawr] Fakkan in 1973, some 80 km south of the Strait of Hormuz (M. Barwani, pers.comm. in Baldwin *et al.*, 1999). Baldwin (1995) indicated that humpback whales are sometimes seen near the coasts of Fujairah (UAE) and Khor Fakkan in the northwestern Gulf of Oman, though without citing specific cases.

Here we discuss five specimen records for the Persian Gulf (Arabian Gulf). Four of these (two of which new) have been adequately authenticated, a fifth record is considered to be equally valid. A sixth report for UAE remains so far unsupported. There are no known sightings of humpback whales in international waters of the Persian Gulf, nor from coastal Gulf waters off the UAE, Saudi Arabia, Qatar, Bahrain, Kuwait nor Iran (Baldwin *et al.* 1999; Baldwin, 2003).

CONFIRMED RECORDS IN PERSIAN GULF

1. Bassore Bay, Iraq

The earliest humpback whale record in the Persian Gulf is a fully authenticated 19th century stranding of an adult whale at Bassore Bay (Al-Basra region), Iraq, which led the description of a new species *Megaptera indica* by French taxonomist Paul Gervais in 1883. The whale's identity is unanimously recognized thanks to specimen evidence, while the *M. indica* taxon has been re-assigned for decades as a junior synonym of *Megaptera novaeangliae* (Borowski, 1781) (e.g. Tomilin, 1967; Clapham and Mead, 1999). The *M. indica* type specimen, a calvaria (MNHN 1883-2255) is curated at the Muséum national d'Histoire Naturelle in Paris (Robineau, 1998). Gervais (1888) published a second paper on the same specimen which is occasionally (equivocally) cited as the *M. indica* description. In every sense the Bassore Bay record has been an extraordinary and distributionally enigmatic account. For its taxonomic and historical value, the 1883 publication by P. Gervais remains highly relevant. Considering that the French-language paper of 1883 may be

hardly accessible to interested readers, we here present an annotated, quasi-literal English translation (Appendix).

2. Doha, Qatar

Besides the Iraq specimen, the comprehensive review by Baldwin *et al.* (1999; their Figure 10.2F) mapped two potential but unconfirmed (?) humpback whale cases in the Persian Gulf, one from Qatar, the other from the UAE. Later, Baldwin (2003) noted that the Iraq case is 'one of just two confirmed records from the Arabian Gulf'. While the Iraq case is evident, the second confirmed record remained unclear. When queried by KVV, Robert Baldwin kindly contacted his original source, Dr. Tony Preen, also a marine mammalogist. Dr. Preen then specified (*in litteris*, 17 Feb. 2017) that he himself confirmed a humpback whale record in Qatar from a photo on display in the [National] Museum of Qatar which showed a dead humpback whale being lifted by a crane, presumably in the Doha port. While evidently pre-1999, the precise date remains unknown. We recognize this as a credible species record.

3. Kuwait Inner Harbour, Kuwait

Mörzer-Bruyns (1971; p.182) reported that a humpback whale 'stayed one week in the Kuwait Inner Harbour (Persian Gulf) where it finally died after being hit by the propeller of a manoeuvring ship.' There is no indication of date, while evidently pre-1971. Dutch Captain Willem Frederik Jacob Mörzer-Bruyns, during his 40 years at sea, made a reputation as an experienced field observer of whales and dolphins and published at least six scientific papers on cetaceans. His ability to identify a humpback whale should be undeniable, hence we consider this record to be valid.

4. Qeshm Island, Iran

Fishermen Mr. Abdolrahman Gurani and Mr. Yusof Puzannear, from Guran village, encountered a juvenile humpback whale entangled in their fishing net (Figure 2) in the channel between Khamir (Iran mainland) and Guran (Qeshm Island) on 6 July 2012. The site (N26° 46' 04.9", E55° 36' 52.9"), locally known as Mosaageh, forms part of the Hara Mangrove Protected Area on the north coast of Qeshm Island, and water depth is estimated to be some 8-9 m. The monofilament drift gillnet (length= 150m; depth= 5m; mesh size= 7.5 cm), set to target mainly silver pomfret (*Pampus argenteus*) of 1-6 kg each, typically is soaked for 8-9 days, checked regularly if not daily. As soon the owner-fishermen had been warned by fellow fishermen of the entanglement event, they proceeded to disentangle the whale to recuperate their net. They reported the size of the whale to be 'similar as their boat' (6-7 m), corroborated by video which shows a smallish (young) humpback whale. The cellphone recorded video (.mp4) documented species-diagnostic characteristics, the head covered with peculiar fleshy knobs (tubercles) and a dorsal fin set on a hump (Figure 2). Video voucher data are deposited at the Qeshm Environment Administration of the Qeshm Free Area, Qeshm City, Iran, with a copy at the CEPEC library (Lima, Peru).

5. Akhtar, Iran

One of us (H. Delshab) first documented the relatively fresh, although bloating, carcass of a juvenile male humpback whale (Figure 3) floating alongside the jetty of Akhtar Village (N27°41' 43.3", E52°11' 38.2"), Bushehr Province, which is situated on terrain controlled by the South Pars Oil Company, near Kangan city, on 19 April 2017. The body length of the smallish whale was not measured, but will later be estimated from skull size. Cause of death is unknown. Ventrally, photos showed no evidence of traumatic injuries. Due to heavy wind and wave action, the carcass could not be secured, nor accessed for sampling upon discovery and over the next few days it drifted eastwards to strand again at N27° 36' 20.1", E52° 29'4 4.1" close to Asalouyeh city, on 23 April 2017. One of us (M. Moazeni), head of the Asalouyeh office of the Department of Environment (DoE), directed personnel to collect the whale and bury its remains for later retrieval of the skeleton. Other voucher evidence includes photographs and a video deposited with the Plan for the Land Society, Tehran.

DISCUSSION

We conclude that five humpback whale records for the Persian Gulf (in Iraq, Iran, Qatar and Kuwait) are supported authenticated (n=4) or otherwise reported by a credible source (n=1). The central coast of the United Arab Emirates has also been flagged as a potential location for humpback whale occurrence (Baldwin *et al.*, 1999), but till date this cannot be confirmed (Gallagher, 1991; R. Baldwin, *in litteris* to KVV).

Humpback whales are commonly cited in check-lists of the mammals of Iran (Firoz, 1976; Harrington, 1977; Etemad, 1984; Humphrey and Kharom, 1995; Ziaie, 1996; Firouz, 2005). Owfi *et al.* (2015) suggest that 'these records appear to be based on *Balaenoptera* sp. skeletons that have been mis-identified as humpbacks'. However, unless skeletons are identified to species, one or more cases could theoretically be *M. novaeangliae*. Three humpback whale records for Iran considered reliable originate from the coasts of Sistan/ Baluchistan Province in the northern Gulf of Oman. These include a sighting of a mother-calf near Chabahar in September 2004, a stranding at Pozm (50 km west of Chabahar) in October 2004 and another stranding at an unspecified location in December 2003 (Braulik *et al.*, 2010; Owfi *et al.*, 2015). Unfortunately, verifiable voucher materials are unavailable, although desirable for first or unusual records. In conclusion, the Qeshm and Akhtar cases represent the first fully authenticated records of humpback whale in

Iranian waters, and the 4th and 5th records for the Persian Gulf since 1883.

Considering a number of records in the northwestern Gulf of Oman, close to the entrance of the Strait of Hormuz, it seems reasonable to assume that the humpback whales encountered in the Persian Gulf belong to the wider Arabian Sea population. Genetics should confirm this as soon tissue samples become available. While the first few humpback whales found in the western Persian Gulf (Iraq, Kuwait) gave the impression that rare stragglers might accidentally enter the Strait of Hormuz, perhaps via a deeper-water channel, and then somehow end up trapped, and stranded, in very shallow parts of the Gulf. But with an accumulating number of cases in the western, central and eastern Gulf, an alternate hypothesis seems increasingly plausible, in which Arabian Sea humpback whales may enter the Persian Gulf with some regularity, and rather than rare stragglers may be normal visitors, if not permanent residents. Deficiency of records could, rather than absence of whales, also reflect a general sparsity of whale research effort in the region. With the possible exception for the UAE coast in recent years, dedicated cetacean research has long been limited in the Gulf (Baldwin, 1995; Baldwin *et al.*, 1999; Braulik *et al.*, 2010). A few cetacean surveys implemented in the Persian Gulf did not encounter humpback whales (Henningsen and Constantine, 1992), which would argue against any common occurrence, at least from mid-August to early October.

Future cases, with improving documentation and increasing sample size, should shed light on the ecological factors that may induce humpback whales to penetrate into the Persian Gulf, possibly linked to feeding opportunities or reproductive advantages. All five Persian Gulf records were found nearshore, in shallow waters. In Oman, humpback whales sometimes enter very shallow water to feed (Baldwin and Salm, 1994). Admittedly, the dead specimens (n=4) may have died elsewhere. For instance, the Qatar whale might have been struck and killed by a large ship (e.g. a petroleum tanker) much further east and carried dead on the ship's bulbous bow tens or even hundreds of km, only to be discovered in the port of destination. However, while humpback whales are globally the second-most commonly killed whale species by ship collisions, unlike other balaenopterids the species gets rarely stuck on the bow of vessels (Van Waerebeek *et al.*, 2007). Only very few vessels (military only) had a bulbous bow in the late 19th century, so it seems highly unlikely that the Iraq whale was carried by a ship from a distant location.

Morphological (Gervais, 1883; see Appendix 1), genetic (Pomilla *et al.*, 2014), behavioural (Whitehead, 1985) and distributional (cf. non-migratory) lines of evidence concord in indicating that the Arabian Sea humpback whale population has been reproductively isolated from other populations sufficiently long to differentiate. Enhanced genetic drift within a small population may accelerate the speciation process, and as suggested before (Pomilla *et al.*, 2014), the Arabian Sea population may deserve subspecific status (*Megaptera novaeangliae indica*). A comprehensive comparative-morphological study, involving adequate samples, should re-examine findings by Gervais (1883).

The world's 'most isolated humpback whale population' combined with low population abundance and anthropogenic threats raises concern for its survival (Pomilla *et al.*, 2014). We recommend systematic research throughout the Persian Gulf, including the collection of both biological data and information on anthropogenic mortality from fisheries interactions and ship collisions. Epidemiologic data of emerging infectious diseases (e.g. Van Bresseem *et al.*, 2014) also deserve priority attention. Reliable mortality and morbidity estimates are essential for managers to evaluate potential impact on population trends.

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APPENDIX

On a new species of the genus *Megaptera*, originating from the Bay of Basora (Persian Gulf) by H.-P. Gervais (1883). Translated and annotated [in square brackets] by KVV.

The genus *Megaptera*, as established by the authors of the *Ostéographie des Cétacés* [i.e. Van Beneden & Gervais, 1880] comprehends four distinct species; the first two, the *Megaptera Boops* [(Fabricius, 1780)] and *Megaptera Lalandii* [(Fisher, 1829)] are established with certainty; the two others, *Megaptera Novae-Zelandiae* [Gray, 1864] and *Megaptera Kuzira* [Gray, 1850] are described only provisionally as their characteristics are still insufficiently clear.

Although Mr. [Pieter Jan] Van Beneden, in a recent work, has come back from the idea that he formulated 20 years ago that there exists but a single cosmopolitan species of *Megaptera*, namely *Megaptera Boops*, we think that we can demonstrate from a study that we undertook, through the comparison of new material accumulated at the anatomical collections of the Paris Museum, that the law of species distribution established for the [families] Balaenidae and Balaenopteridae, has to apply also to *Megaptera* and that the number of species of this group have to be recognised as three. These are the *Megaptera Boops*, inhabiting the Northern Hemisphere; the *Megaptera Lalandii* which frequents the southern part of the Atlantic Ocean, and the *Megaptera* of the Persian Gulf, which is the subject of the present note, a species which is supposed to inhabit the Indian Ocean and to which we propose to give the name *Megaptera indica*, since the individual obtained for the collections of the Museum would only have penetrated the Persian Gulf accidentally, from where it was shipped to us.

The size of the humpback whale of the Persian Gulf, which had attained adult age, differs hardly from the size of the skeleton of the equally adult *Megaptera Boops* with which we compared it. The external body shape should however have been more slender and its head more rounded. The general shape of the bony head shows, in its dorsal contours, a much more marked curvature: the rostrum is more obtuse, the lower part of the maxillary is more arched. The occipital region of the skull is less concave than in the *Megaptera* from the north, the longitudinal crest occupying the middle of the external face of the occipital is more pronounced. The lateral occipital protrusions are more marked while the condylar region is less prominent; the occipital opening [foramen magnum] is located less high and, consequently, projects more to the rear.

The os temporale differs especially in its zygomatic part, which is shorter, more massive, more arched at its top and is more outwards

projecting. The frontal bones demonstrate also, in their shape, fairly large differences; their orbital extensions are more massive, in a less oblique way from inside to outside and from the rear to anterior. The optical groove is largely open over its entire tract. The lower part of the skull, although somewhat damaged, has nonetheless permitted us to note that the os palatinum, which is highly characteristic with respect to the distinction between cetacean species, differs in shape, shows more considerable thickness and their large articulation with the maxillaries ['maxillaires supérieurs'] in the *Megaptera* from the Persian Gulf. The pterygoid bones are also very heavy, and their posterior apophysis, much shorter and bulkier than in *Megaptera Boops*, is strongly recurved towards the rear and outwards. The maxillaries' external borders are less straight than in the northern species. The rostrum shows a fairly marked narrowing somewhat anterior to the base of the orbital apophyses, then it widens in the middle region before progressively narrowing towards its anterior end. All the parts show, rather pronounced, different characteristics. The os jugale and the os lacrimale also show a particular configuration in our animal. The vertebrae overall are distinguished by the thickness of their bodies [corpus vertebrae], which is more pronounced in the first few cervicals of the *Megaptera* of the Persian Gulf than the corresponding bodies in the *Megaptera* of Lapome [= *M. Boops*], which however was of greater length. The transverse and spinous processes in the former species, compared to the latter species, differ in shape and direction; they are generally shorter, broader and thicker. The transverse processes of the dorsal region, especially those that occupy the middle part of that region, are higher than can be seen in any of the skeletons described till now and bring our *Megaptera* closer to the right whales, more than any other species of the group.

The first and the second cervical vertebrae deserve to be especially mentioned: the atlas is distinguished from the one in *Megaptera Boops* by the curvature of its upper neural arch, the thickness of its [vertebral] lamina of which the posterior border is grooved by two deep articular cavities [facets] into which the two articular apophyses fit from the anterior rim of the neural arch of the axis; the upper transversal processes are shorter and more massive. The lower transversal processes are well-developed, which is not the case in *Megaptera Boops*; the process at the right is ankylosed with the upper transversal process and forms an apophyseal mass, apparently unique, at which base one can find a large vertebral canal [foramen]. The second cervical vertebra or axis differs as much from that of the northern species as the two atlas vertebrae are different between them. The third cervical vertebra shows two pairs of highly developed transversal processes, namely upper and lower. The thoracic limb [flipper] is longer than the one in *Megaptera Boops*, with which we compare it, even while considering that the body size of the first one is 2 meter shorter than the second one. The scapula does not bear an acromion [diagnostic for the genus *Megaptera*]; the coracoid process is represented by a small bone protrusion and the overall shape of this bone differs measurably between the two species. All metacarpal bones are larger, longer and thicker than in the northern species; they contribute jointly with the phalanges which are also longer, larger and more flattened to give to the flipper of this animal its larger dimensions. The ribs are less long and more rounded than in the two other species. The sternum in our *Megaptera* from the Persian Gulf differs completely in shape from all the Mysticete species described so far. This bone is relatively very small, although we are dealing with an adult specimen. Its shape is like some sort of tail flukes of which the anterior face is concave in vertical sense and convex transversally. The lateral extensions, articulating with the first pair of ribs, are barely noticeable. All the edges are rounded, especially the anterior one which is thick and curved forward; the lower border ends in a pronounced triangular point. The tympanic bulla of the *Megaptera* of the Persian Gulf has a characteristic shape; and is remarkable by its small dimensions. The baleen plates are long, thick and coloured uniformly black.



Figure 1. Distribution of five confirmed specimen records of humpback whales (red dots) in nearshore areas of the Persian Gulf: [West] Bay of Bassora, Iraq; Kuwait Inner Harbour, Kuwait; [Central] Doha, Qatar; Akhtar, Bushehr Province, Iran; [East] Qeshm Island, Iran. No sightings have been reported in international waters.



Figure 2. Three (non-successive) frames sampled from a cell-phone video showing a gillnet-entangled juvenile humpback whale near Qeshm Island, Iran, in 2013 (see text). Although grainy, the frames unmistakably show the diagnostic head with fleshy knobs (tubercles) and a low, stubby dorsal fin with broad base. Video taken by Abdolrahman Gurani.



Figure 3. Freshly dead juvenile humpback whale floating at the jetty of Akhtar Village, Busherh Province, Iran