

# 2 Cetacean diversity in Mauritanian waters, an Annotated Checklist with new species records

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## 22 ABSTRACT

The exact number of cetacean species present in Mauritanian waters is unknown. A first overview was  
24 published only in 1980, the latest in 1998. Yet, published information remains modest compared to *e.g.*  
neighbouring Senegal (first review in 1947). The complex oceanography of Mauritanian waters permits a  
26 mixed assemblage of cetacean fauna, with the distribution of both cool temperate and (sub)tropical species.  
In this updated review, we use our own observations from strandings, bycatches and vessel-based surveys, as  
28 well as published and grey literature, to support an inventory of cetaceans of Mauritania. The updated  
checklist includes two new authenticated species records: *Kogia sima* and *Lagenodelphis hosei*. *Stenella*  
30 *coeruleoalba* is verifiably documented for the first time. Further, a first specimen record of *Stenella*  
*longirostris* is presented, as well as new (second) specimens of *Mesoplodon europaeus*, *Steno bredanensis*  
32 and *Megaptera novaeangliae*. Revised evidence shows that of 30 reported species, 27 of 6 families are  
provably supported while 3 species lack (accessible) voucher material but probably (P) occur in Mauritania:  
34 *Megaptera novaeangliae*, *Balaenoptera musculus*, *B. borealis*, *B. omurai*, *B. acutorostrata*, *B. physalus*, *B.*  
*brydei* (P), *Physeter macrocephalus*, *Kogia sima*, *K. breviceps*, *Sousa teuszii*, *Tursiops truncatus*, *Delphinus*

36 *delphis*, *Stenella frontalis*, *S. attenuata*, *S. coeruleoalba*, *S. longirostris*, *S. clymene*, *Steno bredanensis*,  
37 *Peponocephala electra* (P), *Lagenodelphis hosei*, *Grampus griseus*, *Globicephala macrorhynchus*, *G. melas*  
38 (P), *Orcinus orca*, *Pseudorca crassidens*, *Ziphius cavirostris*, *Mesoplodon europaeus*, *M. densirostris* and  
39 *Phocoena phocoena*. Finally, a first case of tattoo skin disease (TSD) is reported for continental NW Africa,  
40 in a stranded *D. delphis*.

42 **KEYWORDS:** CETACEA; MAURITANIA; NORTHWEST AFRICA; CANARY CURRENT; STRANDINGS;  
43 SIGHTINGS; BYCATCHES

#### 44 **INTRODUCTION**

45 The Mauritanian coast is considered one of the most productive oceanic regions in the world (Peña-Izquierdo  
46 *et al.*, 2012). It is situated within the Canary Current Large Marine Ecosystem (CCLME), one of four most  
47 productive eastern boundary currents where upwelling brings nutrient-rich waters to the surface year-round  
48 (Valdés and Déniz-González, 2015). This rich and biodiverse ecosystem created by this upwelling supports  
49 one of the most important fisheries in the world (Zeeberg *et al.*, 2006). The evident importance of this region  
50 for cetaceans and seabirds has been noted by numerous authors (Russell *et al.*, 2018; Capone and Hutchins,  
51 2013; Baines and Reichelt, 2014; Camphuysen *et al.*, 2015; Djiba *et al.*, 2015).

52 The cetacean fauna of the Mauritanian coast and their natural history are poorly known (Robineau and Vely,  
53 1998). Moreover, the handful of published studies, based mostly on strandings, are 20-30 years old (*e.g.*  
54 Duguay, 1976; Maigret, 1980, 1981; Smeenk *et al.*, 1992; Vely *et al.*, 1995; Robineau *et al.*, 1994; Robineau  
55 and Vely, 1993, 1998) and are limited in space and time. More recently sightings data opportunistic to  
56 research of fisheries resources (Zeeberg *et al.*, 2006; Djiba *et al.*, 2015), a seismic survey (Russell *et al.*,  
57 2018) and several dedicated surveys ( Van Waerebeek and Jiddou, 2006; Camphuysen *et al.*, 2012, 2015,  
58 2017) were added. Observations at sea and monitoring of strandings were conducted between 2012 and 2016  
59 as part of a major project *Biodiversité-Gaz-Pétrole* (BGP) in collaboration with the KOSMOS oil company,  
60 resulting in a significant amount of new information on cetacean presence in Mauritanian coastal waters.  
61 These recent efforts offer an opportunity to critically review former records from multiple sources and allow  
62 a much-needed updated overview. Well-illustrated, it may appeal to a wider, non-specialist public.

63 Sustainable management of marine ecosystems relies on a good knowledge of the species biodiversity and  
64 their habitats. Monitoring of these ecosystems requires the availability of relevant indicators to better  
65 understand their functioning. Marine mammals are good bio-indicators of the health of marine ecosystems  
66 (Van Bresseem *et al.*, 2009), being placed at the top of the food chain while many species have long life spans  
67 (Wilson *et al.*, 2019), they feed at a high trophic level and have unique fat stores that can lead to  
68 accumulation of liposoluble anthropogenic toxins (Alvarado-Rybak *et al.*, 2020; Geraci and Lounsbury,  
2005). Marine mammal populations respond to changes lower down the food chains. Consequently, changes

70 in their distribution, abundance and behaviour are indicative and regular monitoring may provide  
information on changes in the equilibrium of marine ecosystems (Alvarado-Rybak *et al.*, 2020).

72 We here concisely review earlier evidence on the cetacean fauna of Mauritania, document relevant new  
records, update the cetacean check-list for the country by adding several species and discuss other recent  
74 insights. This contribution should support current and future fisheries and bycatch monitoring, studies of  
cetacean zoogeography and ecology, provide a useful source of information to marine mammal management  
76 and conservation efforts in Mauritania and other nations that share the CCLME ecosystem (Valdés and  
Déniz-González, 2015), as well as inform a wider public.

## 78 MATERIAL AND METHODS

For this review we used four different data sources: (i) novel data from the BGP coastal monitoring  
80 programme (2012-2016); (ii) ship-board surveys of seabirds and marine mammals carried out by IMROP  
and partners during 2012, 2015, 2016; (iii) cetacean reference collections in Mauritania; (iv) published and  
82 grey literature. Many new specimens, mostly skulls, were collected during periodical beach survey effort, as  
part of the *Programme Biodiversité-Gaz-Pétrole* (BGP) implemented by the Mauritanian Ministry of  
84 Environment, the Ministry of Fisheries and the Ministry of Oil in collaboration with the *Institut Mauritanien  
de Recherches Océanographiques et des Pêches* (IMROP) and the *Office National d'Inspections Sanitaires  
des Produits de Pêche et de l'Aquaculture* (ONISPA). We monitored the 720 km of the Mauritanian  
86 coastline, from Nouakchott (18°04'44"N,15°57'56"W) to N'Diago (16.167°N, 16.50°W) near the southern  
88 border with Senegal, and from Nouakchott harbour north to the Nouadhibou artisanal fishing port  
(20°56'33"N,17°02'10"W) in northern Mauritania (Fig. 1). Beaches located 28 km S of Nouakchott (locality  
90 'PK 28') were regularly patrolled (Figs. 1). We conducted regular beach monitoring during the day from  
07:00 until 19:00 h using a slow-moving all-terrain vehicle close to the high tide line. This allowed us to  
92 cover long distances and readily spot live and dead stranded cetaceans.

We examined also specimens, mostly skulls, at the IMROP collection (n= ~100), PNBA (n= 48) and the  
94 *Centre National d'Élevage et des Recherches Vétérinaires* (CNERV) at Nouakchott (n= ~30). Van  
Waerebeek and Jiddou (2006) identified and catalogued (MR numbers) skeletal material of 56 individual  
96 cetaceans at IMROP in 2005. Some 25 skulls were examined (by KVV) at the Nouakchott headquarters of  
the German Agency for International Cooperation (GIZ) in 2015. Collected from Mauritanian beaches, many  
98 were lacking numbers and associated voucher data such as precise location.

Four ship-board visual surveys of avifauna and megafauna were carried out from the R/V *Al Awam* in  
100 December 2012, September 2015, August 2016 and April 2018. The main aim of these surveys was the  
mapping of the distribution of seabirds and cetaceans along the Mauritanian continental shelf (neritic zone)  
102 and slope. Transects were designed to cross the shelf break preferably at a 90° angle and followed a zigzag  
pattern with 2-3 shelf-slope crosses each between Nouadhibou and N'Diago (Fig. 1) at an average speed of 8  
104 knots. Data were collected at 5-minute intervals and for each period, the geographical position was recorded

106 as well as the ship's speed, sea state, sea surface temperature (SST), and the presence of clearly visible  
107 fronts.

108 Below we succinctly review cetacean biodiversity in Mauritania and recognize three categories. Fully  
109 confirmed species records for which verifiable voucher material exist, either accessible osteological  
110 specimens, diagnostic craniometrics or descriptions, external morphological features (identifiable  
111 photographs) or molecular genetics evidence. Voucher material is considered essential to support first or rare  
112 species records or species that are notoriously difficult to distinguish from others. Probable, but unconfirmed,  
113 species involve unverifiable records for which no voucher material exist or it is inaccessible. Potential  
114 species are those that have not been reported but are expected to occur in Mauritania considering known  
115 distribution in the eastern tropical Atlantic. Documented cases from contiguous range states (Senegal, The  
116 Gambia, Morocco, Cape Verde Archipelago, Canary Islands) or other areas of CCLME are briefly  
mentioned where relevant.

## RESULTS

118 The newly collected records amounted to a total of 14,531 individuals pooled from 229 sightings and 848  
beach-cast specimens, which allow us to provide the following species updates.

### 120 ***DELPHINIDAE (Oceanic dolphins)***

#### **Common bottlenose dolphin, *Tursiops truncatus* (Montagu, 1821)**

122 *Specimens.* Cadenat *et al.* (1959) first reported *T. truncatus* for Mauritania. Robineau and Vely (1998)  
123 encountered 94 specimens along the Mauritanian coast. During BGP beach surveys, we recorded 104  
124 specimens, both skulls (Fig. 2) and complete carcasses (Fig. 3). Currently 26 *T. truncatus* skulls are curated  
at IMROP collection.

126 *Sightings.* *Tursiops truncatus* is the most frequently observed cetacean species along the north coast of  
Mauritania and especially the shallow waters of Banc d'Arguin are an important year-round habitat (Maigret,  
128 1980; Vely *et al.*, 1995; Van Waerebeek and Jiddou, 2006). Robineau and Vely (1998) sighted four groups  
of 26-31 individuals in November 1994 and one group with 30-40 individuals in January 1995 (Vely *et al.*,  
130 1995). Van Waerebeek and Jiddou (2006) documented 11 sightings of 2-36 individuals on the Banc  
d'Arguin over three days in November 2006, the predominating cetacean species.

132 Along the Grande Plage, common bottlenose dolphins are most abundant in November-December (Robineau  
and Vely, 1998). During the R/V *Al Awam* surveys off Mauritania, 15 individuals were sighted in December  
134 2012, 170 in September 2015 and 29 individuals in November 2016 (Camphuysen *et al.*, 2012, 2015, 2017).

#### **Common dolphin, *Delphinus delphis* Linnaeus, 1758**

136 *Specimens.* Based on molecular genetics it was recently proposed that short-beaked *D. delphis* and long-  
beaked *D. capensis* common dolphins may be ecotypes of a cosmopolitan, highly variable, monotypic

138 species *D. delphis* (Cunha *et al.*, 2015). Although we consider that this work is not the final word on  
140 *Delphinus* taxonomy, indications are that morphological variability (cranial, colouration) observed in  
142 common dolphins in the CCLME off NW Africa (Fig. 5), including Mauritania, indeed suggests intraspecific  
144 variation (K. Van Waerebeek, unpub. data). A cursory check of colouration patterns (Fig. 6) indicate  
146 significant, but possibly clinal, variation (Djiba *et al.*, 2015). Significant bycatch mortality off Mauritanian  
148 shores have long been recognized. Cadenat (1959) first published measurements of 7 specimens captured off  
144 Nouakchott and Maigret (1981) reported two and seven specimens bycaught respectively in May and June  
1980. Robineau and Vely (1998) collected 52 common dolphins along the Mauritanian coast. Two mass  
146 mortality episodes of indeterminate cause, mainly of this species, were recorded in May 2000 and June 2006  
(IMROP, unpublished data). We documented 68 stranded common dolphins during BGP and IMROP beach  
148 surveys in 2012-2019.

Macroscopic examination revealed evident dermatopathy in one common dolphin. On its right flank (Fig.7)  
150 the animal showed several tattoo skin disease (TSD) lesions, clinically highly diagnostic for this poxviral  
152 disease (Van Bresseem *et al.*, 2006). This is the first record of TSD in a cetacean encountered in Mauritania  
154 and generally on the NW African continent (Van Bresseem *et al.*, 2017). However, TSD has been detected in  
156 several small cetaceans in the Canary Islands. *Sightings*. Cadenat (1959) first reported common dolphins  
158 offshore of Nouakchott in September 1956 and October 1958. It was the species sighted in largest numbers  
160 (total n= 9,612 individuals) off the Mauritanian coast (Fig. during the BGP seabird and marine mammal  
surveys (Camphuysen *et al.*, 2012, 2015). Tulp and Leopold (2004) also reported it as the most abundant  
species off Mauritania, encountered on most at-sea days, particularly in the south. Djiba *et al.* (2015) found  
that 28.7% of all cetacean sightings (32.7% including 'probable *Delphinus*') in the CCLME were of this  
species, and represented 71.3% (76.5%) of all individuals of Cetacea. Russell *et al.* (2018) reported seven  
sightings ( $\Sigma=760$  individuals) of a long-beaked form of common dolphin.

### **Striped dolphin, *Stenella coeruleoalba* (Meyen, 1833)**

162 *Specimens*. Robineau and Vely (1998) collected a first calvaria on the Grande Plage identified as *S.*  
*coeruleoalba*. However this record lacks supporting evidence and we could not locate it in a Mauritanian  
164 collection. A freshly dead striped dolphin stranded on a beach north of Nouakchott in January 1997, and was  
butchered for food (Fig. 8). Another four specimens were found south of Nouakchott during BGP beach  
166 surveys: one in August 2014, another in November 2015 (Fig. 9) and two on 28 April 2016 (220cm male at  
19°52'41.25"N, 16°18'18.31"W; 210 cm female at 16°47.923'N; 16°22.163'W). In Senegal, a specimen was  
168 harpooned off M'Bour (Cadenat, 1949); also two historical specimen records (in 1882 and 1942) were  
possibly valid (Van Waerebeek *et al.*, 2000).

170 *Sightings*. No striped dolphins have been sighted in Mauritanian coastal waters (see Camphuysen *et al.*,  
2012, 2015, 2017; Djiba *et al.*, 2015; Tulp and Leopold, 2004), presumably because of the species' far  
172 offshore, pelagic habitat (Best, 2007) and its general scarcity in coastal continental NW Africa (*e.g.* Van

174 Waerebeek *et al.*, 2000). A single documented record for Atlantic Morocco consists of a small group (n= 12) photographed by KVVW off Marrakesh in July 2012 (Djiba *et al.*, 2015; Plate 5.7.2). The species is frequently sighted in deep water off the Canaries (Ritter and Wähler, 2011).

176 **Atlantic spotted dolphin, *Stenella frontalis* (Cuvier, 1829)**

178 *Specimens.* A mass mortality from fishing interaction killed at least 125 dolphins between Nouamghar and Nouakchott in November-December 1995. Of these, 37 were positively identified as *S. frontalis* (Nieri *et al.*, 1999). It is unclear whether some were collected. No material is curated at IMROP collection. A new *S. frontalis* specimen was encountered washed ashore at 17°05'40.1"N, 016°14'40.3"W, on 16-11-2012 (Fig. 9).  
180 *Sightings.* Six groups (2-50 individuals, median=19) and nine groups (2-360 individuals, median= 48) of Atlantic spotted dolphins were sighted from R/V *Al Awam*, respectively in November-December 2012 and September 2015, several of which are supported by photographs taken by Jan Verdaat (Fig. 10)  
182 (Camphuysen *et al.*, 2012, p. 49; 2015).  
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**Clymene dolphin, *Stenella clymene* (Gray, 1850)**

186 *Specimens.* One positively described *S. clymene* calvaria was collected 113 km north of Nouakchott on 27-11-1992 (Robineau *et al.*, 1994; Robineau and Vely, 1998) but its whereabouts are unknown. No other  
188 specimen records have been published and no *S. clymene* material is present at the IMROP collection. One fully documented specimen record exist for the Saloum Delta, Senegal (Cadenat and Doutré, 1958) and a confirmed calvaria (PFM-001) was collected at Bijol Islands, The Gambia (Van Waerebeek *et al.*, 2000; Perrin and Van Waerebeek, 2012).  
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192 *Sightings.* Clymene dolphin occurs in deep tropical and subtropical waters of the Atlantic Ocean (Perrin *et al.*, 1981), while it is particularly common in the northern Gulf of Guinea (de Boer *et al.*, 2016; Van  
194 Waerebeek *et al.*, 2009). A general review indicates the occurrence of Clymene dolphins between the central Mauritanian coast and southern Angola (Weir *et al.*, 2014). Group size ranged from 3–1,000 animals, with  
196 60.9% of groups comprising ca. 50 animals. One large pod of an estimated 560 *S. clymene* was well-documented at 16°30'N, 16°59.8'W (depth 1,102 m) on 08-09-2015 (Camphuysen *et al.* 2015) (Fig. 11).  
198 Russell *et al.* (2018) reported 150 individuals in 2012.

**Spinner dolphin, *Stenella longirostris* (Gray, 1828)**

200 *Specimens.* Spinner dolphins are distributed in all tropical and most sub-tropical waters worldwide (Carwardine, 2020), but there are no historical specimen records available for Mauritania (Robineau and  
202 Vely, 1998; Perrin and Van Waerebeek, 2012). One skull was collected in southern Mauritania on 11 June 2014 during a BGP beach survey. For two calvariae (W420, St1) examined at GIZ headquarters, no  
204 associated data were available and may include the former. Specimen W420 with CBL=431mm showed >50 maxillar alveoli each side (Fig. 12), while specimen St1, with CBL ~417mm (with eroded rostrum tip) had  
206 about 50 maxillar alveoli per side. Standard craniometrics are archived with the authors.

208 Van Bree (1971a) documented 4 skulls of *S. longirostris* from Senegal, deposited at IFAN museum, and one  
210 from Côte d'Ivoire. No specimens exist for Morocco nor The Gambia (Bayed and Beaubrun, 1987, 1996;  
212 Van Waerebeek *et al.*, 2000). The above-mentioned skulls are the first specimen records of *S. longirostris* for  
Mauritania and apparently the northernmost documented records off continental NE Africa (Perrin and Van  
Waerebeek, 2012). Very rare specimens are reported (not documented) for Canary Islands (Ritter and  
Wähner, 2011).

214 *Sightings.* Russell *et al.* (2018) sighted one pod of 392 individuals of *S. longirostris* during a geophysical  
survey in 2012. Duguay (1976) reportedly sighted a group of 50 individuals north of Cap Vert, Senegal. None  
of these sightings seem to be supported by photographic evidence. The species was not encountered during  
216 R/V *dr. Fridtjof Nansen* coastal surveys off NW Africa (Djiba *et al.*, 2015). We conclude that spinner  
dolphins are uncommon in the CCLME and apparently restricted to far offshore waters.

#### 218 **Pantropical spotted dolphin, *Stenella attenuata* (Gray, 1846)**

220 *Specimens.* Pantropical spotted dolphin have a tropical to sub-tropical distribution worldwide (Carwardine,  
2020) however, till date no confirmed specimen records exist for Mauritania (Robineau and Vely, 1998;  
Perrin and Van Waerebeek, 2012; Djiba *et al.*, 2015; this paper).

222 *Sightings.* A group of 14 dolphins identified as *Stenella attenuata* was observed from R/V *Al Awam* at  
19°27'36"N, 17°15'W, on 12-09-2015 but no photos were taken (Camphuysen *et al.*, 2015). Russell *et al.*  
224 (2018) reported 59 individuals during a geophysical survey in 2012. *Stenella attenuata* has a preference for  
tropical oceanic waters and may largely avoid the cooler, upwelling-modified neritic habitat of the CCLME,  
226 including off Mauritania (Djiba *et al.*, 2015).

#### **Fraser's dolphin, *Lagenodelphis hosei* Fraser, 1956**

228 *Specimens.* No historical cases of Fraser's dolphin are reported for Mauritania (Maigret *et al.*, 1976;  
Robineau and Vely, 1998; Perrin and Van Waerebeek, 2012). A BGP beach survey yielded one *L. hosei*  
230 calvaria, a first specimen record for Mauritania and a possible second specimen was found (16°37'24.2"N,  
16°26'19.5"W) in southern Mauritania in February 2014 (Fig. 13). Identification was based mainly on a low  
232 tooth count of 37-38 alveoli in the upper half-jaws, alveoli with small diameter (indicating small teeth), a  
relatively short rostrum with a wide base (RL/RWB<sup>1</sup>= 2.02-2.09 *versus* 2.38-2.43 in *S. clymene* and *S.*  
234 *coeruleoalba*), a large preorbital process and a wide, grooved palate (Perrin *et al.*, 1994). In NW Africa,  
Fraser's dolphin is rare with only a few authenticated specimens known. One stranding each is reported from  
236 the Canary Islands (Vonk and Martin, 1990) and Sangomar Island, Senegal (Van Waerebeek *et al.*, 2000)  
and two from Cabo Verde (Torda *et al.*, 2010), but photo-supported sightings exist for the Canaries (Ritter  
238 and Wähner, 2011). Fraser's dolphin is regularly landed as bycatch in western Ghana (e.g. Van Waerebeek *et*  
*al.* 2009; Debrah *et al.*, 2010).

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1 Standard measurements : RL= Rostrum length ; RWB = Rostrum width at base

240 *Sightings*. Fraser's dolphin is distributed world-wide in tropical and subtropical oceanic waters within 30° of  
the equator, but no sightings exist for Mauritania, nor Senegal (Camphuysen *et al.*, 2012, 2015; Djiba *et al.*,  
242 2015; Russell *et al.*, 2018). The species is not uncommon in the Gulf of Guinea (Weir *et al.*, 2008). Off  
Ghana and Côte d'Ivoire *L. hosei* was found to be the most abundant species, due to large group sizes, often  
244 many hundreds (de Boer *et al.*, 2016).

### **Rough-toothed dolphin, *Steno bredanensis* (Lesson, 1828)**

246 *Specimens*. A first stranding was reported at Cap Timiris (Duguay, 1976) however unverifiable for lack of a  
voucher specimen or description. Maigret (1980) reported two strandings in Baie du Lévrier (25-01-1978 and  
248 05-1975) and one at Cap Timiris on 20-01-1975. A cranially immature calvaria (MR-0061; CBL=535 mm)  
was collected in southern Mauritania during a BGP survey in February 2014 and is deposited at IMROP  
250 (Fig. 14). Recently, on 02-04-2021 a fairly fresh carcass stranded on a Nouadhibou beach was photographed  
(Fig. 15) but not collected.

252 *Sightings*. On 21-06-1988, 10-12 rough-toothed dolphins approached a Dutch research vessel at 20°40'N,  
17°31'W in rather shallow water (70 m depth) 51 km west off Cap Blanc, authenticated by photographs  
254 (Addink and Smeenk, 2001). Unsupported sightings include one in Baie du Lévrier on 20-02-1952 (Duguay,  
1976) and another two in the same bay on 20-01-1952 and 23-07-1975 (Maigret, 1981). The frequent  
256 presence of *T. truncatus* in the area (Van Waerebeek and Jiddou, 2006), with a similar morphology,  
underscores the need for voucher material. The most recent sighting was of 50 animals in 2012 (Russell *et*  
258 *al.*, 2018).

### **Atlantic humpback dolphin, *Sousa teuszii* (Kükenthal, 1892)**

260 *Specimens*. Most Atlantic humpback dolphins found stranded (n=15) originated from the Parc National du  
Banc d'Arguin (PNBA) (Robineau and Vely, 1998), indicating it as the species' main habitat in Mauritania  
262 (Van Waerebeek *et al.*, 2000, 2004). Hence, this discrete population of *S. teuszii* was named the "Banc  
d'Arguin" stock, deemed to be reproductively separated from the Saloum Delta (Senegal) stock and Dakhla  
264 (Western Sahara) stock (Van Waerebeek *et al.*, 2003). A single skull from the PNBA (MR-0050) is  
deposited at IMROP (Fig. 16), five skulls are curated at PNBA, six are at CNERV while earlier ones may  
266 have been exported. The most recent known specimen, following beach monitoring by IMROP, is an adult  
male (SL= 235 cm) encountered at 19°17'36"N, 16°28'53.4"W on 10-05-2013 (Fig. 16).

268 *Sightings*. These have mostly been reported from the Banc d'Arguin and the shallow waters near Iwick, most  
of these at least two decades ago. Five sightings were reported south of Nouamghar. None have been  
270 documented from Baie du Lévrier or Cap Blanc (Maigret 1980; Van Waerebeek *et al.*, 2004). Surprisingly, a  
3-day boat survey of the Banc d'Arguin in November 2006 yielded 11 sightings of *T. truncatus* but not a  
272 single one of *S. teuszii* (Van Waerebeek and Jiddou, 2006). The only published photo of free-ranging *S.*



*teuszii* in Mauritania is of a small group porpoising at Banc d'Arguin in the 1980s (Maigret, 1990a).  
274 Renewed boat survey effort is urgently needed.

### **Risso's Dolphin, *Grampus griseus* (Cuvier, 1812)**

276 *Specimens.* Duguay (1976) first reported the collection of a skull at Nouamghar in 1973. Robineau and Vely  
(1998) mentioned 5 *G. griseus* strandings, 1 near Cap Blanc and 4 around Nouakchott, likely accounting for  
278 two specimens kept at IMROP (MR0032 and MR0038) and examined in November 2005 (Van Waerebeek  
and Jiddou, 2006). Currently cranial material of 7 Risso's dolphins are curated at IMROP collection. Twelve  
280 specimens were encountered during the BGP beach surveys, including a 288 cm moderately decomposed  
carcass re-encountered in October 2017. The most recent is a fresh specimen found on a Nouakchott beach,  
282 at 18°15'53.36"N, 16°2'17.92"W on 17-08-2021 (Fig. 17). These data suggest *G. griseus*, a warm temperate  
water adapted species (Perrin and Van Waerebeek, 2012), to be common off Mauritania.

284 *Sightings.* Two groups of Risso's dolphins were observed in Mauritanian waters, both from the R/V *Al Awam*  
(Fig. 13). A group of nine Risso's dolphins was sighted at 18.125°N, 16.706°W on 06-12-2012 and another  
286 11 individuals were recorded at 20.00°N, 17.582°W on 08-12-2012 (Camphuysen *et al.* 2012). In September  
2015, 14 groups were observed (range: 1-24 individuals) also from R/V *Al Awam* (Camphuysen *et al.*, 2015).  
288 Djiba *et al.* (2015) photographed two groups off Morocco in July 2012. Risso's dolphin has not been  
documented from Senegal (Van Waerebeek *et al.*, 2010; Djiba *et al.*, 2015), which may reflect low survey  
290 effort in deeper offshore areas.

### **Melon-headed whale, *Peponocephala electra* (Gray, 1846)**

292 *Specimens.* Robineau and Vely (1998) mentioned finding a skull at Cap Alzas (20°25'N, 16°20.3'W) in  
January 1995, but this report is unverifiable for lack of documentation, and the specimen has not been  
294 located in a national collection. No supported cases are known for Mauritania. One well-documented skull  
originated from the Saloum Delta, Senegal, another from the Bijagos Archipelago, Guinea-Bissau (van Bree  
and Cadenat, 1968). Two mass strandings are known from Cape Verde Islands (Van Waerebeek *et al.*, 2008).  
296 *Sightings.* The species occurs in tropical and sub-tropical waters worldwide, with preference for deep  
offshore habitat (Carwardine, 2020), but none have been sighted off Mauritania, most likely due to cool  
298 CCLME upwelling.

### **Killer whale, *Orcinus orca* (Linnaeus, 1758)**

*Specimens.* Cranial material of two killer whales is curated at IMROP. One is a complete adult skull (4x 12  
302 alveoli; MR0034) collected at Mejratt on 11-11-1993 (Fig. 19) and the other is a left mandible (MR0056)  
with 12 diagnostic oval-shaped (in cross-section) tooth alveoli from an unspecified locality in Mauritania. A  
304 male killer whale was found stranded in Baie de Cansado, near Nouadhibou, on 10-11-2010 (Fig. 18). A  
fourth specimen, an adult *O. orca* skull without data or number was identified by KVVW at the GIZ  
306 Nouakchott headquarters on 25-04-2015.

*Sightings.* Killer whales are unmistakable at sea, hence *bona fide* laymen sightings can be credible. Small groups of 1-3 individual killer whales are observed year-round in Mauritanian waters. Most sightings have been from Baie du Lévrier and a few from the Banc d'Arguin area (Maigret, 1990b; Robineau and Vely, 1998; Hammond and Lockyer, 1988). Orcas are seen also with some regularity in Senegal (Van Waerebeek *et al.*, 2000; Djiba *et al.*, 2015). A pod of six individuals was encountered at 17°07'N, 16°36.0'W, in 98m deep water on 07-09-2015 (Camphuysen *et al.*, 2015). Djiba *et al.* (2015) estimated an encounter rate in CCLME coastal waters of 0.088 individuals 100km<sup>-1</sup>

#### 314 **Short-finned pilot whale, *Globicephala macrorhynchus* Gray, 1846**

*Specimens.* Two verified *G. macrorhynchus* skulls (see van Bree, 1971b) are curated at IMROP (Van Waerebeek and Jiddou, 2006). Skull MR0031 was collected at PNBA on 02-10-1993, while calvaria MR0033 was found at PK66 south of Nouakchott, on 14-07-1993 (Fig. 20). Three cranial specimens, one from around Nouakchott, were reported (Robineau and Vely, 1998) but their whereabouts are unknown. During recent BGP beach surveys we found 13 pilot whale specimens (Fig. 21) including five complete individuals, with (measured) body lengths ranging 440 – 449 cm.

*Sightings.* Short-finned pilot whales are encountered mostly in the offshore CCLME, particularly in continental slope waters (Fig. 22). However in November-December 2012, Camphuysen *et al.* (2012) did not encounter any pilot whales off Mauritania, despite surveying deep waters. Camphuysen *et al.* (2015) estimated a total of 527 individuals in 38 sightings. Group size averaged 65.9 ± 57.8 individuals (range 14-178, n= 8). Most sightings were within the oceanic zone (mean water depth 879 ± 97m, range 760-1114m) and a majority of the sightings were in the southern half of the study area, with high sea surface temperatures (SST 28.8 ± 1.5°C, range 26.1-30.0°C) (Camphuysen *et al.*, 2015). The pilot whales were often associated with *T. truncatus*, as in other areas of western Africa. Encounter rate of *G. macrorhynchus* in CCLME neritic habitat, and some continental slope waters, was a low 0.47 individuals 100km<sup>-1</sup> (Djiba *et al.*, 2015), with sightings located off Guinea-Bissau and Guinea.

#### **Long-finned pilot whale, *Globicephala melas* (Trail, 1809)**

*Specimens.* No *G. melas* material is present at IMROP, PNBA, CNERV or GIZ. Nonetheless, Robineau and Vely (1998) reported on 5 skulls or calvariae which they identified as long-finned pilot whale, of which two found north and one south of Nouakchott (others of unknown locality). However, no identification criteria were discussed, none were pictured nor measured, and whereabouts are unknown, so verification is impossible. Van Waerebeek *et al.* (2008) warned that immature and subadult skulls of *G. macrorhynchus* are easily misidentified as *G. melas* because only with cranial maturity do the premaxillaries laterally expand to such a degree to completely cover the maxillaries (van Bree, 1971b). The occasional presence of *G. melas* off Mauritania is considered highly likely but, to date, not authenticated.

340 *Sightings*. A pod of at least 30 pilot whales, mixed with 12 *T. truncatus*, was sighted just north of Cap Blanc  
at 21°24'N, 17°42'W, on 13-07-1973, and was labeled as *G. melaena* (Duguy, 1976). Nores and Pérez (1988)  
342 claimed that 'the boreal species [*i.e.* *G. melas*] dominates African coastal waters, from Morocco to  
Mauritania' and, for the latter country they cite Maigret *et al.* (1976) and Duguy (1976), who reported two  
344 at-sea observations. However Robineau and Vely (1998) correctly object that these sightings could have  
been either species. Without distinguishing features reported (Duguy, 1976), we consider these *Globicephala*  
346 sp.

#### **False killer whale, *Pseudorca crassidens* (Owen, 1846)**

348 *Specimens*. Although *P. crassidens* is distributed worldwide in tropical to warm temperate waters, no  
specimens are recorded for Mauritania (Robineau and Vely, 1998; Perrin and Van Waerebeek, 2012). Also,  
350 despite the considerable recent beach survey efforts, as indicated, these neither resulted in specimens. We  
suggest that *P. crassidens* is uncommon off Mauritania, at least in coastal waters.

352 *Sightings*. Two small groups of two and nine individuals were photographed (Fig. 23) from the R/V *Al Awam*  
over the continental slope at depths of, respectively, 383 m and 492 m, on 12-09-2015 (Camphuysen *et al.*,  
354 2015).

#### **PHOCOENIDAE (Porpoises)**

##### **356 Harbour porpoise, *Phocoena phocoena* (Linnaeus, 1758)**

*Specimens*. The harbour porpoise was first documented in Mauritania more than half a century ago (Fraser,  
358 1958). Its common presence along most of the Mauritanian coast, but especially in the north, is confirmed  
from regular strandings (Robineau and Vely, 1998; this paper). Between April 1999 and May 2000, one of us  
360 (ASB) recorded 14 stranded individuals between Nouakchott and Nouamghar, with body size ranging from  
120-173 cm. More recently, four years (2012-2016) of systematic BGP beach surveys revealed the remains  
362 of 321 porpoises, many of these showing clear marks of fisheries interactions (Mullié *et al.*, 2013). Merely in  
the month of June 2014, 80 dead porpoises were found, with body sizes ranging from 107-210 cm (Fig. 24).

364 *Sightings*. Only few georeferenced sightings of harbour porpoise have been registered for Mauritania  
(Robineau and Vely, 1998). Van Waerebeek and Jiddou (2006) sighted five small groups (median= 3 ind.,  
366 range= 2-14 ind.) near Cap Blanc on 11-11-2006. Camphuysen *et al.* (2012) sighted three single individuals  
in the same area, one on 02-12-2012 and two on 03-12-2012. The harbour porpoise is the smallest cetacean  
368 of Mauritania and due to this, its rounded (beakless) head, small triangular dorsal fin and brief surfacings, it  
is rather unmistakable especially for a trained observer.

370 **PHYSETERIDAE (Sperm whales)**

**Sperm whale, *Physeter macrocephalus* Linnaeus, 1758**

372 *Specimens.* For a cosmopolitan species like *P. macrocephalus*, surprisingly limited material evidence exists  
in Mauritania. The almost complete skeleton of a locally stranded sperm whale is maintained outside near the  
374 PNBA station at Iwick (19°51'N, 16°20'W) (Fig. 25); Robineau and Vely, 1998). Another stranding, from 20  
km north of Nouakchott in December 1980 lacks voucher material (Maigret, 1981).

376 *Sightings.* Camphuysen *et al.* (2012) reported 9 sightings of sperm whales, made on a single day (08-12-  
2012). All were singletons except a group of seven individuals. More sperm whales were reported in  
378 September (Camphuysen *et al.*, 2015) (Fig. 26).

**KOGIIDAE (kogiid sperm whales)**

380 **Dwarf sperm whale, *Kogia sima* Owen, 1866**

*Specimens.* No historical records exist for Mauritania (Robineau and Vely, 1998; Perrin and Van Waerebeek,  
382 2012). The dwarf sperm whale, the smaller of the two kogiid species, was documented for the first time from  
a stranding (Fig. 27) in southern Mauritania (17°34'49.11"N, 16°4'5.991"W) in August 2014. The skull is  
384 curated at IMROP (Fig. 27). Although two specimens were reported for Senegal (Maigret and Robineau,  
1981), none were present at the IFAN zoological collection in Dakar, when examined in 1999-2000 by Van  
386 Waerebeek *et al.* (2000).

*Sightings.* Russell *et al.* (2018) reported two individuals seen during a geophysical survey in 2012, but no  
388 photos were available. Moreover, distinction from the congeneric *Kogia breviceps* (see below) is extremely  
difficult at sea, and we cannot consider these substantiated sightings.

390 **Pygmy sperm whale, *Kogia breviceps* (de Blainville, 1838)**

*Specimens.* Two strandings of pygmy sperm whales have been reported for Mauritania, a 315 cm carcass at  
392 Grande Plage in August 1992 and a calvaria collected at the Parc National du Banc d'Arguin in January 1995  
(Robineau and Vely, 1998). Here we report a third specimen. The senior author encountered a carcass (Fig.  
394 28) at 19°05'55.3"N, 16°16'26.2"W on 15-11-2013. Its calvaria was examined by KVV at the GIZ  
headquarters in Nouakchott on 25-04-2015. Some key cranial measurements include: condylobasal length  
396 (CBL), 427mm; rostrum width at base (RW), 225mm; preorbital skull width (POW), 368mm; zygomatic  
skull width (ZYGW), 346mm.

398 *Sightings.* No live sightings of pygmy sperm whale are documented for Mauritania, but *Kogia* spp. are  
notoriously hard to identify at sea as they show very little body when breathing. Among cetaceans, kogiid  
400 whales may well be underreported. The pygmy sperm whale was mentioned also for the Canary Islands  
(Casinos, 1977; Vonk and Martin, 1988) and Madeira (Maul and Sergeant, 1977).

402 **ZIPHIIDAE (Beaked whales)**

**Gervais' beaked whale, *Mesoplodon europaeus* Gervais, 1855**

404 *Specimens.* The carcass of a 455 cm female Gervais' beaked whale was found stranded on a beach south of  
Nouakchott (17°14'N,16°11'W) on 02-12-1992. It was positively identified through diagnostic cranial  
406 features documented in some detail (Robineau and Vely, 1993; 1998). The CBL of the skull was 753 mm.  
Unfortunately, its current location is unknown. We found a second specimen, a skull, at 17°5'10.83"N,  
408 16°14'52.61"W on 24-12-2021, which was deposited in the IMROP collection (WP298). Diagnostic cranial  
features are shown in Fig. 29. *Mesoplodon europaeus* has also been recorded in the Canary Islands, Azores  
410 and Guinea-Bissau (Ritter, 2011; Robineau and Vely, 1998; Perrin and Van Waerebeek, 2012).  
*Sightings.* None have been confirmed from Mauritanian waters but Camphuysen *et al.* (2015) listed a  
412 possible sighting of two animals off the southern coast on 09-09-2015.

**Blainville's beaked whale, *Mesoplodon densirostris* (de Blainville, 1817)**

414 *Specimens.* The skull of an animal that stranded on a beach of Nouakchott in October 1992 (Robineau and  
Vely, 1998) is still the only case reported for Mauritania, but it was not located in any public Mauritanian  
416 collection. This widely distributed species has been recorded also in Senegal, Canary Islands and Madeira  
(Ritter and Brederlau, 1999; Best, 2007; Perrin and Van Waerebeek, 2012).  
418 *Sightings.* *Mesoplodon densirostris* has not been observed alive in Mauritanian waters, despite that its  
preferred habitat, including continental and island slopes (Best, 2007), have regularly been surveyed.  
420 Blainville's beaked whale is probably the most cosmopolitan of (sub)tropical ziphiids (Carwardine, 2020;  
Perrin and Van Waerebeek, 2012) and Mauritania could be a habitual range state.

422 **Cuvier's beaked whale, *Ziphius cavirostris* G. Cuvier, 1823**

*Specimens.* The stranding of a Cuvier's beaked whale on Grande Plage at 18°50'N, on 07-10-1990 (Robineau  
424 and Vely, 1998) is still the only report of this cosmopolitan ziphiid in Mauritania. Although we could not  
examine the skull (location is unknown), we accept this as a valid record considering the characteristic  
426 morphology and large size (reported CBL= 855 cm) of an adult male *Z. cavirostris* skull renders it  
unmistakable.  
428 *Sightings.* Cuvier's beaked whale has not been observed off Mauritania, but is regularly encountered around  
El Hierro, Canary Islands (Ritter, 2011) where deep water is found close to shore. Morocco, Cape Verde  
430 Islands and Senegal are also confirmed range states (Haase, 1987; Perrin and Van Waerebeek, 2012).

## **BALAENOPTERIDAE (Rorquals)**

### **432 Humpback whale, *Megaptera novaeangliae* (Borowski, 1758)**

*Specimens.* A humpback whale was reported stranded in Baie du Lévrier in February 1954 (Cadenat, 1955) and, although unsubstantiated, the species' morphology is unequivocal. A second case, an 8 m juvenile gillnet entanglement victim stranded probably alive at Mheijrat, some 100 km north of Nouakchott in March 2016 (IMROP, this paper; Fig. 30). Seasonality agrees with the Northeast Atlantic (Cape Verde Islands) population (see Wenzel *et al.*, 2009; Bamy *et al.*, 2010). *Sightings.* Five humpback whale sightings have been documented from Mauritanian waters. One flipper-slapping non-adult individual surfaced <200 m from a fisheries survey ship off southern Mauritania on 23-04-2004 (Tulp and Leopold, 2004). In 2012, four winter sightings were made from R/V *Al Awam* (Camphuysen *et al.*, 2012) identified by diagnostic dorsal fins, bushy blows and long flippers: one on 07-12-2012, and two, apparently feeding and lob-tailing, on 08-12-2012 along the Mauritanian coast. The three December observations are consistent with the known winter occurrence at low latitudes by the Northeast Atlantic population, such as off the Cape Verde Islands (Wenzel *et al.*, 2009). No humpback whales were encountered in coastal waters over 3,995 km of surveys between Conakry – Tangier – Las Palmas in late spring, *i.e.* May-June 2012 (Djiba *et al.*, 2015). Indications are that humpback whales are uncommon in Mauritanian waters at any time, in sharp contrast with their abundance off central Senegal, The Gambia, Guinea-Bissau and Guinea in October-December (Bamy *et al.*, 2010; Van Waerebeek *et al.*, 2013). The latter are thought to constitute a Southern Hemisphere population that visit the NW African continental shelf as north as central Senegal (Dakar), in boreal spring and summer months, several with small calves in what is a proposed nursing area (Bamy *et al.*, 2010; Van Waerebeek *et al.*, 2013; Djiba *et al.*, 2015). Irrespective of stock affinity, the potential exists for the year-round presence of a number of humpback whales both breeding and feeding off NW Africa, thanks to abundant prey availability linked to CCLME coastal upwelling (Papastavrou and Van Waerebeek, 1998).

### **454 Common minke whale, *Balaenoptera acutorostrata* Lacépède, 1804**

*Specimens.* The first Mauritanian record of common minke whale, a 430 cm carcass stranded on la Grande Plage, at 18°58'N, 16°32'W (BLM3-94), was identified from cranial features (CBL= 110cm) and external morphology (Robineau and Vely, 1998; Van Waerebeek *et al.*, 1999). Our BGP surveys registered three new cases: (a) a 417 cm minke whale stranded south of Nouakchott on 23-10-2014 (Fig. 31); (b) a 520 cm specimen bycaught in a gillnet at Mheijrat in March 2018, and (c) a 430 cm specimen found stranded at 19°27'N, 16°47'W in January 2021. Small body lengths are consistent with earlier findings of primarily juveniles and calves of minke whales stranding on the NW African coast, a proposed breeding/calving ground for the Northeast Atlantic population of *B. acutorostrata* (Van Waerebeek *et al.*, 1999).

464 *Sightings*. No *B. acutorostrata* sightings are confirmed in Mauritanian waters, however among the many unidentified balaenopterids reported, particularly in winter 2014 (Maigret, 1981; Camphuysen *et al.*, 2012; Baines and Reichelt, 2014; Djiba *et al.*, 2015), some may have been minke whales.

466 **Blue whale, *Balaenoptera musculus* (Linnaeus, 1758)**

*Specimens*. Till date no blue whale strandings have been documented in Mauritania.

468 *Sightings*. An adult-sized blue whale was positively identified off Mauritania at 19°22.44'N, 17°4.2'W on 04-12-2012 (Fig. 32) and another one was seen just northeast of the Timiris Canyon system over the Arguin mud wedge on 14-09-2015 (Camphuysen *et al.*, 2015). Ten blue whale sightings, identified from small dorsal fin and mottled bluish colouration, were observed during a winter survey (November 2012-January 470 2013) at variable depths (range= 45-1,556 m; X = 722 m) off Banc d'Arguin (Baines and Reichelt, 2014). Generally, blue whales are thought to be present in CCLME waters during the cooler months from 472 November-April (Djiba *et al.*, 2015) and may represent members of the NE Atlantic blue whale stock that feeds off Iceland in summer, May-September (Sears and Perrin, 2009). A group of three blue whales found 474 at the continental break (depth 383 m) off The Gambia on 13-05-2013 is the southernmost documented observation of *B. musculus* in the Northeast Atlantic (Djiba *et al.*, 2015; Plate 5.7.2).

478 **Fin whale, *Balaenoptera physalus* (Linnaeus, 1758)**

*Specimens*. Maigret *et al.* (1976) reported two cases of small-sized fin whales; a 9.5 m female captured in the 480 Baie de l'Archimède on 29.03.1971 and a 10.2 m female stranded at Nouadhibou on 23.03.1975. However, supporting evidence is lacking and, considering small body sizes, some concern exists about potential 482 confusion with Omura's whale, with similar colouration (Jung *et al.*, 2015; see below). No authenticated *B. physalus* specimens exist for the country.

484 *Sightings*. Similar concerns about species identification apply to three sightings reported as fin whales in 1973-1974, lacking descriptions or photos (Maigret *et al.*, 1976; Maigret, 1980), also because frequently 486 occurring sei whales were not reported. Baines and Reichelt (2014) in a winter survey reported two fin whales seen together (depth, 856 m). Tulp and Leopold (2004) noted a single animal in April 2004, while 488 Camphuysen *et al.* (2012) reported four individuals in November and December 2012. Finally the first convincing photographs were presented by Camphuysen *et al.* (2017) who reported 4 sightings (6 490 individuals). No fin whales were sighted in more neritic (and more tropical) CCLME waters, surveyed by R/V *dr. Fridtjof Nansen* (Van Waerebeek *et al.*, 2012; Djiba *et al.*, 2015). Aguilar and García-Vernet (2018) 492 drew the boundary of the primary range of *B. physalus* in the NE Atlantic precisely at Mauritania. Fin whales globally are rare in tropical waters.

494 **Sei whale, *Balaenoptera borealis* Lesson, 1828**

*Specimens*. Maigret (1981) first identified an 11 m long balaenopterid stranded in the western Baie du 496 Lévrier just north of Nouadhibou, on 16.02.1981, as *B. borealis*. However until recently voucher material of

this species was missing (Maigret, 1981; Robineau and Vely 1998). Five black baleen plates with pale, fine  
498 fringe hairs, diagnostic for *B. borealis*, deposited at IMROP were collected by the first author during a  
demersal research trawl haul from the R/V *dr. Fridtjof Nansen* at 17°40.2'N, 16°37.8'W on 01-06-2012.  
500 Since gum tissue was present, these baleen were ripped out through a collision of the trawl gear with a live  
whale or raked up from a submerged carcass (Van Waerebeek et al., 2012; Djiba et al., 2015, see Plate  
502 5.7.2). Remains of another specimen (condition code 4) washed ashore at 18°54'30.2"N, 16°10'56.5"W on  
13.01.2013. Photos (IMROP) clearly expose the downward arched rostrum indicative of *B. borealis*. A third  
504 authenticated specimen is a sei whale of 1400 cm stranded dead at village Ten-alloul (PNBA) and examined  
by ASOB on 24-11-2014. The single rostral ridge, a large falcate dorsal fin, colouration and black baleen  
506 plates with pale fringe hairs confirm identification (Fig. 33 a,b). The most recent case is an individual cast  
ashore at N18°54'30.2", W16°10'56.5" on 03-06-2021 (Fig.33 c).  
508 *Sightings*. In April 2001, at least two sei whales were observed off Mauritania from a tourist expedition  
vessel (Prieto et al., 2012). Baines and Reichelt (2014) reported 7 confirmed sei whale sightings, identified  
510 by their dorsal fin, downward-curved rostra and surface skim-feeding behaviour, which are diagnostic (Best,  
2007; Carwardine, 2020), in mainly deep waters (x=1,233 m) off Banc d'Arguin in a winter survey  
512 (November-January). Group sizes ranged 1-18 animals. Combined the records strongly suggest *B. borealis* to  
be common, and may overwinter off Mauritania, or more likely be present year-round, considering the  
514 baleen case in June.

### **Omura's whale, *Balaenoptera omurai* Wada, Oishi and Yamada, 2003**

516 *Specimens*. A 398 cm calf rorqual washed ashore near Chott Boul, southern Mauritania, was found on 03-11-  
2013 was identified as *B. omurai* by several unusual morphological features and three mt-DNA markers  
518 (Jung et al., 2015; Mullié et al., 2015). It represents the first confirmed Omura's whale in the Atlantic Ocean,  
either a long-distance straggler (presumably alongside a maternal female) from the Indo-Pacific or, far more  
520 likely, a member of an unrecognised Atlantic population (Jung et al., 2015).

*Sightings*. No Omura's whales have yet been recognized alive in Mauritanian or any West African waters.  
522 However many accounts exist of unidentified balaenopterids in late-autumn and winter (Camphuysen et al.,  
2012; Baines and Reichelt, 2014; Djiba et al., 2015) which could include this species. Geographically, the  
524 nearest documented record of *B. omurai* was found off Brazil (Cypriano-Souza et al., 2015). Considering the  
distance of several thousand km from Mauritania, any reproductive connection seems improbable.

526

### **Bryde's whale, *Balaenoptera brydei* Olsen, 1913**

528 *Specimens*. No substantiated specimen records of Bryde's whale exist for Mauritania (Maigret et al., 1976;  
Robineau and Vely, 1998; Van Waerebeek and Jiddou, 2006; this paper). While an incomplete skeleton at  
530 the Nouamghar PNBA station was flagged as a potential specimen (Robineau and Vely, 1998), no  
supporting arguments were mentioned.



532 *Sightings*. Camphuysen *et al.* (2012) reported three balaenopterid sightings in December 2012 as ‘probably’  
Bryde’s whale, and one as Bryde’s for which they noted ‘clear and fairly tall but thin blow, sickle shaped  
534 dorsal, not as tall and ‘nicked’ as in sei whale’. However considerable overlap exists in dorsal fin shape  
between sei, Bryde’s, Omura’s and Eden’s *B. edeni* whales, impeding positive species identification at sea if  
536 it is the only characteristic observed (Carwardine, 2020; Best, 2007). Sei and Bryde’s whales are frequently  
confused as the two species can be frustratingly difficult to tell apart in typical situations (Jefferson *et al.*,  
538 2008). Much of the literature on Bryde’s and sei whales still to this day contains identification errors  
(Jefferson *et al.*, 2008). Hence we consider the above-mentioned sightings ‘possible’ Bryde’s whale records  
540 until authenticated. Baines and Reichelt (2014) reported 238 cetacean sightings off Mauritania, 70% of  
which large whales. However ‘on no occasion was the potentially sympatric Bryde’s whale specifically  
542 identified’, while on 7 occasions sei whales were positively identified thanks to multiple characters observed  
(Baines and Reichelt, 2014).

544

## DISCUSSION

546 The complex oceanography of Mauritanian waters (Valdés and Déniz-González, 2015) permits a mixed  
assemblage of cetacean fauna, with the distribution of cool temperate odontocetes like *P. phocoena* and  
548 (probably) *G. melas* overlapping with that of (sub)tropical species such as *S. teuszii*, *S. clymene* and *S.*  
*frontalis*. The tally of cetacean species richness has steadily increased over the years. Maigret (1976) listed  
550 10 species and Robineau and Vely (1998) reported 21 species for the area. A succinct review by Perrin and  
Van Waerebeek (2012) listed 16 small cetacean species. Russell *et al.* (2018) reported 16 cetacean species  
552 observed during the geophysical survey between September and December 2012.

The present updated checklist includes two new species records that have not previously been reported for  
554 Mauritanian waters: *Kogia sima* and *Lagenodelphis hosei*. *Stenella coeruleoalba* is verifiably documented  
for the first time. Also, a first specimen record of *Stenella longirostris* is presented, as well as second  
556 specimen cases for *Mesoplodon europaeus*, *Steno bredanensis* and *Megaptera novaeangliae*.

The final tally of reported cetacean diversity in Mauritanian waters then amounts to 30 cetacean species,  
558 including 23 odontocetes and 7 mysticetes. Of these, 27 species are verifiably authenticated and thus fully  
confirmed, three (*Globicephala melas*, *Peponocephala electra*, *Balaenoptera brydei*) are ‘species probably  
560 present’, *i.e.* have been reported but are lacking scientifically verifiable voucher material, including lost or  
(equivalent) inaccessible material. However, the list of cetacean species reported in the tropical and  
562 subtropical northeast Atlantic (from Madeira to Senegal) shows 34 species (Robineau and Vely, 1997).

## 564 Odontocetes

At least one delphinid with a pantropical distribution, and two ziphiids, are so far unknown from Mauritania  
566 but documented from other NW African range states including the Canary or Cape Verde Islands (Perrin and  
Van Waerebeek, 2012) and will likely be encountered some day. These include pygmy killer whale *Feresa*

568 *attenuata*, known from a stranding on Boavista Island, Cape Verde Islands (López-Suarez *et al.*, 2012),  
True's beaked whale *Mesoplodon mirus* documented in the Azores and Canary Islands and Sowerby's  
570 beaked whale *M. bidens* in the Canary Islands (Perrin and Van Waerebeek, 2012). For the 21 fully supported  
(of 23 reported) odontocetes, the level of evidence differs among species, some are authenticated by  
572 specimens stranded or captured, others by direct observations at sea.

West Africa constitutes the southern distribution limit of *P. phocoena* (Jefferson *et al.*, 1997), and is the  
574 habitat of the world's most southern population that ranges from Agadir to at least Joal-Fadiouth in Senegal,  
and possibly The Gambia (Van Waerebeek *et al.* 2000; Fontaine *et al.*, 2004). Linked to the CCLME  
576 upwelling, porpoises are increasingly rare south of the Casamance River where the warm Guinea Current  
predominates (Van Waerebeek *et al.*, 2000). Distributional support for discreteness consists of an apparent  
578 distribution gap of some 895 km from Cabo de Espichel (38°25'N, 09°12'W), southern Portugal, over the  
Strait of Gibraltar south to Agadir, central coast of Morocco (Robineau and Vely, 1998; Van Waerebeek *et*  
580 *al.*, 2000). The Mauritanian population is reproductively isolated from the other populations in the northeast  
Atlantic. Porpoises from the upwelling zones off Iberia and Mauritania have recently been identified as  
582 genetically divergent from *P. p. phocoena* and *P. p. relicta* (Black Sea population), based on DNA sequence  
analysis of a quarter of the mitogenome (Fontaine *et al.*, 2007; Fontaine, 2016).

584 During our beach monitoring in 2012-2016, we counted 321 stranded harbour porpoises along the  
Mauritanian coasts, most of them south of Nouakchott. Two mass mortality events were recorded, one in  
586 June 2014 (80 specimens) and another in June 2016 (46 specimens). Several specimens were lacking  
tailstocks or dorsal fins, indicative for bycatch victims (Geraci and Lounsbury, 2005) as carcasses are  
588 deliberately mutilated to facilitate removal from fishing nets. Cases of bycatch have regularly been reported  
in Mauritania and Senegal for decades (Cadenat, 1949; Fraser, 1958; Maigret, 1994a; Van Waerebeek *et al.*,  
590 2000; Mullié *et al.*, 2013).

The Atlantic humpback dolphin is endemic to the tropical and subtropical eastern Atlantic nearshore  
592 waters in West and Central Africa (Van Waerebeek *et al.*, 2004; Weir *et al.*, 2011). A review applying the  
International Union for Conservation of Nature (IUCN) criteria and based on restricted geographic range,  
594 low abundance and apparent decline considered *S. teuszii* 'Critically Endangered' (Collins, 2015). Of the  
eight management stocks defined by Van Waerebeek *et al.* (2004), the population size does not seem to  
596 exceed tens to a few hundred animals each. Known distribution is discontinuous, possibly due to local  
extirpation following decades of bycatch, directed takes and habitat degradation (Ayissi *et al.*, 2014; Van  
598 Waerebeek *et al.*, 2004, 2017; Weir *et al.*, 2011; Collins, 2015). In Mauritania the principal distribution of *S.*  
*teuszii* is centered at the PNBA marine park with relatively few records from surrounding areas, from Baie  
600 du Lévrier and Baie de l'Etoile in the north to Cap Timiris and Nouamghar in the south (Maigret, 1980;  
Robineau and Vely, 1998; Van Waerebeek *et al.*, 2004; Weir *et al.*, 2011). The limited information available  
602 on abundance and small-scale distribution is dated by 2-3 decades (Maigret, 1980; Robineau and Vély,  
1998). A 3-day boat survey covering 226 nm in and around PNBA in November 2006 encountered abundant

604 *T. truncatus* but not a single humpback dolphin (Van Waerebeek and Jiddou, 2006). New boat surveys are  
urgently required to evaluate the status of the Banc d'Arguin stock, as well as the tiny, apparently isolated  
606 Dakhla stock to the north. As elsewhere, bycatch in small-scale coastal fisheries is the primary culprit of  
anthropogenic mortality for humpback dolphins in Mauritania and likely represents the most important threat  
608 to the species throughout its range (Van Waerebeek *et al.*, 2004; 2017; Van Waerebeek and Perrin, 2007;  
Bamy *et al.* 2010; Collins *et al.* 2010; Weir *et al.* 2011; Collins, 2015).

610 All examined pilot whales in the Canaries have been *G. macrorhynchus* based on both close-up  
observations and molecular genetics (Boehlke, 2006; Miralles *et al.*, 2013; KVV, pers. observations), and  
612 we found no firm evidence for *G. melas* in Mauritania (this paper), as was the case in Cape Verde Islands  
(Van Waerebeek *et al.*, 2008). Nonetheless, we deem the occasional presence of *G. melas* off Mauritania  
614 quite likely. Miralles *et al.* (2013) demonstrated that, rarely, hybridization may occur off Northwest Africa,  
but the location of inter-specific breeding events is unknown.

616 During this study we inventorized five species of the genus *Stenella* off Mauritania: *S. frontalis*, *S.*  
*attenuata*, *S. clymene*, *S. longirostris* (first specimens, see above) and *S. coeruleoalba* (first supported  
618 records). Most observations of stenellids were registered during the R/V *Al-Awam* surveys in 2012-2016  
(Camphuysen *et al.*, 2012, 2015, 2017) and a geophysical survey (Russell *et al.*, 2018). *Stenella frontalis*  
620 accounted for the majority of these. Robineau and Vely (1998) cited only two stenellids in Mauritania, *S.*  
*clymene* and *S. coeruleoalba*, based on unverifiable cranial material. The rarity of *Stenella* sp. records are  
622 explained by their thermal preference for warmer offshore waters. Stenellids were generally observed  
beyond the continental slope in areas with water depths greater than 400 m. Russell *et al.* (2018) observed *S.*  
624 *frontalis* at depths greater than 2,000 m during 70% of all encounters and showed a narrower range of water  
depth (1,086 – 2,948 m). Most observations of *S. frontalis* made during BGP surveys (Camphuysen *et al.*,  
626 2012, 2015, 2017) also occurred in deep waters (277-1,376m) with a high sea surface temperature (27.5-  
29.7 °C). Although not mentioned, we assume that most of these were the mostly unspotted offshore form  
628 (see Fig. 11). *Stenella clymene* groups of 560 individuals were observed in water depth of 1,012 m  
(Camphuysen *et al.*, 2015) and 673-3,169 m (Russell *et al.*, 2018). Van Waerebeek and Perrin (2007)  
630 recommended that the West African population of Clymene dolphins be added to Appendix II of the  
Convention on the Conservation of Migratory Species of Wild Animals (CMS), considering relative scarcity  
632 of the species in western African waters and the high bycatch rates in Ghana (Van Waerebeek *et al.*, 2009).

The short-beaked common dolphin ranks among the most frequently encountered cetaceans on the  
634 Mauritanian coast. Robineau and Vely (1998) indicated that *D. delphis* represented 21% of cetacean  
strandings (individuals), ranking second only to *T. truncatus*. However, at sea, common dolphins were by far  
636 the dominant marine mammal sighted, accounting for (a minimum) 28.7% of cetacean sightings in coastal  
waters of northwest Africa (Djiba *et al.*, 2015) and represented three quarters (71.3% - 76.5%) of the total  
638 number of individual cetaceans observed. It was both the most numerous and most frequently encountered  
oceanic dolphin species observed in 2012 (910), 2015 (3170 individuals) and 2016 that occurred in 366-

640 1,239 m depth water and with sea surface temperatures (SST) averaging  $23.9 \pm 2.3^{\circ}\text{C}$  (Camphuysen *et al.*,  
2012, 2015). However, Maigret (1980) reportedly observed four groups from Nouakchott beach, *i.e.* in  
642 shallow water, in June, July, August and September.

There is little information on the occurrence of a long-beaked form of common dolphin in Mauritania  
644 coast, bar a unique citation by Russell *et al.* (2018). Van Waerebeek (1997) reported 12 skulls of a long-  
beaked form from Senegal deposited at the Zoological Museum of the University of Amsterdam (now at  
646 Leiden Natural History Museum), which may be explainable by the wide phenotypic variation in *D. delphis*.

Apart from the Fraser's dolphin skull reported here, in continental NW Africa only one other, both  
648 cranially and physically mature specimen, is known, from Senegal's Sangomar Island (Van Waerebeek *et al.*, 2000). Unfortunately it was destroyed in a fire, but photos remain in CEPEC archives. The scarceness of  
650 Fraser's dolphin in the CCLME is unsurprising considering it is a strictly tropical, oceanic species, e.g. it is  
common in the Gulf of Guinea (de Boer *et al.*, 2016; Debrah *et al.*, 2010; Van Waerebeek *et al.*, 2009).

652

### ***Mysticetes***

654 Although fin whales occur in all oceans, the species is scarce in equatorial regions and generally the tropics  
(Best, 2007). The population occupying the western basin of the Mediterranean Sea is largely resident  
656 (Aguilar and García-Vernet, 2018). Bayed and Beaubrun (1987) state that since 1960 no fin whale records  
exist for Morocco, but reminded that dozens of fin whales were taken from the Benzou land station in 1949-  
658 1954 (Aloncle, 1964). Mauritania may form the southernmost range boundary in the NE Atlantic and fin  
whales probably belong to the Spain-Portugal-British Isles subpopulation (Jefferson *et al.*, 2015; Aguilar and  
660 García-Vernet, 2018). No confirmed fin whale strandings are known for Mauritania. Two reports of  
strandings in Senegal (Dupuy and Maigret, 1980, 1982) cannot be confirmed.

662 In conclusion, at least six (humpback, blue, fin, sei, common minke, Omura's whale), and probably  
seven (including Bryde's) mysticete species are distributed in Mauritanian waters. We counted 40 stranded  
664 whales between 2013 and 2021, among them three juveniles (2 minke, 1 humpback whales). The cause of  
death for most whales could not be determined, as most were in an advanced state of decomposition, and  
666 logistics for necropsy were unavailable. Robineau and Vely (1998) reported four species (*B. physalus*, *B.*  
*borealis*, *B. acutorostrata* and *M. novaeangliae*) with a single observation for each one of them. Russell *et al.* (2018) reported 72 whales divided over four species and unidentified whales. During the seabird and  
668 marine mammal surveys off Mauritania, 51 whales were observed (Camphuysen *et al.* 2012, 2015, 2017).  
670 Finally, collectors are urged to deposit valuable specimens in Mauritanian collections, as to enhance the  
national natural patrimony and contribute to marine mammal science and conservation within the country.

672

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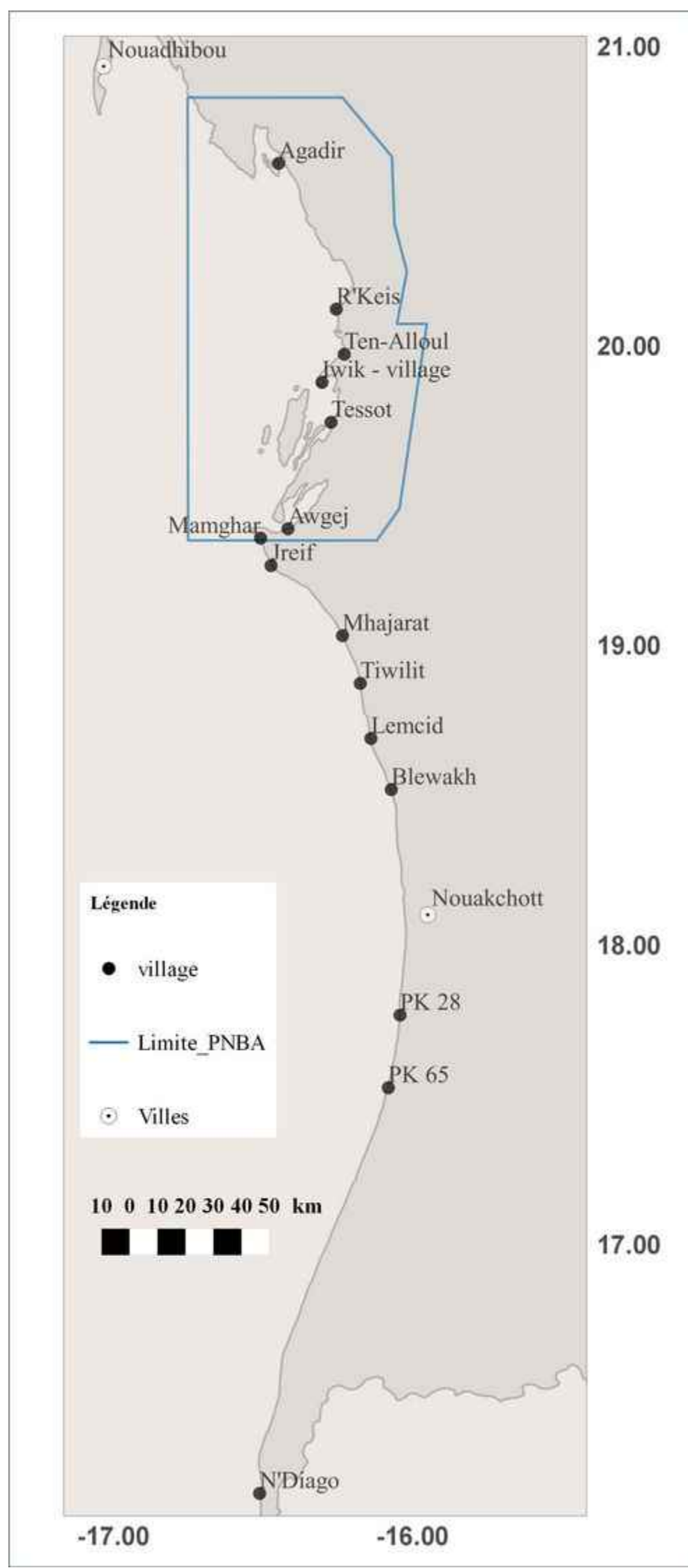
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956 **Figure 1.**  
957 Map of the study  
958 area: coast of  
959 Mauritania. PNBA  
960 limits in blue.





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964 **Figure 2.** Ventral and dorsal views of cranially adult calvaria of common bottlenose dolphin *Tursiops truncatus*, Jreiv, 12-02-1994. Curated at IMROP as MR0020 (Photo ©KVV).



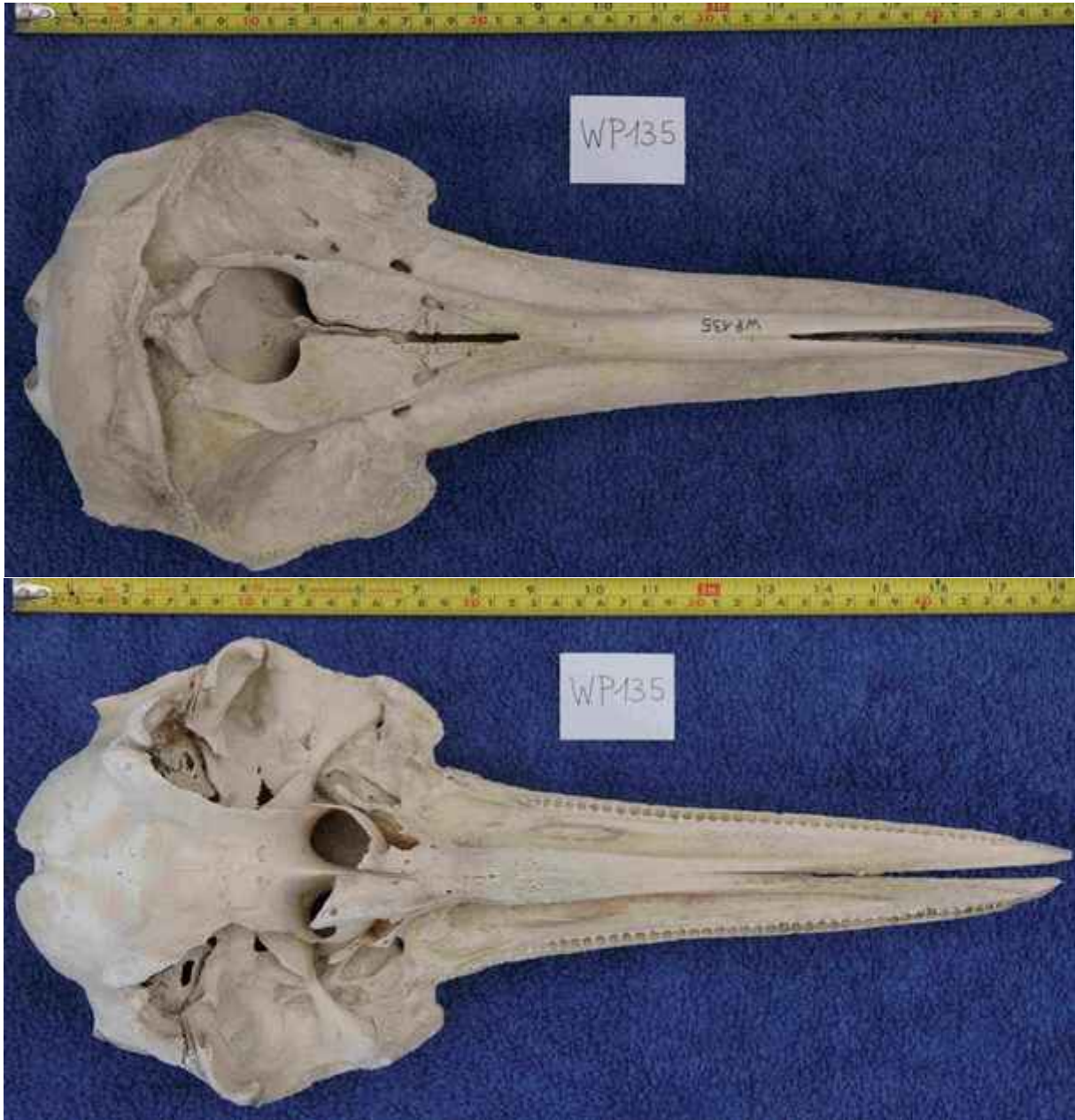


966 **Figure 3.** Adult common bottlenose dolphin *Tursiops truncatus* found stranded on 10-08-2017. BGP Project (Photo ©ASOB).



968 **Figure 4.** A subgroup of common bottlenose dolphins *Tursiops truncatus*, including two calves, porpoising near the vessel, in shallow waters of the PNBA National Park on 10-11-2006 (Photo ©KVW).

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974 **Figure 5.** Dorsal [Above] and ventral views [Below] of cranially adult calvaria (WP135; IMROP) of common  
976 dolphin *Delphinus delphis* from Mauritanian coast. Note the pseudo-lanceolate shape of the proximal palatinal  
ridge, typical in common dolphins of NW Africa (Photos ©KVV).

978





980 **Figure 6.** Common dolphin *Delphinus delphis* observed on 08-08-2012 (Photo © Hans Verdaat).



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984 **Figure 7.** A juvenile short-beaked common dolphin *Delphinus delphis* found stranded on 07-02-2018  
986 during BPG project. Note multiple lesions on right flank, pathognomonic for tattoo skin disease (TSD), a  
first case in Mauritanian cetaceans and on the NW African continent (Photo ©ASOB).



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**Figure 8.** Fresh carcasses of striped dolphins *Stenella coeruleoalba*, [Above] stranded on a Nouakchott beach, January 1997 (Photo IMROP Archives); [Below] A male found at PK 28 beach south of Nouakchott on 17-11-2015 (Photos © ASOB, IMROP). Main and accessory lateral stripes are clearly present in both specimens.

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**Figure 9.** Atlantic spotted dolphin *Stenella frontalis* found stranded at 17°05'40.1"N, 016°14'40.3"W, on 16-11-2012. (Photo © ASOB, IMROP).

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1000 **Figure 10.** Atlantic spotted dolphins *Stenella frontalis* observed from R/V *Al Awam* on 08-09-2015 (Photo ©  
1002 Hans Verdaat). Note individuals are largely unspotted, typical for the offshore form.

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**Figure 11.** Clymene dolphins *Stenella clymene* observed in Mauritanian waters  
1022 from the R/V *Al Awam*, on 08-09-2015 (Photos © Hans Verdaat).

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1024 **Figure 12.** Dorsal [Above] and ventral view [Below] of the calvaria W420 of a cranially adult spinner dolphin  
1026 *Stenella longirostris*, examined at GIZ-Nouakchott collection on 25-04-2015 (Photo © KVV). Craniometrics  
available. Note the long rostrum, small alveoli (>50 each half upper jaw) and wide proximal palatinal ridge.

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1036 **Figure 13.** Dorsal [Above] and ventral views [Below] of calvaria of Fraser's dolphin, *Lagenodelphis hosei*,  
1038 found at N16°37'24.2", W16°26'19.5" on 15-02-2014. (Photo ©ASOB, IMROP). Distal splitting of the left and  
1040 right (pre)maxillaries due to desiccation (sun erosion) makes rostrum appear somewhat less tapered than in fresh  
1042 skull. Estimated upper tooth counts: 37-38 per half jaw. The left premaxillary indicates the rostrum length.



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1046 **Figure 14.** Dorsal and ventral views of calvaria (MR0061; IMROP) of rough-toothed dolphin *Steno bredanensis*.  
1048 Cranially immature (CBL=535 mm). Collected in southern Mauritania, February 2014. (Photos © KVV).

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**Figure 15.** Fresh carcass of a rough-toothed dolphin *Steno bredanensis* stranded near  
Nouadhibou on 02-05-2021. (Photo © AOSB). Note that the tall dorsal fin is covered by sand.



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**Figure 16.** [Above] Dorsal and ventral views of skull (MR-0050) of Atlantic humpback dolphin *Sousa teuszii* collected from PNBA in August 2008 and curated at IMROP (Photo © KVV). [Below] A male humpback dolphin washed ashore at 19°17' 36"N,16°28'53.4"W on 10-05-2013 (Photo © AOSB), the most recent documented *S. teuszii* specimen record for Mauritania.

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1084 **Figure 17.** A freshly dead Risso's dolphin *Grampus griseus* found stranded on a Nouakchott beach at 18°15'53.36"N, 16°14.825'W, on 17-08-2021 (Photo © ASOB).

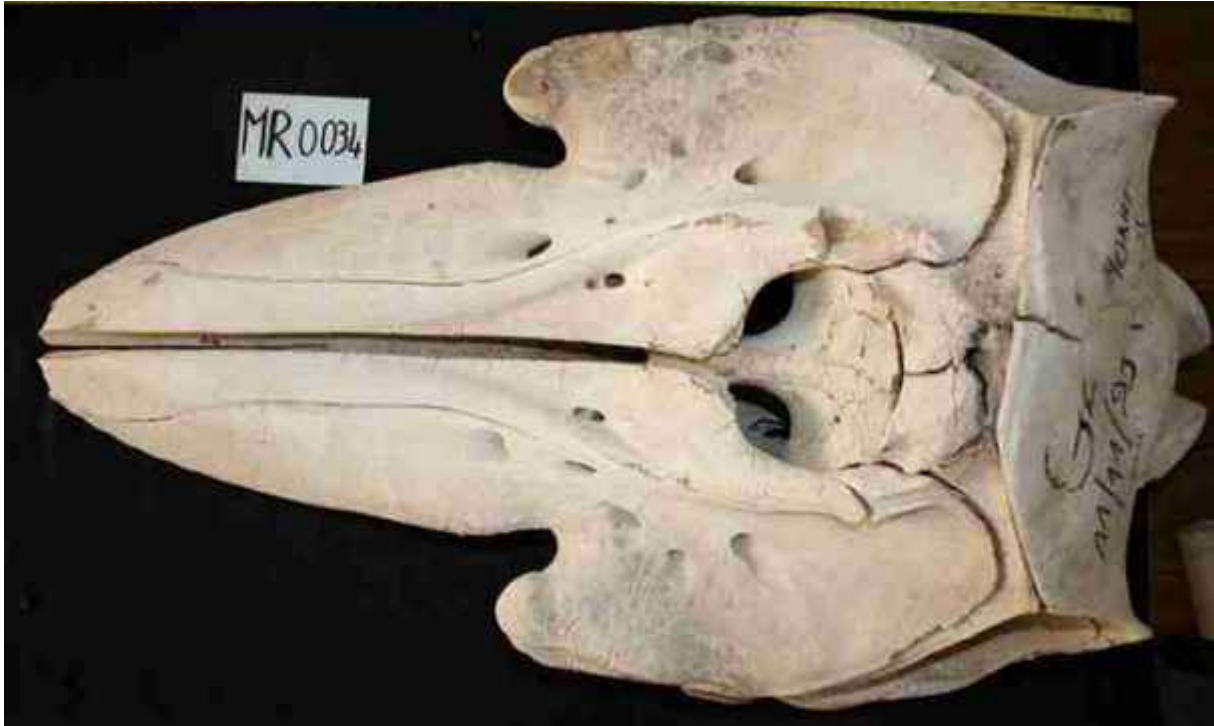


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1088 **Figure 18.** Male killer whale *Orcinus orca* encountered at Baie de Cansado, Nouadhibou, on 10-10-2010 (Photo © Saiko Omar Kidé, IMROP). Cause of death is unknown.

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**Figure 19.** Dorsal view of adult skull of killer whale *Orcinus orca* collected at Mejratt, on 11-11-1993. Curated at IMROP as specimen MR0034. (Photo © KVV).

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**Figure 20.** Dorsal view of adult calvaria of short-finned pilot whale *Globicephala macrorhynchus* curated at IMROP as MR0033 (Photo ©KVV). Anteriorly the premaxillaries completely cover the maxillaries, a main distinguishing feature compared to *G. melas* in which the maxillaries remain visible.



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**Figure 21.** Decomposed carcass of a short-finned pilot whale *Globicephala macrorhynchus* stranded at 18°24' 2.75"N, 16°3' 2.19"W. Registered on 08-04-2015 (Photo © AOSB).

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**Figure 22.** Short-finned pilot whales *Globicephala macrorhynchus*. (a) individual observed on 06-09-2012 (Photo ©Hans Verdaat); (b) A group observed on 09-11-2021; note the small calf (Photo © AOSB).

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**Figure 23.** False killer whales *Pseudorca crassidens* observed on 12-09-2012 (Photo ©Hans Verdaat). Dorsal fin more pointed than usual.

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1116 **Figure 24.** Harbour porpoise *Phocoena phocoena* incidentally net-entangled and probably discarded by artisanal  
1118 fishers (Photo © ASOB).

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1136 **Figure 25.** Skeleton of a sun-weathered adult sperm whale deposited outside the PNBA office  
1138 at Iwick, photographed in December 2000 (Photo © KVV). Details of stranding unknown.

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1140 **Figure 26.** Head and blowhole of sperm whale *Physeter macrocephalus* observed on 14-09-2015 (Photo ©Hans  
1142 Verdaat).



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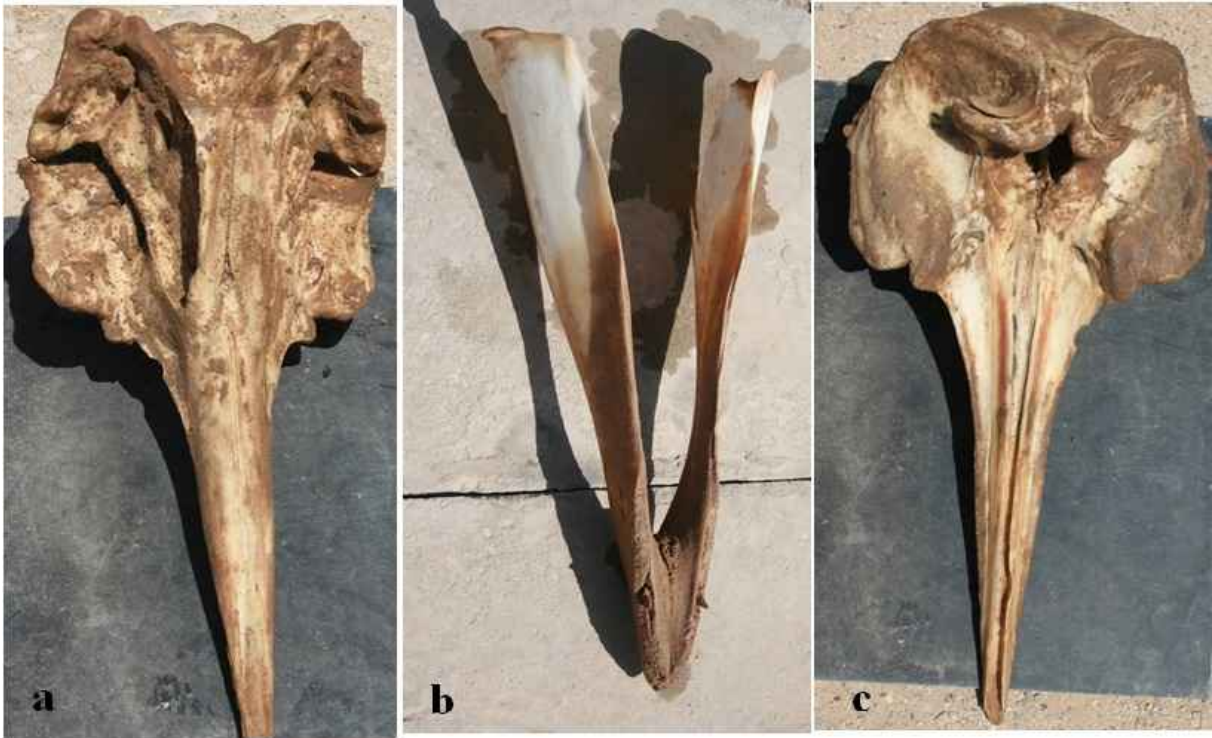
**Figure 27.** Ventral [Left] and dorsal views [Right] of a cranially adult calvaria of dwarf sperm whale *Kogia sima* collected at N17°34'49.1124", W16°45.9916", southern Mauritania, 26-08-2014. First species record for Mauritania. Complete skull is curated at IMROP. (Photos ©ASOB, IMROP).



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**Figure 28.** (a) Decomposed carcass of pygmy sperm whale *Kogia breviceps* found on 15-11-2013; and (b) skull of same animal recovered two months later, now curated at IMROP (Photos ©ASOB, IMROP).



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1160 **Figure 29.** Adult Gervais' beaked whale *Mesoplodon europaeus* skull collected at N17°05'10.83",  
1162 W16°14'52.61" in southern Mauritania on 24-12-2021. (a) Ventral view; (b) Mandibles with characteristic  
1164 subapically placed teeth; (c) Dorsal view. Represents second record of *M. europaeus* for Mauritania. Skull  
1166 curated at IMROP. (Photos ©ASOB, IMROP).  
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1172 **Figure 30.** A juvenile humpback whale *Megaptera novaeangliae* of 800 cm body length, stranded alive (but  
 1174 died) at Mhaijrat on 01-03-2016. Superficial incisive lacerations, consistent with fishing gear damage, were  
 1176 present on dorsum and on the trunk laterally. Small, bleeding injuries on the dorsal fin. (Photo © ASOB).



1178 **Figure 31.** North Atlantic common minke whales *Balaenoptera acutorostrata* : (a) Decomposed specimen found  
 1180 at N17°55' 7.28", W16°01' 58.84" on 23-06-2014. Note short, triangular upper rostrum; (b) Specimen net-  
 1182 entangled and stranded at Mhaijrat on 13-03- 2019. White flipper patch stands out (Photo © ASOB); (c) Carcass  
 1184 stranded at N19°16'42.31", W16°28' 42.71" on 30-01-2021. Short, sharply triangular rostrum, pale baleen and  
 diagnostic pale flipper patch is still visible. (Photo © ASOB, IMROP).

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**Figure 32.** Blue whale *Balaenoptera musculus*, sighted from R/V *El-Awam* in Mauritanian waters at N19°22.44', W17°4.2' on 04-12-2012. Note bluish mottled skin and non-falcate, small dorsal fin set  $\frac{3}{4}$  of way along the dorsum.(Photo ©Hans Verdaat).

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**Figure 33.** Sei whales *Balaenoptera borealis* stranded freshly dead in Mauritania: (a,b) Dorsal and ventral view, at PNBA National Park, 24-11-2014; (c) Ventral view, individual cast ashore at N18°54'30.2", W16°10'56.5" on 03-06-2021. (Photos © ASOB, IMROP). Note single rostral ridge, mixed pale and dark colouration ventrally.