Cetacean strandings along the German North Sea coastline 1604–2017

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Abstract

The occurrence of 19 cetacean species along the German North Sea coastline as well as the lower reaches of the major rivers discharging into the German Bight is reviewed for the period 1604–2017 based on records of dead animals, either stranded dead or put to death. The harbour porpoise (Phocoena phocoena) is considered the most abundant and only native species in German coastal and riverine waters. Based on written sources its presence can be traced back to at least 1651, although with statistical data only available from 1990. Finds of further 18 species have been documented: white-beaked dolphin (Lagenorhynchus albirostris), bottlenose dolphin (Tursiops truncatus), Atlantic white-sided dolphin (Lagenorhynchus acutus), common dolphin (Delphinus delphis), striped dolphin (Stenella coeruleoalba), Risso’s dolphin (Grampus griseus), long-finned pilot whale ( Globicephala melas), killer whale (Orca orca), beluga whale (Delphinapterus leucas), narwhal (Monodon monoceros), Sowerby’s beaked whale (Mesoplodon bidens), northern bottlenose whale (Hyperoodon ampullatus), sperm whale (Physeter macrocephalus), minke whale (Balaenoptera acutorostrata), sei whale (Balaenoptera borealis), fin whale (Balaenoptera physalus), blue whale (Balaenoptera musculus) and humpback whale (Megaptera novaeangliae). This review corrects several false species assignments earlier introduced in literature based on incorrect scientific or ambiguous German vernacular names and recovers lost records of beluga whale, northern bottlenose whale, sperm whale and fin whale.

Introduction

Modern scientific interest in cetacean diversity emerged in the mid-1700s all over Europe based on the examination and collection of specimens originating from animals found dead or killed on the beach or near shore – nowadays collectively known as ‘stranding records’. Although being a heterogeneous dataset, they none the less constitute the only long-time series available for comparative studies into species diversity and changes therein (Lambert et al., 2011).

For the entire North Sea coastline, cetacean stranding records date back to the 13th century, but systemically they have only been compiled and published for about a century with regular British stranding reports commencing in 1913 (Harmer, 1927). The first comprehensive Dutch compilation appeared in 1931 (van Deinse, 1931) with regular reports published since then. From the Danish coastline older records date back to 1575 and new records up till 2017 were compiled by Kinze and co-authors (Kinze, 1995; Kinze et al., 1998, 2010, 2018).

While British, Dutch and Danish strandings are reported on a regular basis, similar overviews covering the entire German North Sea coastline so far have been unavailable, despite earlier attempts to launch a systematic reporting scheme for cetacean strandings (Mohr, 1937; Kock, 1976). It was only in the mid 1980s that cetacean species found along the German North Sea coast became the subject of scientific investigations, with a stranding network being established only by 1990 after the first seal die-off (Benke et al., 1998; Siebert et al., 2006). However, Schultz (1970), in his review of North and Baltic Sea cetacean occurrences had already included some German North Sea records covering the period to 1969, mainly from the northern coasts, i.e. the German federal state of Schleswig Holstein (SH), Goethe (1983), Meyer (1994) and Steede (1994) reviewed finds from the coast of the federal state of Niedersachsen (NI) until 1992 while Borkenhagen (2011) added and corrected records for the SH coast to 2010.

The harbour porpoise (Phocoena phocoena) is the most common cetacean species in the North Sea (Hammond et al., 2002) and comprehensive studies during recent decades have re-established its status as an abundant native species in the German Bight (Siebert et al., 2006) and the lower reaches of all major German rivers (Wenger & Koschinski, 2012).

Kinze et al. (1997) summarized records from the entire German North Sea coastline of white-beaked (Lagenorhynchus albirostris) and Atlantic white-sided dolphins (Lagenorhynchus acutus) for the years 1983–1992, while Ijsseldijk et al. (2018a) included the most recent records of the white-beaked dolphin along the German North Sea coasts in
their study. The 2016 sperm whale mass strandings all over the North Sea prompted a detailed investigation (Unger et al., 2016; Ijsseldijk et al., 2018).

Here we provide the first full review of all cetacean species records from the German North Sea coast and lower reaches of the larger rivers based on archival data, earlier publications, newspaper records and hitherto unpublished data. Due to the large number of stranding records for the harbour porpoise, below we only summarize available data while for all other less frequently occurring cetaceans we provide full details.

Finally, we offer a zoogeographic interpretation of these local cetacean occurrences.

Materials and methods

The data sets used for the present analysis comprise cetacean stranding records, here defined as any whale corpse encountered at a certain locality along a stretch of coast or riverbank at a given date within the German North Sea coastline. Although circumstances may vary, these records are considered to provide the most reliable faunistic signal over time. Cetacean corpses discovered in advanced and final stages of decomposition and finds of skeletal remains were excluded from the analysis in order not to weaken the signal due to possible drift-ins from other waters hereby causing temporal imprecisions.

Records were compiled from archive sources, published information (newspaper reports and popular and scientific reviews and papers) and databases held at the Institute for Terrestrial and Aquatic Wildlife Research, the Lower Saxony State Office for Consumer Protection and Food Safety, the Seal Nursery and National Park Center Norddeich, the Wadden Sea National Park Authority of Lower Saxony, natural history museum collections in Oldenburg, Wilhelmshaven, Bremerhaven, Hamburg, Kiel, Frankfurt, Stuttgart and Berlin and critically reviewed and assigned to a cetacean species using standard determination procedures. False species identifications and double counts were corrected.

Subdivision of the coastal and riverine areas

Geographically, the German North Sea coastline is of considerable length (1155 km Table 1) as it includes both the shores of the mainland and that of several chains of islands. A major part of the Wadden Sea is found in German coastal areas and ecologically they are governed by its tidal regime. Further, the German coastal waters are influenced by the combined freshwater discharge of four larger rivers into the German Bight: the Ems, the Weser, the Elbe and the Eider, second only to the Rhine estuary output which also affects the adjacent German North Sea coastline (Radach, 1992). As such, the German Bight forms a biologically relevant sub-entity of the larger North Sea.

Administratively, the major portions of the coastline of the German North Sea belong to the federal states of Niedersachsen (NI) and Schleswig-Holstein (SH), respectively, while two tiny portions are part of the federal states of Hamburg (HH) and Bremen (HB), respectively. The River Elbe for about 110 km forms the border between SH and NI and also includes the major part of the HH coastline (Figure 1). Here we subdivide the German North Sea coastlines into a south-western component (Ems estuary to the mouth of Elbe; SW (NI) or SW (HH) for the island of Neuwerk), a north-eastern component (mouth of Elbe to Danish border; NE (SH)), and four riverine components (lower courses of the rivers Ems, Weser, Elbe and Eider; R Ems, R Weser, R Elbe and R Eider, respectively).

Validation of species assignments and deletion of double counts

Since the onset of zoological nomenclature with the 10th edition of Linnaeus Systema Naturae in 1758 the number of cetacean

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### Table 1. Non-phocoenid cetacean record for the German North Sea coastal area in total and subdivided into four 50 years periods and finds older than 1818

| Species                  | 1968–1977 | 1978–1967 | 1868–1917 | 1818–1867 | <1818 | Total |
|-------------------------|-----------|-----------|-----------|-----------|-------|-------|
| White-beaked dolphin    | 60        | 4         | 0         | 0         | 0     | 64    |
| Bottlenose dolphin      | 7         | 10        | 8         | 5         | 0     | 30    |
| White-sided dolphin     | 7         | 0         | 0         | 0         | 0     | 7     |
| Common dolphin          | 11        | 1         | 0         | 0         | 0     | 12    |
| Striped dolphin         | 1         | 0         | 0         | 0         | 0     | 1     |
| Risso’s dolphin         | 0         | 0         | 2         | 0         | 0     | 2     |
| Long-finned pilot whale | 7         | 1         | 0         | 0         | 0     | 8     |
| Killer whale            | 2         | 5         | 0         | 2         | 0     | 9     |
| Beluga whale            | 1         | 0         | 1         | 0         | 0     | 2     |
| Narwhal                 | 0         | 0         | 0         | 0         | 0     | 2     |
| Sowerby’s beaked whale  | 3         | 1         | 0         | 0         | 0     | 4     |
| Northern bottlenose whale | 2       | 1         | 2         | 0         | 2     | 7     |
| Sperm whale             | 16        | 0         | 0         | 0         | 8     | 24    |
| Minke whale             | 12        | 1         | 0         | 2         | 1     | 16    |
| Sei whale               | 1         | 1         | 0         | 0         | 0     | 2     |
| Fin whale               | 7         | 5         | 7         | 4         | 0     | 23    |
| Blue whale              | 0         | 0         | 1         | 0         | 0     | 1     |
| Humpback whale          | 2         | 0         | 0         | 1         | 0     | 3     |
| Total                   | 139       | 30        | 21        | 14        | 13    | 217   |
species has increased from originally eight to about 40 extant North Atlantic cetacean species (Jefferson et al., 2015). While the identification of a species relies on specific diagnostic features either depicted on an illustration or description in words, the scientific name of the species may have changed over time. Therefore, sometimes incorrect species assignments survived till the present day although the record originally was based on correct contemporaneous literature available. For our taxonomic review we follow Jefferson et al. (2015) and our validation is based on collection specimens, depictions and descriptions from literature including newspaper records.

In northern European waters traditionally two small cetacean species have been recognized: a smaller (i.e. the harbour porpoise *Phocoena phocoena*) and a larger ‘porpoise’ species (i.e. an ‘umbrella species’ containing present-day bottlenose dolphin *Tursiops truncatus* and other similar sized delphinids). This conception can be traced back in time to at least the early 18th century. Both species were referred to as ‘ Tümmler’ in the German language and without further specification the two species probably from time to time were confused with one another. Until 1975, the harbour porpoise and the bottlenose dolphin indeed were the most common species along the Dutch coast (Kompanje, 2001).

Also, bottlenose and white-beaked dolphins have been confused with one another as already pointed out by van Bree (1970). Among the rorqual species as well several misidentifications have been revealed with minke whales being reported twice – erroneously as blue whale calves and correctly as minke whale adults from the same locality and almost the same date (Goethe, 1983).

The drift of cetacean carcasses is influenced by the dynamics of the hydrographic regime of the North Sea, and along the German North Sea coast in particular the shifting tides of the Wadden Sea. Therefore, as a source of error the same individual when not collected may have been reported several times from different localities and over time in different stages of decomposition.

**Results**

Including the harbour porpoise, 19 cetacean species have been recorded along the German North Sea coastline, the lower reaches and tributaries of the Ems, Weser, Elbe and Eider rivers.

In total, 239 individuals of non-phocoenid cetaceans (i.e. species other than the harbour porpoise) comprising 18 species were compiled and validated. The earliest record documented concerns a multiple sperm whale stranding on the island of Pellworm (SH) in 1604. Rare occurrences comprise the narwhal (1669 and 1736 only), Risso’s dolphin (twice in 1873 only), and the blue whale (1881 only). Records for the latest 50 years (1968–2017) hence comprise 16 species only. More than half of these records (N = 122) originate from the period 1990–2017 comprising 13 species in addition to the harbour porpoise for which during the same period the number amounted to 3734 (see below) (Table 1).

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

The harbour porpoise throughout time has been recognized as the only native species in the German Bight.

For the NE (SH) coast Mohr (1962) reported on the species providing qualitative data whilst Goethe (1983) and Meyer (1994) compiled similar records for the period 1840–1989 for the NI (SW) coastline.

The species, now supported by quantitative data, is regarded as an indigenous inhabitant of the entire North Sea. Quantitatively, this status within the German part of the North Sea only became well-established by the late 1980s when annual stranding numbers became available in conjunction with the set-up of dedicated stranding networks in the various federal states.

The total number of stranding records for the years 1990–2017 was 3764. While the numbers for SW (NI) exhibit an increase over time, indicative of a shift in distribution to the south, the NE (SH) figures fluctuate. Figure 2 provides an overview of the annual number of harbour porpoise strandings for NI and SH, respectively, for the period 1990–2017.

The harbour porpoise used to be seasonally abundant in the lower reaches of all major rivers discharging into the German Bight, but due to increased pollution occurrences probably ceased totally in the mid-1990s.

For German rivers historical records are known from the River Elbe at least since 30 December 1651 (newspaper report in *Extra Ordinari Mittwochs Postzeitungen CCCCIV*, 8 January 1652) and the River Weser as early as 2 April 1670 (Poppe, 1882).
Subsequent occurrences also include the River Rhine (1885, city of Emmerich (le Roi & von Schenvenenburg, 1909), River Ems (de Fries & Focken, 1881), and the River Eider (August 1863, city of Tönning; newspaper report Vestlesvigk Tidende, 10 August 1863).

A recolonization of the Elbe and the Weser rivers by the species has occurred, most likely caused by the significant habitat improvements of recent decades (Wenger & Koschinski, 2012), while re-entrances to the lower River Eider may have been hampered though not entirely blocked by the construction of the Eider Barrage in 1973.

**White-beaked dolphin (Lagenorhynchus albirostris Gray 1846)**

The white-beaked dolphin is the second most frequent cetacean species encountered along the German North Sea coastline with altogether 64 strandings since 1920 (Appendix 1). While peaking in the 1990s, fewer strandings have been recorded during the last two decades (Figure 3).

Occurrences prior to 1980 only account for six records exhibiting several decadal gaps and therefore may be under-represented due to confusion with the bottlenose dolphin. There are specimens of *Lagenorhynchus albirostris* most likely originating from the German North Sea coastline in the collections of several European museums (e.g. the Vienna Natural History Museum) purchased as *Tursiops truncatus* and therefore may have been blurred due to the confusion with both the white-beaked dolphin (van Bree, 1970) and the harbour porpoise (Wiepken & Greve, 1876).

The bottlenose dolphin possesses the highest riverine affinity second only to the harbour porpoise and has been documented for all major German riverine systems.

**River Eider:** In early March 1843, a school of 10–12 dolphins was sighted at Friedrichstadt at the confluence of the River Treene and the River Eider (NE (SH)). The estimated lengths (8–10 Danish feet; 2.5–3.1 m), the general behaviour and the school size fit both the white-beaked and the bottlenose dolphin, while the riverine and in-land locality only makes the latter species plausible (Danish newspaper Berlingske Tiden, 14 March 1843).

**River Elbe:** During the 19th century the species was documented for the year 1852 near Winsen (NI) (Poppe, 1882), 1860 near Glückstadt (SH) (Mohr, 1935), 1867 from an unspecified Lower Elbe locality (based on a specimen in the Copenhagen Zoological Museum), between 1875 and 1876 near Wittenberge (federal state of Brandenburg) (Erhardt, 1937), in May 1879 at the confluence of the River Stör with the Elbe (SH) (Häpke, 1880; concerning a female and her newborn calf) and in 1924 from almost the same locality yet another animal (Wegener, 1924).

**River Weser:** In December 1836, an individual was caught at Drielake, Oldenburg (NI) (Wiepken & Greve, 1876, 1897) while a ‘large dolphin’ was reported by Häpke from the town of Celle (NI) in the River Aller tributary to the Weser. Poppe (1882) reported on an animal taken in 1852 in the Hunte, a tributary of the Weser.

Coastal records include a stranding near Wilhelmshaven (NI (SW)) in 1872 (Möbius, 1888). Schultz (1970) listed two records of the common dolphin (Island of Amrum without year specified) and the common dolphin (without details). Since for both these species quotations no diagnostic details were provided, it cannot be ruled out that they may have been finds of white-beaked dolphins instead. *Tursiops truncatus.*

**Bottlenose dolphin (Tursiops truncatus (Montagu, 1821))**

Altogether there are 31 records of *T. truncatus* documented between 1836 and 1998 (Figure 4). Until the 1920s, river occurrences predominated while the most recent occurrences solely have originated from the south-western component of the German North Sea coast (SW (NI)).

The occurrence of the bottlenose dolphin, as pointed out above, may have been blurred due to the confusion with both the white-beaked dolphin (van Bree, 1970) and the harbour porpoise (Wiepken & Greve, 1876).

**River Rhine:** The first definite German North Sea record of this species is from Büsum (NE (SH)) and in the year 1921 but was, however, not recognized as such until 1970 when van Bree (1970) corrected Mohr’s (1935) original species assignment ‘*Tursiops truncatus*’ i.e. bottlenose dolphin. For the NE segment, Dahl (1894, 1906) listed both the common dolphin (Island of Amrum without year specified) and the bottlenose dolphin (without details). Since for both these species quotations no diagnostic details were provided, it cannot be ruled out that they may have been finds of white-beaked dolphins instead. *Tursiops truncatus* in sensu Mohr (1935) hence is to be regarded synonymous with the white-beaked dolphin. Therefore, doubt must be cast on several other records of *Tursiops truncatus.*

Pohle (1941) considered *Tursiops truncatus* (i.e in sensu Mohr = *Lagenorhynchus albirostris*) as ‘the other native species’ in German North Sea waters (see Appendix 1).

![Fig. 2. Number of harbour porpoise strandings 1990–2017. NI (SW) = federal state of Niedersachsen (south-western component), SH (NE) = federal state of Schleswig-Holstein (north-eastern component).](https://doi.org/10.1017/S0025315421000503)
of *Tursiops* from the NE (SH) Wadden Sea area (erroneously with reference to Mohr (1935) but apparently based on photographic evidence in the Hamburg Mohr archive). Both records are from September 1935 and the Islands of Hooge (SH) and Nordstrand (SH), respectively. Mohr (1961) under ‘false cover’ provided evidence on yet another specimen stranded on the island of Trischen (SH) without specified date.

Kompanje (2001) gave a comprehensive summary of Dutch strandings and found a marked decline in occurrence. By about 1975, the species here was reduced to the status of straggler. To the north, along the adjacent Danish coastline there has been an absence of the species since 1968 (Kinze, 1995). Our findings agree well with the general riverine and southern warmer-water distribution known for the species and possibly the bottlenose dolphins formerly occurring along the German North Sea coast thence formed part of the Dutch Zuiderzee population (Kompanje, 2001).

Atlantic white-sided dolphin (*Lagenorhynchus acutus* (Gray, 1828))

The Atlantic white-sided dolphin was recorded seven times from the German North Sea, the first time in 1968, a single find from the island of Schillig, SW (NI) (Goethe, 1983), while of the remaining six records five originate from the south-western (NI) coastline (all but one from the month of April) and a single...
from the north-eastern (SH) coastline from the month of September (Figure 5).

Common dolphin (Delphinus delphis Linnaeus, 1758)

The application of the name ‘Delphinus delphis’ also in the German literature has been a matter of great confusion. A species under this heading was ubiquitously listed for German waters, but with no specific records ever provided. Without certainty, whether the present-day species was meant, these records must remain dubious. Dahl (1894, 1906) reported ‘Delphinus delphis’ from the island of Amrum, a record doubted by Mohr (1935) who believed most German records of ‘Delphinus delphis’ instead to be bottlenose dolphins. However, as van Bree (1970) established, she confused bottlenose dolphins with yet another species: the white-beaked dolphin. Poppe (1882) listed ‘Delphinus delphis’ from the SW coast with reference to Heineken (1837) who, however, also listed the species without any supportive evidence.

The first genuine record of the common dolphin originates from the SW coast and the year 1958 (Goethe, 1983) with 12 subsequent records (Figure 5).

The common dolphin during certain periods enters the southern North Sea, presumed to be indicative of an influx of warmer water. Fraser (1937) reported such an earlier occurrence during the 1930s while Kompanje (2005) and recently Smeenk & Camphuysen (2016) reviewed the trends in occurrence along the Dutch coast.

Striped dolphin (Stenella coeruleoalba (Meyen, 1833))

The striped dolphin was documented for the first time in 2006 near Büsum (NE (SH)), a single record adding a new species to the list of cetaceans recorded from German North Sea waters (Figure 5). The natural distribution area of the striped dolphin is both further south and further offshore than German coastal waters. Two Danish North Sea records were presented by Kinze et al. (2000) and Kinze et al. (2018), respectively, while adjacent Dutch records were reviewed by Kompanje (2005) and Smeenk & Camphuysen (2016b).

Already in 1910, however, Trouessart (1910) had reported ‘Prodelphinus euphrosyne’ from near the mouth of the River Elbe. The source of his record is unfortunately unknown. Mohr (1931) doubted this occurrence, quoting Brohmer (1914), as did Schultz (1970) although citing Tomelin (1967) for this information. A misinterpretation of Möbius (1873) so-called ‘Gestreifter Delphin’ (literally = striped dolphin), referring to two finds of Risso’s dolphin near Büsum in 1873, seems evident.

Risso’s dolphin (Grampus griseus (Cuvier, 1812))

The first and hitherto only record from the German North Sea coast originates from the year 1873 (Figure 6).

Two individuals of this species were found in February within two days of each other near the town of Büsum NE (SH) (Möbius, 1873). The literal translation of the German vernacular name ‘Gestreifter Delphin’ is striped dolphin and may have caused a confusion with Stenella coeruleoalba.

Long-finned pilot whale (Globicephala melas (Traill, 1809))

The long-finned pilot whale was documented eight times (Figure 6). The first reported record of the species originates from the year 1965 and the island of Sylt (Gewalt, 1971). Three finds were registered for the SW coast (1976, 1988 and 2017) and five for the NE coast (1965, 1974, 1995, 1999, 2001), respectively.

The long-finned pilot whale is an oceanic teuthophageous species and therefore probably poorly adapted to the coastal habitat and in particular to the Wadden Sea coast – alike sperm whales. Unlike these, they are much smaller and therefore may have escaped detection in earlier decades.

Killer whale (Orcinus orca (Linnaeus, 1758))

Between 1841 and 2016 nine strandings of killer whale have been documented (Figure 6). Dahl (1894, 1906) and Mohr (1931, 1935) listed the earliest documented find (1841) from the island of Sylt (NE (SH)). Other older records of the species include an
individual stranded on the shores of the island of Juist NI around World War I (Schultz, 1970) and another killed upstream in the Elbe at Fliegenberg (NI) in 1921 (Hentschel, 1921).

The species was further encountered both for the SW coast (Juist 1943; Wangerooge 1956; Borkum 1967) and the NE coast (Sylt 1965, 2016; Föhr 1988), respectively. It is noteworthy that the 1943 killer whale was reported as a ‘Nordkaper’, a German vernacular name confusingly also in use for the fin whale and the North Atlantic right whale.

**Beluga whale (Delphinapterus leucas (Pallas, 1770))**

Records of stranded dead belugas are rare due to the pronounced coastal adaptability of the species. Individuals often enter rivers and migrate upstream. Accordingly, the only German North Sea stranding hitherto reported was of a beluga whale found dead on the Island Rhinplatte in the vicinity of the town of Glückstadt (SH), i.e. some 100 km upstream in the River Elbe in 1993. Here, we include another record recovered from an unequivocal newspaper report: a 5 m individual found on the island of Föhr (SH) in 1905 (*Neue Hamburger Nachrichten*, 17 August 1905) (Figure 7).

Although the beluga whale is an arctic coastal species, during certain periods invasions seem to take place into more southern coastal waters, namely also the North Sea. In 1984 an individual swam up the River Elbe near Hamburg, and subsequently appeared in the Jadebusen and Dollart at the mouth of the River Ems (Jensen et al., 1987; Goethe, 1996). Already in 1967, another beluga had swum 400 km up the Rhine to Bad Honef (Gewalt, 1976).

There is a very doubtful old record of the species from the River Elbe near Hamburg for the year 1736. The only source here seems to be Mohr (1935) who quoted Japha (1919) (a reference not contained in her reference list) to have quoted Klein (1741) for this record, but Klein reported on a 1736 narwhal only. Schultz (1970) as well lists a beluga for this year with reference to another Mohr paper (1962) which, however, again only refers to a narwhal. This record therefore has been deleted from the list.

**Narwhal (Monodon monoceros Linnaeus, 1758)**

There are two historical records of the narwhal, one from the Dollart in 1669 (SW, NI; Hartmann 1930) and another from 1736 and the mouth of the River Oste, a tributary to the Elbe (R Elbe, NI; Klein, 1741. Mohr, 1931, 1962) (Figure 7).

Mohr (1931) at first believed that two individuals had been taken during 1736, but in 1935 she considered only a single occurrence of a male in early February of this year. Donndorff (1792) on the other hand provided a different month (December) and Tomelin (1967) reported the specimen to be female. Recently, Haelters et al. (2018) reviewed extralimital occurrences of the species in the North Sea.

**Sowerby’s beaked whale (Mesoplodon bidens (Sowerby, 1800))**

Records of this species have been extremely rare with only four finds from the German North Sea coast (Figure 7). The two earliest finds are both from the island of Sylt: 1962 Rantum and 1970 Morsum (Schultz, 1970; Kühlemann, 1983). In 2009, there were two reports of the species from two adjacent localities, but in different federal states. Careful analysis of photographs documents them as two independent records. Also, during 2009 there were two North Sea live strandings: first 13 August on the English coast near Blakeney Point on the northern shores of Norfolk (which subsequently was found dead), then later 4 October 2009 on the Dutch coast near Msvlaake. The latter specimen was not re-encountered and may be identical with one of the German North Sea strandings.

**Northern bottlenose whale (Hyperoodon ampullatus Forster, 1770)**

This large beaked whale was recorded seven times (Figure 7) comprising nine individuals in total. For the year 1659, Mohr (1935) reported on the earliest bottlenose whale find from Blankenes on the banks of the River Elbe to the west of Hamburg. To this we add from the island of Föhr (SH) a catch of two individuals during the summer of 1780 (Danish newspaper report København.
Kongelig alene privilegerte Adresse-Contoirs Efterretninger, 9 August 1780). The species identity of the latter record rests on the vernacular Danish, German and Dutch names applied, the size of the two individuals, the season of the catch and the obvious reference to the bottlenose whale account delivered by Chemnitz (1779).

Marshall (1896) listed it as one of the more commonly occurring species and mentioned several contemporaneous finds (i.e. the 1890s) exhibited in public, but unfortunately without providing any details. Recently, an additional find from the early 20th century has been identified from a photograph and newspaper reports of an individual stranded on Langeoog (NI) in 1902 (Schmidt, 2014, Neue Hamburger Zeitung, 13 September 1902). For the year 1913 a well-known find from Freiburg (upon Elbe, NI) hitherto erroneously was considered a stranding of a single male. Correctly the incident, however, instead involved a mother-calf pair (Neue Hamburger Zeitung 13 September 1913). A single record is known from Memmert (NI) in 1938 (Goethe, 1983). In 1976 there was a stranding near Büsum (SH) and another in 1981 from Süderoogsand (SH) (Borkenhagen, 2011).

**Sperm whale** (*Physeter macrocephalus* L. 1758)

Due to the immense size of this toothed whale, sperm whale strandings can be traced back in time further than any other large cetacean. The earliest known German North Sea sperm...
whale stranding dates back to 1604. In total, 21 strandings of at least 59 individuals have been documented (Figure 8). Here we include a hitherto overlooked sperm whale stranding from the Elder estuary from early 1695. Subsequent strandings have occurred in the 18th century in 1721, 1723 (18 animals), 1738 (3 animals), 1751 (3 animals, scattered), 1759 (2 animals) and 1762 (≥2 animals). From the 19th century there are no safe records. A presumed sperm whale stranding from 1848 on the island of Borkum (Vanselow & Ricklefs, 2005) did not meet the criteria for an unequivocal species identification and was not included in the list compiled by Smeenk & Evans (2018). The gap in records between 1762 and 1969 for the German North Sea strandings is in accordance with findings from the entire North coastline. Smeenk & Evans (2018) reviewed sperm whale stranding for the entire North Sea area while Pierce et al. (2007) proposed a relationship between strandings and fluctuations in sea temperature.

Minke whale (Balaenoptera acutorostrata Lacepede, 1804)

The minke whale was documented 16 times in total between 1669 and 2017 (Figure 9). For the period 1990–2017 it ranked the most commonly encountered baleen whale with an overwhelming preponderance for the NE (SH) coastline. Records from the SW (NI) coastline include Beichle et al. (2005).

The species was originally known as the Balaena rostrata of Fabricius, 1780, but has frequently been confused with its homonym Balaena rostrata, Müller, 1776, a junior synonym of the northern bottlenose whale. Therefore, Poppe (1882) erroneously listed an undisputable minke whale of 1669 (a life-size oil painting in the town hall of Bremen; Goethe, 1983) as a bottlenose whale.

Prior to 1971, the only German record known for this species originated from Leesum, the River Weser and the year 1669 (Goethe, 1883). Here, a record from Hooksiel and the 1830s originally considered a fin whale (Wiepken & Greve 1876), we re-assign to minke whale. Mohr (1935) reported a ‘fin whale suckling’ on exhibit in Hamburg in early 1932. This animal stranded near Cuxhaven at the mouth of the River Elbe and was reported to be 7–8 m in length. Based on newspaper photographs (e.g. in Der gerade Weg, 3 April 1932) we re-identify it as a minke whale.

Sei whale (Balaenoptera borealis Lesson, 1828)

Only two records of this species were documented from the German North Sea coastline: in 1955 on the island of Norderney (NI) (Goethe, 1983) and recently in 2016 near Blexen (NI) at the mouth of the River Weser (Figure 9).

Due to its pelagic habitat the sei whale is a very rare visitor to the shallow parts of the North Sea. However, further sei whale specimens may be found among collected rorqual specimens 7–10 m in length that were entered to scientific collections under an incorrect species heading. The 2016 Blexen specimen was identified morphologically (baleen colour) and molecularly (DNA analysis) to sei whale (Ralph Tiedemann, pers. com.).

Fin whale (Balaenoptera physalus Linnaeus, 1758)

Twenty-one fin whale records have been documented, spanning from 1827–2012 (Figure 10) indicating a preponderance in occurrence on the Sylt coasts (SH) (N = 8) and among these finds for the List Deep between the islands of Sylt and Romo (Denmark).

Unfortunately, the fin whale was known by both the German vernacular names ‘Nordkaper’ and ‘Grönländischer Wal’, also being in use for the North Atlantic right whale (Eubalaena glacialis) and the Greenland right whale or bowhead whale (Balaena mysticetus), and even the killer whale (Orcinus Orca) thereby causing a lot of confusion (see above). In the 18th century fin whales were listed under the species heading Balaenoptera musculus (Companyo 1830) therefore in later reviews (e.g. Schultz, 1970) erroneously were considered records of blue whale.

Here, we establish the correct species assignment of a 75-feet female ‘Walfisch’ from the island of Helgoland found in November 1849 to be a fin whale (archival evidence: Claudius in lit., 28 August 1857 to J. H. Blasius; Appendix 1). This stranding was erroneously considered a record of Balaena mysticetus, the Greenland right whale by von Dalla Tore (1889) based on Oetker (1855). Mohr (1931) after Dahl (1894, 1906) gave the
year as 1805 (an obvious printing error for 1850) for the same incident.

Of Wiepken & Greve’s (1876) two records of fin whale (Hooksiel 1830s, Wilhelmshaven 1870), only the latter record could be validated as belonging to the species while the Hooksiel record has been re-identified as minke whale. Newspaper reports revealed a further two fin whale strandings near Cuxhaven for the year 1882, and the species has also been documented from the island of Sylt in 1911 by Mohr (1931).

Both World War I and II unfortunately produced fin whale casualties due to collisions with sea mines. During August 1915, another two large baleen whales, possibly fin whales, washed ashore on the west coast of Amrum (SH) and the island of Pellworm (SH), respectively. A possible third fin whale stranding occurred in July 1943 as a ‘headless’ rorqual was found on the Juister Riff (NI).

Blue whale (Balaenoptera musculus (Linnaeus, 1758))

For the German North Sea coastline, the blue whale still only has been encountered once in 1881 on the island of Sylt (SH) (Möbius, 1885) (Figure 10).

While the fin whale during the latter half of the 19th century unfortunately was known as Balaenoptera musculus (Companyo 1830) a homonym of the present day scientific name of the blue whale (Balaenoptera musculus (Linnaeus, 1758), the blue whale during the same period carried a variety of scientific names including Sibbaldius borealis Gray 1864 and Pterobalaena gigas Van Beneden 1861. Some 19th century records of ‘Balaenoptera musculus’ in literature therefore refer to fin whales instead and sometimes even are listed twice, both correctly as fin whales and incorrectly as blue whales (e.g. Schultz, 1970).

Further, Meyer (1994) erroneously reported a minke whale as ‘blue whale’. This stranding supposedly occurred on the island of Neuerk on12 December 1984, but indeed it is identical with a find the previous day on exactly the same location of a minke whale.

From the adjacent North Sea there are just three additional validated records: a Belgian (1827) and a Dutch (1840) one (Smeenk & Camphuysen, 2016c) and a single 1907 record from the Danish North Sea coast (Kinze, 2007).

Humpback whale (Megaptera novaeangliae (Barowskii, 1791))

The humpback whale was reported thrice only, in 1824 at the mouth of River Elbe (Mohr, 1935) and a single specimen, 1991 in the Jade inlet, and in 1994 an individual floating in the German Bight (Stede et al., 1996) (Figure 10).

Discussion

As compared with adjacent coastlines, the lower cetacean diversity (Table 2) encountered in the German Bight may be explained by the hydrographic conditions possibly favouring species with coastal affinity and adaptability. The riverine habitat has been exploited by both the harbour porpoise and the bottlenose dolphin, but with increasing riverine pollution throughout the 20th century these visits ceased. However, the successful return of the harbour porpoise to these rivers also may be a precursor to the reappearance of the bottlenose dolphin. So far records of bottlenose dolphin are documented for the southernmost part of the German North Sea coast and may be an inclusive part of the Dutch distributional scenario with stragglers occurring only. Along the northern English North Sea coastline bottlenose dolphins from Scotland have recently expanded their range further south (Stockin et al., 2006; Evans & Waggitt, 2020).

Historically, all cetaceans encountered in the German part of the North Sea other than the harbour porpoise over-simplified were lumped into a single category of presumed erratic species. However, they constitute a rather heterogeneous group of species with very different potentials to adapt to the hydrographic regime of the larger German Bight. So-called ‘neighbourhood species’ include frequently reported white-beaked dolphins and minke whales while sperm whales and other pelagic cetaceans are purely erratic species (Gosselck & Kinze, 2011). Hence, coastal and shelf species from southern and northern areas may adapt to environmental conditions and altered sources of food. On the other hand, oceanic or pelagic species are challenged by their lack of resilience to the coastal habitat and may even face shortcomings of their orientation and navigation capacities.

Fig. 10. Records of fin, blue and humpback whales.
Several German scholars of the late 18th and early 19th century have pointed out the lack of knowledge on cetaceans occurring along the German coasts in particular and the North Sea coastline in general (Blasius, 1857). These treatises therefore in many ways provided a generalized picture drawn from adjacent, in many cases Dutch, waters – thereby listing cetacean species assumed to occur or expected to appear in German waters. The literature containing information on historical cetacean strandings is rather scattered, reflecting the historical administrative division of present-day Germany into then several independent states. The species assignment sometimes relied on inadequate literature and was in several cases found incorrect. Even the most recent reviews by Schultz (1970) and Goethe (1983) contain misinterpretations and double counts (see above).

The present federal state Schleswig-Holstein until 1864 was part of the Danish monarchy which is why several older reports on cetacean strandings are written in the Danish language. After a transition period, SH became a province of Prussia in 1867. Subsequent literature on 19th century cetacean records from the North Sea coast comprise the works of Möbius (1873, 1885) and Dahl (1894, 1906) while Mohr (1931, 1935) provided the first comprehensive compilation but also introduced several errors, as did Schultz (1970). Borkenhagen (2011) listed and corrected records to the year 2010. Also, certain ‘border cases’ were removed from the list since they took place on the present-day Danish coast and already have been treated elsewhere (Kinze, 1995).

The present federal state of Niedersachsen was only formed in 1945, merging the coastal areas of the Prussian province of Hannover and the Grand Duchy of Oldenburg into a single entity and hence older literature on cetaceans covered only certain portions of the present coastline.

### Historical context

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### Historical context

#### Table 2. Strandings of non-phocoenid cetaceans (number of individuals) along the Dutch, German and Danish North Sea coasts for the period 1990–2017

| Species                          | NL | D  | DK |
|----------------------------------|----|----|----|
| White-beaked dolphin *Lagenorhynchus albirostris* | 126 | 46 | 117 |
| White-sided dolphin *Leucopleurus acutus*        | 7  | 7  | 9  |
| Common dolphin *Delphinus delphis*               | 4  | 7  | 4  |
| Striped dolphin *Stenella coeruleolab*           | 9  | 1  | 1  |
| Bottlenose dolphin *Tursiops truncatus*          | 13 | 6  | 0  |
| Long-finned pilot whale *Globicephala melas*     | 3  | 6  | 12 |
| Killer whale *Orcinus orca*                     | 3  | 1  | 2  |
| Beluga whale *Delphinapterus leucas*             | 0  | 1  | 0  |
| Sowerby’s beaked whale *Mesoplodon bidens*       | 11 | 2  | 1  |
| Blainville’s beaked whale *Mesoplodon densirostris* | 1 | 0 | 0 |
| Bottlenose whale *Hyperoodon ampullatus*         | 2  | 0  | 0  |
| Sperm whale *Physeter microcephalus*             | 26 | 27 | 42 |
| Minke whale *Balaenoptera acutorostrato*         | 18 | 9  | 22 |
| Sei whale *Balaenoptera borealis*                | 1  | 1  | 0  |
| Fin whale *Balaenoptera physalus*                | 12 | 5  | 1  |
| Humpback whale *Megaptera novaeangliae*          | 7  | 2  | 1  |
| Total                                           | 215 | 120 | 213 |
| Length of coast (km)                          | 451 | 1155 | 606 |
| Finds per 100 km                                | 47.7 | 10.4 | 35.3 |
| Species number                                  | 15  | 14  | 11  |

Sources: NL: Smeenk, 1995, 2003, Camphuysen et al., 2008, Keijl et al., 2016 and www.walvistrandingen.nl. DK: Kinze, 1995, Kinze et al., 1998, 2010 and 2018.

**Harbour porpoise**

The period 1990–2017 in adjacent Dutch waters (Smeenk 1995, 2003; Camphuysen et al., 2008; Keijl et al., 2016) yielded 8444 specimens. The Dutch figures do indicate a very high reporting effort along with a marked increase in occurrence resembling the SW (NI) German figures while the NE (SH) figures seem to fluctuate with no clear trend.

**Other species**

For the entire German North Sea coastline and the period 1990–2017, 120 specimens of 14 non-phocoenid species were documented while the Dutch coast yielded 215 specimens of 15 and the Danish coast 213 of 11 species. The German coastline exhibited the lowest number of specimens as well as the lowest encounter rate with about 10 finds per 100 km coastline while for the Dutch and Danish coasts a much higher encounter rate could be noted with nearly 48 finds per 100 km and 35 finds per 100 km, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively. Sperm whales accounted for 22.5%, 19.7% and 12.1%, respectively.

For the present-day Federal States of Hamburg and Bremen information on cetacean records are found in Itzerodt (1904) and Heineken (1837), respectively.
along the German North Sea coast, the white-beaked dolphin has kept position as the most common delphinid, but due to evident climate changes shifts in species frequency are to be expected and rising sea temperatures could push white-beaked dolphins further north and away from the German North coastline and instead attract more common dolphins, although these two species do not share the same ecological preference (Evans & Waggitt, 2020). Common dolphins, being indicative for a warmer climate, have also occurred in earlier periods in the southern North Sea (Fraser, 1937).

Striped dolphins are both pelagic and southern indicators. Their occurrence along the German North Sea coast has been recorded just once so far. There have been several finds along the English and Dutch coasts, generally in increasing numbers since 1967 (Jisselink et al., 2018a, 2018b).

The killer whale is a rare visitor to the German North Sea coastline with no clear trend in occurrence. Within the northern sectors of the North Sea killer whales have continuously been present for decades (Evans & Waggitt, 2020). The white-sided dolphin had its first appearance on the SW (NI) coast already in 1968 and may be considered a northern pelagic intrusion. Possibly the freshwater output within the German Bight has led to finds only outside the river mouths, i.e. further to the west and to the north. The beluga whale is a coastal Arctic species with a high riverine affinity. As in adjacent waters this species exhibits a low stranding mortality with much more frequent sightings and live strandings than finds of dead specimens. In 1983 for instance, the entire German North Sea coastline for weeks was visited by a single beluga whale (Jensen et al., 1987; Goethe 1996) without a lethal stranding incident. During periods, e.g. 1903–1908 (Schultz, 1970) there have been extralimital intrusions of beluga whales into temperate waters. The rediscovered find from the island Föhr and the year 1905 falls into the same period while the find from the River Elbe is supportive for the riverine affinity. As in adjacent waters this species exhibits a low stranding mortality with much more frequent sightings and live strandings than finds of dead specimens. In 1983 for instance, the entire German North Sea coastline for weeks was visited by a single beluga whale (Jensen et al., 1987; Goethe 1996) without a lethal stranding incident. During periods, e.g. 1903–1908 (Schultz, 1970) there have been extralimital intrusions of beluga whales into temperate waters. The rediscovered find from the island Föhr and the year 1905 falls into the same period while the find from the River Elbe is supportive for the riverine affinity. The narwhal is a high Arctic pelagic species for which there are only historic records. From Dutch, English and Belgian North Sea waters more recent finds are known (Weber, 1912; Fraser, 1949; Haelters et al., 2018).

Genuine oceanic species such as the teuthophageous sperm whale, northern bottlenose whale and Sowerby’s beaked whale may find little food along the German North Sea coast. In addition, their navigation capacities may run short. None the less, ziphiid species are known to enter rivers and venture upstream. For the Thames estuary and river at least six such occurrences of northern bottlenose whales have been documented (Crouch, 1891; Deaville & Jepson, 2007) that may mirror the occurrences in the River Elbe (1659, 1913).

Among the baleen whales there is a high preponderance of fish-eating species (minke, fin and humpback). The minke whale is a rather stable fauna component in the northern and central North Sea but has also become the most frequent roqual in the German North Sea stranding record. The species may have benefited from the intense exploitation of the larger piscivorous baleen whales such as the fin whale and the humpback whale. The fin whale seems to have been a foraging visitor along the NE (SH) coast, with occurrences in the deeps between the islands. The humpback populations of the North Atlantic experienced a heavy exploitation in the 19th and 20th century but now seem to have undergone a full recovery with few but regular sightings off the Dutch coast (Leopold et al., 2018) and accordingly again records from the German North Sea coast.

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The holdings of the collections in Frankfurt (Senckenberg Museum), and Stuttgart (Staatliches Museum für Naturkunde Stuttgart) were accessed over their websites (CCK). Details of specimens held in the scientific collections of the museums in Oldenburg were provided to RC.

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Authors contribution. CCK Conducted the overall compilation and analysis, drafted the manuscript, provided historical records from literature and archives. RC provided recent records from Niedersachsen and photographic documentation. HH designed the distribution maps. US initiated the work and provided recent records from Schleswig-Holstein and photographic documentation. All authors read and approved the final manuscript.

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Appendix 1

Record details. Date given in format YYYY-MM-DD. Sex M, male; F, female; U, sex unknown; TL, total length; TW, total weight; PR, pregnant.

White-beaked dolphin (Lagenorhynchus albirostris Gray, 1846)

| Record no | Date       | Locality     | Subarea | Sex, TL and TW | Validation |
|-----------|------------|--------------|---------|----------------|------------|
| 1         | 1921-07    | Büsum        | NE (SH) | F adult        | Mohr, 1935 |
|           |            |              |         | U calf         |            |
| 2         | 1952-02-15 | Wangerooge    | SW (NI) | U 275 cm       | Goethe (1983) |
| 3         | 1962-01-15 | Düne, Helgoland | NE (SH) | F 262 cm       | Goethe (1983) |
| 4         | 1962-01-23 | Wangerooge    | SW (NI) | U 2 m          | Goethe (1983) |
| 5         | 1973-12-04 | Baltrum      | SW (NI) | M              | Specimen kept in Kiel |
| 6         | 1982-06    | Scharhörn     | SW (NI) | F 270 cm       | Goethe (1983) |
| 7         | 1982-09-11 | Hooksiel      | SW (NI) | F 256 cm 191 kg | Goethe, 1983 |
| 8         | 1982-11-04 | Wittduün, Anrum | NE (SH) | F 314 cm* 320 kg | Specimen kept Kiel |
| 9         | 1982-11-04 | Wittduün, Anrum | NE (SH) | F 320 kg       | Specimen kept Kiel |
| 10        | 1982-11-04 | Nordstrandischmoor | NE (SH) | F 258 cm 275 kg | Specimen kept in Kiel |
| 11        | 1983-02-02 | Baltrum      | SW (NI) | U 2 m          | Goethe (1983) |
| 12        | 1983-04-26 | Süderoogsdand | NE (SH) | M 290 cm       | Specimen kept in Kiel |
| 13        | 1983-05-06 | Süderoogsdand | NE (SH) | U              | Specimen kept in Kiel |
| 14        | 1984-02-10 | Föhr         | NE (SH) | F 226 cm 226 kg | Specimen kept in Kiel |
| 15        | 1984-07-14 | Sylt         | NE (SH) | M 281 cm       | Specimen kept in Kiel |
| 16        | 1986-05-30 | Langeness    | NE (SH) | U 257 cm 252 kg | Specimen kept in Kiel |
| 17        | 1986-11-07 | Speikeroog, west coast | SW (NI) | F 234 cm 100 kg | Specimen kept in Oldenburg |
| 18        | 1989       | Föhr         | NE (SH) | U              | Specimen kept in Hamburg |
| 19        | 1989-11-10 | Campen, light house | SW (NI) | F 252 cm 200 kg | Specimen kept in Oldenburg |
| 20        | 1990-01-12 | Sylt         | NE (SH) | F 275 cm 235 kg | Specimen kept in Kiel |
| 21        | 1990-12-28 | Oststrand List, Sylt | NE (SH) | M 197 cm       | Specimen kept in Kiel |
| 22        | 1991-03-01 | St. Peter Ording | NE (SH) | M 232 cm 174.5 kg | Specimen kept in Kiel |
| 23        | 1991-05-29 | Norderney    | SW (NI) | U              | Specimen kept in Oldenburg |
| 24        | 1992-01-12 | Tammerwerft, Pellworm | NE (SH) | F 176 cm 78 kg | Specimen kept in Kiel |
| 25        | 1992-11-26 | Norderney    | SW (NI) | F 223 cm 145.5 kg | Meyer (1994), Stede (1994) ** |
| 26        | 1992-12-10 | Norderney    | SW (NI) | M 255 cm       | Specimen kept in Oldenburg |

(Continued)
### Appendix 1. (Continued.)

| Record no | Date       | Locality      | Subarea | Sex, TL and TW | Validation            |
|-----------|------------|---------------|---------|----------------|-----------------------|
| 27        | 14-12-1992 | Brokdorf, Elbe| NE (SH) | F 285 cm 230 kg | Specimen kept in Kiel |
| 28        | 06-04-1993 | Baltrum       | SW (NI) | U 2 m           | Specimen kept in Oldenburg |
| 29        | 05-05-1993 | Eiderstedt (Stuffhusen) | NE (SH) | F 245 cm | Specimen kept in Kiel |
| 30        | 29-05-1993 | Büsum         | NE (SH) | F 263 cm 245 kg | Specimen kept in Kiel |
| 31        | 29-05-1993 | Helmsand (Friedrichskoog) | NE (SH) | F 244.5 cm | Specimen kept in Kiel |
| 32        | 29-05-1993 | Friedrichskoog, Spitze | NE (SH) | F 275 cm | Specimen kept in Kiel |
| 33        | 11-07-1993 | St. Peter Ording, Strand | NE (SH) | F 262 cm 275 kg | Specimen kept in Kiel |
| 34        | 17-07-1993 | Westerhever-Sand | NE (SH) | F 136 cm | Specimen kept in Kiel |
| 35        | 07-09-1993 | Heverstrom, Nordsee | NE (SH) | F 243 cm 178 kg | Specimen kept in Kiel |
| 36        | 07-09-1993 | Westerhever Sand | NE (SH) | M 250 cm 191 kg | Specimen kept in Kiel |
| 37        | 07-11-1993 | Spiekeroog   | SW (NI) | U 240 cm | Specimen kept in Kiel |
| 38        | 09-11-1993 | Beitringerharder Koog, near Lütthoorsiel | NE (SH) | F 241 cm 178 kg | Specimen kept in Kiel |
| 39        | 09-03-1994 | Amrum        | NE (SH) | M 205 cm | Specimen kept in Kiel |
| 40        | 27-06-1994 | Trischen     | NE (SH) | U           | This paper |
| 41        | 11-09-1994 | Büsum        | NE (SH) | F 177 cm | Specimen kept in Kiel |
| 44        | 16-01-1995 | Borkum       | SW (NI) | F 254 cm 180 kg | Specimen kept in Oldenburg |
| 45        | 17-01-1995 | Borkum       | SW (NI) | F 253 cm 200 kg | Specimen kept in Oldenburg |
| 46        | 1997-05-15 | Wittduen Amrum | NE (SH) | F 230 cm | Specimen kept in Kiel |
| 48        | 09-08-1998 | Westerhever Sandbank | NE (SH) | M 230 cm | Specimen kept in Kiel |
| 49        | 18-10-1998 | Nieblum, Foehr | NE (SH) | F 245 cm 230 kg | Specimen kept in Kiel |
| 50        | 07-11-2000 | Wilhelmshaven | SW (NI) | F 245 cm 225 kg | Specimen kept in Oldenburg |
| 51        | 08-11-2000 | Wilhelmshaven | SW (NI) | F 235 cm 250 kg | Specimen kept in Oldenburg |
| 52        | 08-11-2000 | Wilhelmshaven | SW (NI) | F 245 cm 250 kg | Specimen kept in Oldenburg |
| 53        | 02-07-2001 | Hooge        | NE (SH) | U 150 cm | Specimen kept in Kiel |
| 54        | 18-06-2002 | Leysiel      | SW (NI) | F 245 cm | Specimen kept in Kiel |
| 55        | 27-06-2002 | Sylt, Morsum Weststrand, Höhe Haupttrepp | NE (SH) | F 237 cm | Specimen kept in Kiel |
| 56        | 10-02-2003 | Sylt, Rantum, Nord, Camping | NE (SH) | F 252 cm 214 kg | Specimen kept in Kiel |
| 57        | 31-12-2003 | Borkum       | SW (NI) | F 260 cm 230 kg | Specimen kept in Kiel |
| 58        | 22-01-2005 | Baltrum      | SW (NI) | F 235 cm | Specimen kept in Oldenburg |
| 59        | 09-12-2006 | Amrum        | NE (SH) | M 260 cm | Specimen kept in Kiel |
| 60        | 04-09-2007 | Klappholtal Sylt | NE (SH) | M 190 cm | Specimen kept in Kiel |
| 61        | 2007-06-30 | Minsener Oog  | SW (NI) | U 248 cm | This paper |
| 62        | 04-01-2010 | Sylt, List, Klappholtal | NE (SH) | F | Specimen kept in Kiel |
| 63        | 21-03-2010 | Sylt, Wenningsstedt, Kliffkieker | NE (SH) | F | Specimen kept in Kiel |
| 64        | 23-12-2015 | Norderney     | SW (NI) | U 260 cm | Specimen kept in Oldenburg |

* Zoological length; ** type errors in Stede: Date 26-01, TW 232 kg; 1992 Dissection report date 27-11. Kiel refers to Zoological Museum University of Kiel, Oldenburg to Natural History Museum Oldenburg.

### Bottlenose dolphin (*Tursiops truncatus* (Montagu, 1821))

| Record no | Date       | Locality         | Subarea | Sex, TL and TW | Validation                  |
|-----------|------------|------------------|---------|----------------|-----------------------------|
| 1         | 1836-12-22 | Drielake, Oldenburg | R Weser | U 276 cm | Wiepken & Greve (1876) |
| 2         | 1850 spring | Celle (River Aller) | R Weser | Large dolphin | Häpke (1880) |
| 3         | 1852 summer | Winsen           | R Elbe  | U       | Poppe (1882) |
| 4         | 1860        | Glückstadt       | R Elbe  | U       | Mohr (1935) |
| 5         | 1867 summer | Lower Elbe       | R Elbe  | M       | Specimen kept in Copenhagen |

(Continued)
### Appendix 1. (Continued.)

| Record no | Date       | Locality     | Subarea | Sex, TL and TW | Validation          |
|-----------|------------|--------------|---------|----------------|---------------------|
| 6         | 1872       | Wilhelmshaven| SW (NI) | U              | Möbius (1888)       |
| 7         | 1876-03    | Garbe River  | R Elbe  | U              | Erhardt (1937)      |
| 8         | 1879       | Glückstadt   | R Elbe  | F 300 cm 450 kg Calf 100 cm | Härke (1880) |
| 9         | 1887-07-17 | Hoopsiel     | SW (NI) | M 300          | Wiepken & Greve (1897) |
| 10        | 1887-10    | Fedderwerder | SW (NI) | M 363 cm       | Wiepken & Greve (1897) |
| 11        | 1900-04    | Hamburg harbour | R Elbe | U          | Schultz (1970)    |
| 12        | 1901-02-28 | Hamburg harbour | R Elbe | U          | Schultz (1970) |
| 13        | 1903       | Büsum        | NE (SH) | Juvenile      | Specimen kept in Berlin |
| 14        | 1909-07    | Oldenburg    | R Weser | U > 300       | Schütte & Huntemann (1913) |
| 15        | 1924-06-10 | Mouth of River Stör | R Elbe | U 370 cm 288 kg | Wegener (1924) |
| 16        | 1929-10-10 | Brunsbüttel* | R Elbe  | M 365 cm       | Mohr (1935)         |
| 17        | 1935-09-17 | Hooge        | NE (SH) | U              | Mohr Archive Hamburg |
| 18        | 1935-09-19 | Nordstrand   | NE (SH) | U              | Mohr Archive Hamburg |
| 19        | 1940       | Kampen, Sylt | NE (SH) | U 315 cm 350 kg | Schultz (1970) |
| 20        | 1954-04-17 | Wangerooge   | SW (NI) | U 315 cm       | Goethe (1983)       |
| 21        | 1958-10    | Westerland, Sylt | NE (SH) | U              | Schultz (1970)    |
| 22        | 1960       | Trischen     | NE (SH) | U              | Mohr (1962)         |
| 23        | 1963-06-07 | Wangerooge   | SW (NI) | F              | Goethe (1983)       |
| 24        | 1964-08    | Cuxhaven     | SW (NI) | U              | Specimen kept in Stuttgart |
| 25        | 1971-07-01 | Borkum       | SW (NI) | U              | Specimen kept in Kiel |
| 26        | 1989-04-22 | Norderney    | SW (NI) | M 260 cm       | SAS 8/21            |
| 27        | 1990-03-30 | Norderney    | SW (NI) | U 155 cm       | SAS 8/21            |
| 28        | 1991-04-18 | Leybucht     | SW (NI) | M              | Meyer (1994)        |
| 29        | 1993-02-21 | Wangerooge   | SW (NI) | F 227 cm 150 kg | Meyer (1994) |
| 30        | 1993-03-18 | Wangerooge   | SW (NI) | M 210 cm       | SAS 11/10           |
| 31        | 1996-07-17 | Leysiel      | SW (NI) | F 170 cm 80 kg | This paper SAS 15/15 |

White-sided dolphin (*Lagenorhynchus acutus* (Gray, 1828))

| Record no | Date       | Locality     | Subarea | Sex, TL and TW | Validation          |
|-----------|------------|--------------|---------|----------------|---------------------|
| 1         | 1968-04-26 | Schillig     | SW (NI) | U              | Goethe (1983)       |
| 2         | 1990-04-25 | Schillig     | SW (NI) | F 200 cm 150 kg | Stede (1994) |
| 3         | 1990-04-21 | Westplate, Mellium | SW (NI) | U 208 cm | Meyer (1994) |
| 4         | 1996-04-09 | Otterndorf   | SW (NI) | M 243 cm 150 kg | Specimen List IFF Cuxhaven |
| 5         | 2001-04-08 | Leysiel      | SW (NI) | F 235 cm 150 kg | Specimen kept in Oldenburg |
| 6         | 2007-09-18 | Dagebüll     | NE (SH) | M 243 cm 191 kg | Specimen kept in Kiel |
| 7         | 2011-12-31 | Friedrichskoog | NE (SH) | M 255 cm 190 kg | Specimen kept in Kiel |

Common dolphin (*Delphinus delphis* Linnaeus, 1758)

| Record no | Date       | Locality     | Subarea | Sex, TL and TW | Validation          |
|-----------|------------|--------------|---------|----------------|---------------------|
| 1         | 1958-08-24 | Wangerooge   | SW (NI) | M 240 cm       | Goethe (1983)       |
| 2         | 1971-01-14 | Nordstrand   | NE (SH) | M              | Borkenhagen (2011) |
| 3         | 1983-01-25 | Cuxhaven     | SW (NI) | U              | Goethe (1983)       |
| 4         | 1989-05-03 | Schillig     | SW (NI) | F 148 cm 36 kg | Stede (1994) |
| 5         | 1989-08-23 | Schillig     | SW (NI) | U              | Meyer (1994)        |
Appendix 1. (Continued.)

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 6         | 1990-03-27 | Sylt     | NE (SH) | F 193 cm 62 kg | Borkenhagen (2011) |
| 7         | 1995-10-29 | Hedwigenkoog | NE (SH) | M              | Borkenhagen (2011) |
| 8         | 2000-04-16 | Nordstrand | NE (SH) | M 156 cm 39 kg | This paper         |
| 9         | 2005-05-31 | St. Peter Ording | NE (SH) | M 174 cm 40 kg | This paper         |
| 10        | 2007-07-05 | Mellum   | SW (NI) | U 220 cm       | This paper         |
| 11        | 2016-01-05 | Borkum   | SW (NI) | M 207 cm 90 kg | This paper         |
| 12        | 2016-12-23 | List, Sylt | NE (SH) | U              | This paper         |

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

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 1         | 2006-02-22 | Büsum    | NE (SH) | F 161 cm 39 kg | Borkenhagen (2011) |

Risso’s dolphin (*Grampus griseus* (Cuvier, 1812))

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 1         | 1873-02-17 | Büsum    | NE (SH) | F 342 cm       | Möbius (1873)     |
| 2         | 1873-02-19 | Büsum    | NE (SH) | M 370 cm 470 kg| Möbius (1873)     |

Longfinned pilot whale (*Globicephala melas* (Traill, 1809))

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 1         | 1965-06-26 | Ellenbogen, Sylt | NE (SH) | U 5 m          | Gewalt (1928)     |
| 2         | 1974-01-24 | Hörnum, Sylt | NE (SH) | F 467 cm 2t    | Specimen kept in Kiel |
| 3         | 1976-01-20 | Schillig  | SW (NI) | M 600 cm       | Kock (1976)       |
| 4         | 1988-09-04 | Jade      | SW (NI) | M 540 cm 1340 kg | Meyer (1994) |
| 5         | 1995-02-23 | Wyk Föhr  | NE (SH) | M 578 cm       | Specimen kept in Kiel |
| 6         | 1999-06-21 | Oland     | NE (SH) | F 352 cm 407 kg| Specimen kept in Kiel |
| 7         | 2001-03-12 | St. Peter Ording | NE (SH) | F 442 cm 917 kg| Specimen kept in Kiel |
| 8         | 2017-12-09 | Norddeich | SW (NI) | F 450 cm       | Specimen kept in Kiel |

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

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 1         | 1841       | Sylt     | NE (SH) | U              | Mohr (1931)       |
| 2         | 1864       | Büsum    | NE (SH) | U              | Schultz (1970)    |
| 3         | 1921-11-11 | Fliegenberg, River Elbe | F 550 cm 3 t | Hentschel (1921), Mohr (1931) |
| 4         | 1943-07-27 | Juist    | SW (NI) | U 6 m 4 t      | Goethe (1983)     |
| 5         | 1956-11-21 | Wangerooge | SW (NI) | U              | Goethe (1983)     |
| 6         | 1965-09-17 | Rantum Sylt | NE (SH) | M 650 cm       | Schultz (1970)    |
| 7         | 1967-06-26 | Borkum   | SW (NI) | M 550 cm       | Goethe (1983)     |
| 8         | 1988-03-08 | Föhr     | NE (SH) | M 650 cm       | Borkenhagen (2011) |
| 9         | 2016-02-08 | Rantum Sylt | NE (SH) | M 246 cm 181 cm | This paper         |

Beluga whale (*Delphinapterus leucas* (Pallas, 1770))

| Record no | Date       | Locality | Subarea | Sex, TL and TW | Validation        |
|-----------|------------|----------|---------|----------------|-------------------|
| 1         | 1905       | Wyk Föhr | NE (SH) | U 5 m          | This paper         |
| 2         | 1993-07-16 | Rinplate, Elbe near Glückstadt | R (Elbe) | M 440 cm 1t    | Specimen kept in Büsum |
Narwhal (*Monodon monoceros* Linnaeus, 1758)

| Record no | Date   | Locality       | Subarea | Sex, TL and TW     | Validation         |
|-----------|--------|----------------|---------|--------------------|--------------------|
| 1         | 1669-03| Bunderhamrich Dollart | SW (NI) | M 5.1 m (17')     | Hartmann (1930)    |
| 2         | 1736-02| River Oste     | R (Elbe) | M 5.4 m (18')     | Mohr (1962)        |

Sowerby’s beaked whale (*Mesoplodon bidens* (Sowerby, 1800))

| Record no | Date   | Locality       | Subarea | Sex, TL and TW     | Validation         |
|-----------|--------|----------------|---------|--------------------|--------------------|
| 1         | 1962-10-12 | Morsum, Sylt     | NE (SH) | U                  | Kuhlemann (1983)   |
| 2         | 1970-02-02 | Rantum, Sylt    | NE (SH) | U                  | Schultz (1970)     |
| 3         | 2009-09-01 | Minsener Oog    | SW (NI) | U 400 cm           | This paper         |
| 4         | 2009-09-07 | Büsum         | NE (SH) | M                  | This paper         |

Northern bottlenose whale (*Hyperoodon ampullatus* Forster, 1770)

| Record no | Date   | Locality       | Subarea | Sex, TL and TW     | Validation         |
|-----------|--------|----------------|---------|--------------------|--------------------|
| 1         | 1659-09-10* | Blankenese   | R Elbe (HH) | F 24’ (8 m)     | Mohr (1931, 1935)  |
| 2         | 1780-08 | Wyk Föhr      | NE (NH) | 1) U est. 2t 2) U est 2 t | Newspaper report **|
| 3         | 1902-08 | Langeoog      | SW (NI) | U 7.2 m            | Schmidt (2014)     |
| 4         | 1913-09-05 | Freiburg   | R (Elbe) | 1) F 8 m 5027 kg 2) U 4, 5 m | This paper***     |
| 5         | 1938   | Memmert       | SW (NI) | Juvenile           | Goethe (1983)      |
| 6         | 1976-03-01 | Busum         | NE (SH) | M 570 cm           | Borkenhagen (2011) |
| 7         | 1981-08-03 | Süderoogssand | NE (SH) | U                  | Borkenhagen (2011) |

Sperm whale (*Physeter macrocephalus* L. 1758)

| Record no | Date   | Locality       | Subarea | Sex, TL and TW     | Validation         |
|-----------|--------|----------------|---------|--------------------|--------------------|
| 1         | 1604   | Pellworm        | NE (SH) | 2 M                | Smeenk & Evans (2018) |
| 2         | 1695-03 | Mouth of River Eider | NE (SH) | M 58’ (2 M spaced) | This paper*       |
| 3         | 1720-12-31 | Wschhafen   | R Elbe (NI) | M 60-70’   | Smeenk & Evans (2018) |
| 4         | 1722-12-03 | Neuwerk     | SW (NI) | 18 M 70-60’       | Smeenk & Evans (2018) |
| 5         | 1738-01-24 | Süderhöft, Eiderstedt | NE (SH) | 3 M (1 M 48’) | Smeenk & Evans (2018) |
| 6         | 1751-03-14 | Horumersiel; Jadebusen Minssener Oldeoog | SW (NI) | 3 M (1 M 54’ 3”) | Smeenk & Evans (2018) |
| 7         | 1759-12 | Eiderstedt    | NE (SH) | M 58’             | Smeenk & Evans (2018) |
| 8         | 1762-01 | Schahörn/Neuwerk | SW (SH) | >2 M              | Smeenk & Evans (2018) |
| 9         | 1969-04-03 | Westerhever | NE (SH) | M 1610 cm         | Smeenk & Evans (2018) |
| 10        | 1984-11-22 | Bremerhaven | SW (HB) | M 1750 cm         | Meyer (1994)       |
| 11        | 1994-11-04 | Baltrum     | SW (NI) | M 1380 cm         | Smeenk & Evans (2018) |
| 12        | 1996-01-31 | Norderney   | SW (NI) | M 1600 cm         | Smeenk & Evans (2018) |
| 13        | 1997-12-04 | Bremerhaven | R (Weser) | 1 M             | Smeenk & Evans (2018) |
| 14        | 1997-12-04 | Cuxhaven    | SW (NI) | 1 M 1300 cm       | Smeenk & Evans (2018) |
| 15        | 1998-01-23 | Eiderstedt  | NE (SH) | 3 M (3 M escaped) | Smeenk & Evans (2018) |
| 16        | 2002-01-15 | Friedrichskoog | NE (SH) | 3 M             | Smeenk & Evans (2018) |
| 17        | 2003-12-02 | Norderney   | SW (NI) | 2 M             | Smeenk & Evans (2018) |
| 18        | 2011-11-14 | Pellworm    | NE (SH) | M 1500 cm        | Smeenk & Evans (2018) |

* Gregorian date, (Julian date 1659-08-31); ** Danish newspaper *De Aalborgske allene privilegerede Jydske Efterretninger* of 18 August 1780, two whales of the nebohval kind were caught near Wyk harbour; *** Neue Hamburger Zeitung, 28 August 1913.
### Appendix 1. (Continued.)

| Record no | Date       | Locality     | Subarea  | Sex, TL and TW | Validation |
|-----------|------------|--------------|----------|----------------|------------|
| 19        | 2016-01-08 | Wangerooge   | SW (NI)  | 2 M (13.1 m; 11.8 m) | Ijseldijk et al. (2018a, 2018b) |
| 20        | 2016-01-12 | Helgoland    | German Bight | M | Ijseldijk et al. (2018a, 2018b) |
| 21        | 2016-01-12 | Eversand     | R (Weser) | M | Ijseldijk et al. (2018a, 2018b) |
| 22        | 2016-01-13 | Trischen     | SW (NI)  | M 10.7 m | Ijseldijk et al. (2018a, 2018b) |
| 23        | 2016-01-31 | Kaiser Wilhelmsoog | NE (SH) | 8 M (10.2;10.5; 10.8; 11.0;11.2;11.3; 11.4;11.7) | Ijseldijk et al. (2018a, 2018b) |
| 24        | 2016-02-03 | Blaurotsand Büsum | NE (SH) | 2 M (11.4; 12.0) | Ijseldijk et al. (2018a, 2018b) |

* The Danish monthly magazine Maanedlig Relation om det Nyt som ere passered oc fremkommet i May Maaned for the month of May of the year 1695.

### Minke whale (*Balaenoptera acutorostrata* Lacepede, 1804)

| Record no | Date       | Locality     | Subarea  | Sex, TL and TW | Validation |
|-----------|------------|--------------|----------|----------------|------------|
| 1         | 1669-05-15* | Lesum        | R Weser  | F 840 cm (29′) | de Vries & Focken (1881) TL given in Goethe, 1983 (20′) corrected |
| 2         | 1830s      | Hoeksiel     | SW (NI)  | U 9 m          | Wiepken & Greve (1876) Species corrected |
| 3         | 1851-08    | Nordstrandischmoor | NE (SH) | U 959 cm (30½′) | This paper** |
| 4         | 1932-03-25 | Groden near Cuxhaven | SW (NI) | F 600 cm 6 t | Species in Mohr (1935) corrected |
| 5         | 1971-05-10 | German Bight | NE (SH)  | F             | Specimen in Kiel |
| 6         | 1984-12-11 | Neuerwerk    | SW (NI)  | F 450 cm 3700 kg | Stede (1994) |
| 7         | 1989-07-26 | Bensorsiel   | SW (NI)  | F 450 cm       | Meyer (1994) |
| 8         | 1992-08-18 | Hallig Hooge | NE (SH)  | U 870 cm       | Specimen kept in Kiel |
| 9         | 1995-04-19 | German Bight | NE (SH)  | M             | Specimen kept in Kiel |
| 10        | 1995-06-09 | Amrum        | NE (SH)  | U             | Specimen kept in Kiel |
| 11        | 1996-07-15 | St Peter Ording | NE (SH) | F             | Specimen kept in Kiel |
| 12        | 1996-12-21 | Kaiser Wilhelmsoog | NE (SH) | F             | Specimen kept in Kiel |
| 13        | 2000-07-15 | Kampen, Sylt | NE (SH)  | Specimen kept in Kiel |
| 14        | 2001-10-23 | Juist        | SW (SH)  | F 920 cm 3360 kg | Beichle et al. (2005) |
| 15        | 2012-08-07 | Hindenburgdam, Sylt | NE (SH) | F 6 m        | This paper |
| 16        | 2017-12-06 | Cuxhaven     | SW (NI)  | M 700 cm 3000 kg | This paper |

* Julian date 1669-05-08; ** Neue Hamburger Zeitung, 01-09-1915.

### Sei whale (*Balaenoptera borealis* Lesson, 1828)

| Record no | Date       | Locality     | Subarea  | Sex, TL and TW | Validation |
|-----------|------------|--------------|----------|----------------|------------|
| 1         | 1955-03-25 | Norderney    | SW (NI)  | U 7 m          | Goethe (1983) |
| 2         | 2016-12-27 | Blewen       | R (Weser) | M 750 cm       | This paper |

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

| Record no | Date       | Locality     | Subarea  | Sex, TL and TW | Validation |
|-----------|------------|--------------|----------|----------------|------------|
| 1         | 1827-10-31 | List, Sylt   | NE (SH)  | U 21 m (70′)   | Borkenhagen (2011) |
| 2         | 1829-01    | List, Sylt   | NE (SH)  |                | Borkenhagen (2011) |
| 3         | 1843-12-02 | Lister Tief, Sylt | NE (SH) |                | Borkenhagen (2011) |
| 4         | 1849-11    | Helgoland    | German Bight | F 22.5 m (75′) | This paper* |
| 5         | 1870-11    | Jadebusen    | SW (NI)  | U 18 m         | Goethe (1983) |
| 6         | 1870-12    | Juist        | SW (NI)  | U 18 m         | Goethe (1983) |
| 7         | 1882-03-02 | Dorum, Cuxhaven | SW (NI) | U 24 m (80′)  | This paper**  |
| 8         | 1882-03-13 | Duhnen, Cuxhaven | SW (NI) | U 25.5 m (85′) | This paper*** |

(Continued)
### Appendix 1. (Continued.)

| Record no | Date       | Locality       | Subarea | Sex, TL and TW | Validation                |
|-----------|------------|----------------|---------|----------------|---------------------------|
| 9         | 1888       | Großflie, Sylt | NE (SH) | U 15 m         | Borkenhagen (2011)        |
| 10        | 1911       | Sylt           | NE (SH) | U 20 m         | Mohr (1931)               |
| 11        | 1915-08    | Amrum Riff     | NE (SH) | U 25 m         | Mohr (1931)               |
| 12        | 1918-11-28 | Breitenfeld, Sylt | NE (SH) | U 25 m         | Mohr (1931)               |
| 13        | 1930-11    | Knipsand Amrum | NE (SH) | U 25 m         | Mohr (1931)               |
| 14        | 1944-02-08 | Budjadingen    | SW (NI) | F 20 m         | Goethe (1983)             |
| 15        | 1946-03-20 | St Peter Ording| NE (SH) | F 14 m 18.5 t | Schultz (1970)            |
| 16        | 1958-04-17 | Jadewatt       | SW (NI) | F 14 m 18.5 t | Goethe (1983)             |
| 17        | 1984-12-16 | Hamburger Hallig| NE (SH) | F 2063 cm      | Specimen 28910            |
| 18        | 1990-06-27 | Tertius near Büsum| NE (SH) | M 1245 cm      | Specimen 31432            |
| 19        | 1995-02-07 | Wenningstedt, Sylt | NE (SH) | F 1730 cm      | Borkenhagen (2011)        |
| 20        | 2001-06-02 | Hörnum, Sylt   | NE (SH) | M 15 m         | Borkenhagen (2011)        |
| 21        | 2005-09-21 | Außenelbe Rede | R Elbe  | F 14 m 15 t    | Borkenhagen (2011)        |
| 22        | 2006-08    | 30 km NW Neuwerk| German Bight | M 17 m 26.5 t | Borkenhagen (2011)        |
| 23        | 2012-09-23 | Juist          | SW (NI) | U 2525 cm      | Möbius (1885)             |

* Archival evidence: a letter by F.M. Claudius (1822–1869) to J.H. Blasius (1809–1870) dated 28 August 1857 refers to this incident as a stranding of *Pterobalaena vulgaris* which is a junior synonym of *Balaenoptera physalus*; *Newspaper Deutsche Allgemeine Zeitung, Leipzig, 9-12-1849*; ** *Berliner Tageblatt 02-03-1882*; *** *Altonaer Nachrichten 15-03-1882*; **** *Neue Hamburger Zeitung 01-09-1915*. 

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

| Record no | Date       | Locality       | Subarea | Sex, TL and TW | Validation                |
|-----------|------------|----------------|---------|----------------|---------------------------|
| 1         | 1881-06-26 | Rantum, Sylt   | NE (SH) | F 1525 cm      | Möbius (1885)             |

**Humpback whale (*Megaptera novaeangliae* (Borowski, 1791))**

| Record no | Date       | Locality       | Subarea | Sex, TL and TW | Validation                |
|-----------|------------|----------------|---------|----------------|---------------------------|
| 1         | 1824-11    | Vogelsand      | R (Elbe)| M 11.6 m (37°) | Mohr (1931)               |
| 2         | 1991-04-15 | Jade           | SW (NI) | W 690 cm       | Meyer (1994)              |
| 3         | 1994       | 54°20.8 N, 650.5 E | German Bight | F > 10 m       | Stede et al. (1996)        |