Cetaceans stranded in the Netherlands in 2015-2019

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Abstract: This report presents a validated list of stranded cetaceans in the Netherlands, as well as some cetaceans accidentally brought in on ship bulbs, between 2015-2019. During this period 2701 cetaceans representing eleven species were reported. The list also includes a few bones and skulls, among others of killer whale (*Orcinus orca*) and bottlenose dolphin (*Tursiops truncatus*), species not reported otherwise during this period. The most common species was harbour porpoise (*Phocoena phocoena*), with 2651 individuals. The average number of porpoises per year was 530, lower than the preceding seven-year average, but numbers fluctuated largely between years and there has been no particular trend after the strong increase in the early 2000s. The monthly pattern of strandings as recorded during the previous periods, with peaks in March and July-September, remained the same. The number of stranded porpoise is equally spread along the entire coastline. The density, expressed as the number of stranded porpoise per kilometre per year, is 0.6 for the entire coastline, or 1.2 if the extensive and less well surveyed areas of Western Scheldt, Eastern Scheldt and Wadden Sea proper are omitted. Sex ratio remained stable over the years and is in line with results from before 2015, with a preponderance of males. On the basis of length, over half were immature and 8.7% neonate. Among neonates and immatures there was a preponderance of males as well, but not in adults. In the Wadden Sea area more neonates and adults were found than in the other two subareas. The major cause of death was infectious disease, followed by predation by grey seal (*Halichoerus grypus*). Accidental by-catch was identified as the cause of death of 11% of the stranded animals. Of particular interest was the stranding of six sperm whales (*Physeter macrocephalus*) in January 2016, the largest stranding event of this species in the Netherlands. It was part of a stranding event spread out over the Central and southern North Sea, involving thirty individuals. During 2015-2019 four dead fin whales (*Balaenoptera physalus*) and eight minke whales (*B. acutorostrata*) were reported, several of which were hit by ships. There seems to be a slight increase in the strandings of fin whale and Sowerby's beaked whale (*Mesoplodon bidens*) since 2000, while white-beaked dolphin (*Lagenorhynchus albirostris*) shows a decrease. There is no temporal trend for any of the other species since 2000.

Keywords: Cetacea, harbour porpoise, *Phocoena phocoena*, sex bias, mortality, ship collision, North Sea.

Introduction

There has been an increasing interest in cetaceans in the North Sea over the past decades. For instance, three complete censuses, SCANS I, II and III, were executed (Hammond et al. 2002, 2013, 2017) and desk studies were performed to put these in a larger perspective, for instance for identifying areas of importance to cetaceans and human resources (Waggit et al. 2019). Also in the Dutch section of the North Sea, attention to cetaceans and other marine life has increased (e.g. Autenrieth et al. 2017, Foster et al. 2019) and national surveys are nowadays undertaken on a more or

less regular basis (e.g. Scheidat et al. 2013, Aarts et al. 2016, Geelhoed & Scheidat 2016). Most of these are directed towards monitoring of populations as a basis for conservation. Focal species usually concerns harbour porpoise (*Phocoena phocoena*). However, surveys are costly, as they are often dedicated multi-day ship-based operations or aerial surveys, and/or require expensive equipment. A cost-effective way to monitor harbour porpoise presence, as well as that of other species, is the registration of stranded animals. It is difficult to understand how the number of animals on the beach relates to the population and there are several factors complicating the interpretation of rising and falling numbers (Peltier et al. 2013). Numbers however can be considered as relative counts and fluctuating numbers may be used as a proxy for local population trends.

Here we present numbers of stranded cetaceans on the Dutch coast, and of cetaceans brought in on the bulb of ships, from 2015 up to and including 2019. This report is the fourtieth in a series on cetacean strandings in the Netherlands over multiple years (e.g. van Deinse 1933, Husson & van Bree 1972, Camphuysen et al. 2008) and follows on that by Keijl et al. (2016), who reviewed seven years of strandings. Even though the above mentioned interest in whales and dolphins in the North Sea has resulted in a growing number of sightings of live animals, the rare species remain unrecorded during censuses. Documenting strandings appears to be the only way to record their presence (cf. Pyenson 2011) and therefore this list includes all records of cetaceans, also finds of loose bones and skulls.

A change in numbers of strandings of a particular species can be an indication of a shifting range, for instance due to changing conditions. There are aspects of cetacean ecology that can only be studied when the animals are dead, such as pregnancy rate, disease or diet. The Netherlands have ratified the Habitats Directive as well as the Marine Strategy Framework Directive and is thus obligated to maintain a favourable conservation status of the smaller cetacean species. Given the increasing human use of the North Sea, for instance for wind and solar energy production, it is expected that pressure on cetacean populations will increase.

The harbour porpoise is the most common Dutch cetacean, with hundreds of strandings per year, compared to a few individuals of any other species. The number of dead porpoises on the Dutch coast has increased from 53 in 1990 to 888 in 2011, the latter figure being the highest number recorded thus far. Since then, the number has decreased to a couple of hundred per year. Despite the impressive increase in elaborate and dedicated studies (e.g. Blom 1989, Addink et al. 1995, Addink & Smeenk 1999, ASCOBANS 2005, Murphy et al. 2010, Camphuysen & Siemensma 2011, Jansen 2013, Scheidat et al. 2013, Leopold 2015, Gilles et al. 2016, Hammond et al. 2017), it is still unknown what caused the fall and rise in numbers of porpoises in the southern North Sea in the 1950s and 1990s respectively.

In the following, all cetacean strandings are listed individually, with the exception of harbour porpoise. Although more details may be available on www.walvisstrandingen.nl, where peculiarities are mentioned on single animals, this multi-year overview aims at giving insight in changes that have occurred over the recent past, something that cannot be obtained by scrolling through individual cases. For general information on distribution, diet, habitat, biology and trends in strandings of cetaceans in the Netherlands up to 2012, we refer to Broekhuizen et al. (2016).

Methods

Methods for collecting data on strandings are the same as mentioned in the previous report (Keijl et al. 2016). People involved in the strandings network collect and report strandings of seals and cetaceans directly to www.walvisstrandingen.nl, to www.waarneming.nl or

to Sealcentre Pieterburen. Reports are also received from day visitors. Data are stored in the national database and made available online at www.walvisstrandingen.nl, managed by Naturalis Biodiversity Center in Leiden.

The data in this report are presented per species; the taxonomic order and nomenclature follows Wilson and Reeder (2005), with the exception of *Balaenoptera* instead of *Megaptera* for humpback whale (following Sasaki et al. 2005, Miller 2007 and Árnason et al. 2018) and *Leucopleurus* instead of *Lagenorhynchus* for white-sided dolphin (following LeDuc et al. 1999 and May-Collado & Agnarsson 2006). Details are presented for all species with the exception of harbour porpoise, for which the data are summarised and analysed (table 1). Baleen whales caught on the bulb of ships and brought into Dutch waters are included in the report, as well as finds of loose bones of species other than harbour porpoise, as long as these cannot be linked to another strandings case.

It has been convention in previous reports to mention additions, omissions, misidentifications et cetera from the past. This has proven unfeasible; corrections on strandings in the near or far past are updated continuously. For the most recent situation on a precise number of a particular species, correct identification, or other information of individual specimens, it is recommended to consult www.walvisstrandingen.nl, or contact the database manager at Naturalis.

Area

The Dutch coast consists entirely of sandy (bordering the North Sea) or muddy (Wadden Sea proper, some intertidal parts in the southwestern Delta) substrate, but there are some dikes and piers scattered along the coast. Patterns of stranded harbour porpoise are described for three parts of the coastline differing in physical characters (table 2): A. The Delta area, in the southwest, from the Belgian border up to and including Maasvlakte. B. The mainland coast between Hoek van Holland and Den Helder. C. The Wadden Sea, from Razende Bol to Rottumeroog. The 'inner Delta' includes the borders of the rivers Western Scheldt and the partly closed Eastern Scheldt and Grevelingenmeer. The Wadden Sea is subdivided into the North Sea coast of the islands and the Wadden Sea proper, the latter of which includes the Wadden Sea side of the islands, the north-eastern part of province Noord-Holland, Afsluitdijk and the mainland coast of the provinces of Friesland and Groningen. The islet of Razende Bol is combined with Texel (North Sea coast), Griend with Vlieland (Wadden Sea), and Engelsmanplaat with Schiermonnikoog (North Sea coast), while the easternmost islets of Rottumerplaat and Rottumeroog are combined to 'Rottum' (Wadden Sea). The length of the coast of the subareas is given in table 2. See Camphuysen et al. (2008) for a map.

Coverage

Coverage of the complete Dutch coastline was probably similar to that during the previous reporting period (2008-2014). On the North Sea beaches of the Delta and mainland coast coverage is expected to be close to 100%, but it is lower on the North Sea beaches of the Wadden Sea islands, especially outside weekends, holidays and in summer. The coverage of the extensive Inner Delta and the Wadden Sea is low, but unfeasible to estimate. In these areas, beached carcasses are found only by chance, illustrated by the fact that fresh harbour porpoise carcasses are reported from the same locations through the years, for instance near a main entrance to the beach, near an access road, or bordering a harbour.

Research

A number of cetaceans has been collected for research. Smaller individuals are usually

transported to the Faculty of Veterinary Medicine of Utrecht University, where they are necropsied to establish the cause of death, while basic data such as sex and length are standard recordings. Large cetaceans are sometimes investigated on the beach or at a more suitable place nearby. About half of the specimens found during 2015-2019 were not necropsied, but were transported to a destruction site (see under respective species). Some skeletons, or parts (mostly skulls), are collected and stored in the collection of Naturalis Biodiversity Center in Leiden, at nature museum Ecomare on Texel, or at other natural history museums.

Systematic list

During 2015-2019 a total of 2701 stranded cetaceans were reported, involving eleven species (table 1). Two of these concern recent or subfossil bones (not included in table 1), one a single tooth of a sperm whale, while nine are recent cetaceans which could not be identified. All species had been recorded previously in the Netherlands. Since 1900 and excluding harbour porpoise, a total of 974 individual cetaceans belonging to 22 species have been found on Dutch shores (figure 1). In 2015 six species were recorded (one by a bone only), in 2016 five, in 2017 nine (one by a single bone only), and four in both 2018 and 2019. The majority of records however consists of harbour porpoise (2651 individuals, making up 98% of the total number of cetaceans in 2015-2019).

Common minke whale (*Balaenoptera acutorostrata*)

2015-2019: 8 records
2000-2014: 10 records
Before 2000: 27 records

7/11/2015 Rotterdam, Zuid-Holland. Female, 506 cm (measured), 910 kg (weighed).

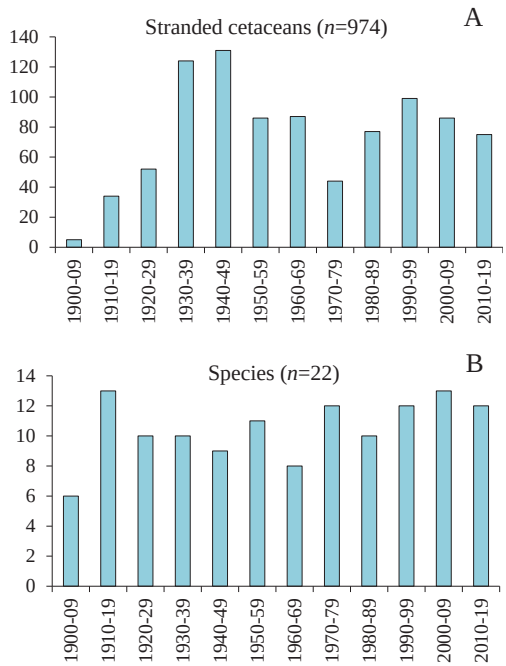


Figure 1. Number of all stranded cetaceans per decade since 1900 (A) and number of species per decade (B), both without harbour porpoise.

Fresh, complete. Skull, a few vertebrae, both flippers and remaining baleens collected (RMNH.5070448). Reported by J. van der Hiele and R. Duyndam. Necropsied by Utrecht University (case no. BA1).

12/12/2015 Razende Bol, Noord-Holland. Pregnant female, 880 cm (measured), 6400 kg (weighed). Rotten, complete. Fetus 200 cm (estimated). Entire skeleton and tissue collected (RMNH.5070317.a), fetus collected (RMNH.5070317.b). Reported by Hans Eelman and Bert Hollanders. Necropsied by Utrecht University (case no. BA2).

13/4/2017 Vrouwenpolder, Zeeland. Male, incomplete (skull 160 cm). Rotten. Not collected, not necropsied.

14/11/2017 Texel, Noord-Holland. Pregnant female, 700 cm (estimated). Rotten, head dam-

Table 1. Stranded cetaceans on the Dutch coast in 2015-2019, including unidentified species. The second last column gives the total per species in the past twenty years, the last column the average number per year. Five species reported in 2000-2014 but not during the last pentade, are presented in the lower part (in italics). Records of loose bones/skulls are excluded.

	2015	2016	2017	2018	2019	2000-2019	Average/ year 2000-2019
Common minke whale	2	-	4	-	2	18	0.9
Fin whale	1	-	1	-	2	15	0.8
Common dolphin	-	3	1	1	-	9	0.5
Long-finned pilot whale	2	-	-	1	-	6	0.3
White-beaked dolphin	-	-	1	-	1	58	2.9
Striped dolphin	-	2	1	-	-	6	0.3
Harbour porpoise	309	667	689	478	508	8962	448
Sperm whale	-	6	1	1	-	16	0.8
Sowerby's beaked whale	-	2	2	-	-	8	0.4
Unidentified Cetacea	0	3	-	0	5	28	1.4
Total	314	683	700	481	518	9126	
Humpback whale	-	-	-	-	-	6	0.3
Killer whale	-	-	-	-	-	1	0.05
Bottlenose dolphin	-	-	-	-	-	2	0.1
White-sided dolphin	-	-	-	-	-	4	0.2
Blainville's beaked whale	-	-	-	-	-	1	0.05

aged, not weighed. Fetus 170 cm (estimated). Complete skeleton (RMNH.MAM.60362.a), tissue (RMNH.MAM.60362.b), fetus skeleton (RMNH.MAM.60362.c) and fetus tail (RMNH.MAM.60362.d) collected. Reported by S. de Wolf and Rijkswaterstaat. Not necropsied.

9/12/2017 Zandvoort, Noord-Holland. Female. Rotten, incomplete (head missing), remainder 450 cm (estimated). Not collected, not necropsied. Reported by K. Kooimans and R. Noort.

12/12/2017 Neeltje Jans, Zeeland. Male, about 680 cm (measured), about 1900 kg (weighed). Rotten. Collected by Natuurhistorisch & Volkenkundig Museum Oudenbosch. Tissue sampled by Utrecht University (case no. BA3), no cause of death established due to the decomposition.

8/7/2019 Texel, Noord-Holland (figure 2). Female, 403 cm (measured), 530 kg (weighed). Fairly fresh, complete. Necropsied by Utrecht University (case no. BA4). Collected by Ecomare (no collection number yet). Reported by A. Oosterbaan.

9/7/2019 Schiermonnikoog, Friesland. Rotten, incomplete (head missing), remainder 350 cm (estimated). Nothing collected by institutions, but a single lower jaw of presumably this individual was found nearby by day visitors.

Despite being a regular inhabitant of the North Sea, minke whale is not recorded yearly on the beach. The species is fairly common in the northern part of the North Sea, especially in summer, but rare further south (Camphuysen & Smeenk 2016). However, the number of beached minke whales seems to be increasing (figure 3A).

Seven out of eight minke whales stranded during this period were sexed and only two

Table 2. Total number of harbour porpoise in 2015-2019 in the Netherlands per subarea. Also given are density (average density, *n*/km/year), percentage of males (with total number of sexed individuals between brackets), and age (as percentage per length class, in cm; see text). See also the Methods section for the geographic subdivision. Note: coastal length differs slightly from Keijl et al. (2016) because Grevelingenmeer and Haringvliet (both with 0 porpoises) are omitted.

	Total	Densitiy	% males (*n*)	<90 cm	90-130 cm	>130 cm	(*n*)
Delta (408 km)	868	0.4	58.9 (643)	15.0	51.8	33.2	(247)
Zeeuws-Vlaanderen	31	0.4	55.0 (20)	0.0	50.0	50.0	(8)
Walcheren	273	1.3	58.8 (228)	12.7	47.3	40.0	(55)
Schouwen	172	1.4	61.9 (139)	12.2	51.0	36.7	(49)
Goeree	158	1.8	51.2 (86)	13.3	64.4	22.2	(45)
Voorne	35	0.8	78.3 (23)	30.8	15.4	53.8	(13)
Inner Delta	126	0.1	54.3 (94)	21.7	63.0	15.2	(46)
Maasvlakte	73	0.8	66.0 (53)	12.9	41.9	45.2	(31)
Mainland coast (153 km)	914	1.2	54.7 (512)	12.4	57.3	30.2	(354)
Zuid-Holland	510	1.4	54.4 (338)	12.7	60.8	26.5	(204)
Noord-Holland	404	1.0	55.2 (174)	12.0	52.7	35.3	(150)
Wadden Sea total (384 km)	869	0.5	62.4 (263)	10.9	55.6	33.5	(495)
North Sea coast (107 km)	745	1.4	61.5 (218)	10.5	55.6	23.9	(446)
Texel	210	1.3	56.9 (109)	15.8	53.3	30.9	(152)
Vlieland	276	1.9	64.7 (17)	4.9	56.8	38.4	(185)
Terschelling	96	1.7	65.5 (29)	9.4	53.1	37.5	(32)
Ameland	107	1.3	59.1 (44)	15.4	53.8	30.8	(52)
Schiermonnikoog	56	0.6	84.2 (19)	12.0	68.0	20.0	(25)
Wadden Sea (277 km)	124	0.1	66.7 (45)	14.3	55.1	30.6	(49)
Texel	27	0.2	71.4 (14)	14.3	64.3	21.4	(14)
Vlieland	6	0.1	100.0 (2)	0.0	50.0	50.0	(4)
Terschelling	23	0.2	54.5 (11)	0.0	50.0	50.0	(8)
Ameland	4	0.0	66.7 (3)	0.0	33.3	66.7	(3)
Schiermonnikoog	8	0.1	100.0 (2)	66.7	33.3	0.0	(3)
Rottum	18	0.4	- (0)	0.0	0.0	100.0	(1)
Noord-Holland	3	0.0	100.0 (2)	-	-	-	(0)
Friesland	22	0.1	42.9 (7)	16.7	58.3	25.0	(12)
Groningen	13	0.0	75.0 (4)	25.0	75.0	0.0	(4)
Total (945 km)	2651	0.6	58.0 (1418)	13.5	55.3	23.9	(1096)

were male. Of the four females investigated, two were pregnant. Two out of eight were fresh or fairly fresh when stranded, indicating that they had died in the vicinity of the Dutch coast. Out of the six that were (partly) investigated, two had likely been hit by a ship, and one had a broken back, although whether this had happened *post mortem* could not be established. The minke whale from 8 July 2019 had scoliosis (figure 2).

Fin whale (*Balaenoptera physalus*)

2015-2019: 4 records
2000-2014: 11 records

Figure 2. Common minke whale. Stranded on Texel, 8 July 2019. *Photo: Frouke Fey*.

Before 2000: 26 records

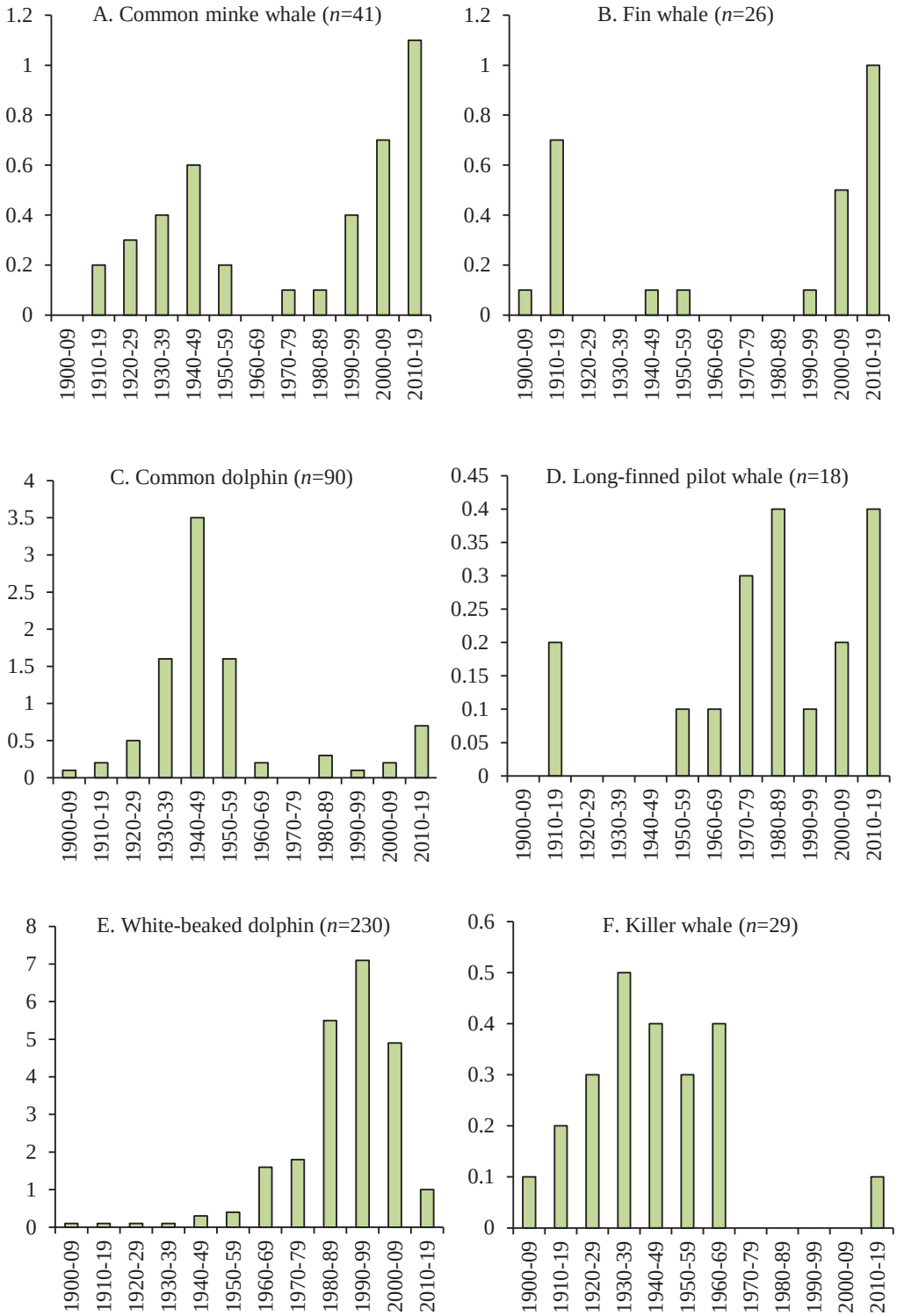
9/11/2015 Terneuzen, Zeeland. Male, 1160 cm (measured), 10,000 kg (weighed). Skeleton collected by the Faculty of Veterinary Medicine at Ghent University, Merelbeke, Ghent, Belgium. Reported by J. van der Hiele and R. Duyndam. Necropsied by Ghent University.

20/8/2017 Texel, Noord-Holland. Female, 1840 cm (measured). Complete skeleton collected by Ecomare, Texel (no collection number yet). Reported by Ecomare. Not necropsied.

7/6/2019 Vlissingen, Zeeland. Male, 1570 cm (measured), 16,000 kg (weighed), but part or most of abdominal organs missing. Not collected. Reported by J. van der Hiele. Necropsied by Utrecht University (case no. BP7).

10/9/2019 Ter Heijde, Zuid-Holland (figure 4). Female, 1440 cm (measured). Collected by Ecomare (baleens; no collection number yet) and Naturalis (bulla, hyoid, eye, left and right flipper, 1 scapula and tissue, RMNH. MAM.59671). Reported by K. Kooimans and R. Noort. Not necropsied.

Necropsy on the fin whale from June 2019 revealed that it was hit by a ship alive (IJsseldijk & Gröne 2019a). Even though only two out of the four fin whales were necropsied (Lempereur et al. 2017, IJsseldijk & Gröne 2019a), the other two were probably hit by a ship as well (see for instance Haelters et al. 2016 and figure 4). The same was suspected for all six fin whales found in 2008-2014 (Keijl et al. 2016). The fin whale that stranded on 20 August 2017 was recorded, and photographed, already on 7 August on a routine flight by the coast guard. It was floating in Dutch waters close to the British/Dutch border, almost 92 km west of The Hague, and as it posed no hazzard to ship traffic, it was left untouched. It was already discoloured and much of the skin was missing and it had thus been dead for several days. It was subsequently located and photographed from the air on four more days (Keijl 2017). At first, the carcass floated around in the same general area with an average speed of 3-6 km/day, but after 18 August it floated in a north-easterly direction with an average speed of 23 km/day, until it stranded on Texel two days later.


A. Common minke whale (n=41)
B. Fin whale (n=26)
C. Common dolphin (n=90)
D. Long-finned pilot whale (n=18)
E. White-beaked dolphin (n=230)
F. Killer whale (n=29)
1900-09
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1990-99
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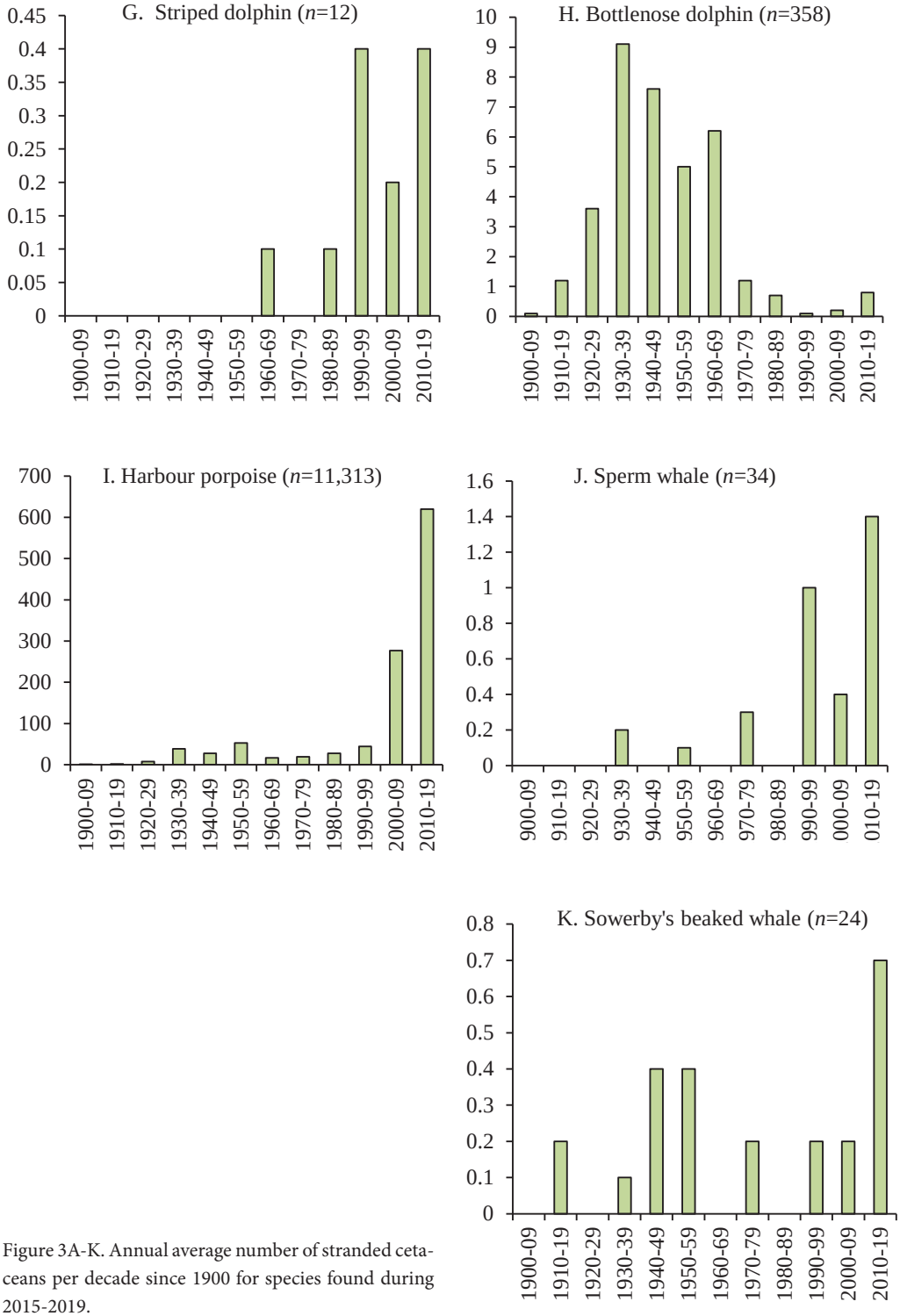

Figure 3A-K. Annual average number of stranded cetaceans per decade since 1900 for species found during 2015-2019.

Figure 4. Fin whale, Ter Heijde, 10 September 2019. *Photo: Rinus Noort.*

Numbers of stranded fin whales in the Netherlands are naturally low, since the species does not occur in the southern North Sea, but the number transported into the North Sea seems to be increasing (figure 3B). The graph of strandings shows a remarkable similarity to that of minke whale. The database contains 41 fin whale records, the oldest dating back to 1306. Between 1901-2000, there were eleven recordings (on average 1 per decade), with a peak in November, when six out of eleven were reported. Of these, four were found in 1914 and their death was ascribed to exploding sea mines (van Deinse 1915). From 2001-2010 there were five (0.5 per year), from 2011-2019 ten (1 per year). The monthly pattern seems to have shifted to the summer period, with five out of eleven strandings in August and another five in June and September combined (figure 5).

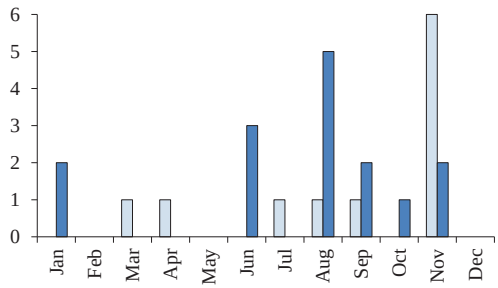

Figure 5. Strandings of fin whales per month in 1900-2000 (pale bars) and 2001-2019 (dark bars) in the Netherlands.

Common dolphin (*Delphinus delphis*)

2015-2019: 5 records
2000-2014: 4 records
Before 2000: 83 records

31/1/2016 Zurich, Friesland. No length reported. Fairly fresh, but washed away by the incoming tide. Reported by I. Ruivenkamp and M. Bakker Paiva. Not necropsied.

21/2/2016 Harlingen, Friesland. Female, 189 cm, 62 kg (but parts missing). Rotten. Entire skeleton collected (RMNH.MAM.60630). Reported by G. Hehenkamp and D. Visser. Not necropsied.

2/9/2016 Wassenaar, Zuid-Holland (figure 6). Male, 220 cm, not weighed, stomach contents

Figure 6. Common dolphin. Wassenaar, 2 September 2016. *Photo: Rinus Noort*.

collected. Skull and flipper collected (Utrecht University, collection number DD4). Reported by J. Warmenhoven and M. Groenenboom. Tissue sampled by Utrecht University (case no. DD4), no cause of death established due to the advanced state of decomposition.

11/4/2017 Nummer Eén, Zeeland. Female, 200 cm (estimated). Rotten. Skull, cervical vertebrae and flipper collected (RMNH.MAM.60364). Reported by P. Wolf. Tissue sampled by Utrecht University (case no. DD5), no cause of death established due to the advanced state of decomposition.

16/4/2018 Westenschouwen, Zeeland. Female, 154 cm (measured), 36 kg (weighed). Stranded alive, but died soon after. Skull collected (RMNH.MAM.60473). Reported by M. Henzel and L. Solé. Necropsied by Utrecht University (case no. DD6).

The stomach of the common dolphin from 2 September 2016 was filled with fish remains. The carcass was badly decomposed and it was impossible to establish the cause of death. The nature of the stomach contents suggests it had last fed in the southern British Channel or further south (M.F. Leopold & G.O. Keijl).

After a period of regular occurrence in the 1930s-1950s, common dolphin has become rare again in the North Sea (figure 3C).

Long-finned pilot whale (*Globicephala melas*)

2015-2019: 3 records
2000-2014: 3 records
Before 2000: 18 records (124 individuals)

11/1/2015 Hondsbossche Zeewering, Noord-Holland. Female, 417 cm (measured), 600 kg (weighed). Rotten, almost complete (fluke missing). Skeleton and tissue collected (RMNH.5069952). Reported by Van Oort/Boskalis and A. Gronert. Necropsied by Utrecht University (case no. GM2).

2/12/2015 Vlissingen. Male, 470 cm (measured), not weighed. Rotten, complete. Skull, cervical vertebrae, first and second ribs and hyoid collected (RMNH.MAM.60470). Reported by J. van der Hiele.

18/11/2018 Egmond aan Zee, Noord-Holland (figure 7). Male, 550 cm (measured), 2021 kg (weighed). Stranded alive, but died soon after. Skull and tissue collected (RMNH.MAM.59217). Reported by L. IJsseldijk. Necropsied by Utrecht University (case no. GM4).

Figure 7. Long-finned pilot whale. Egmond aan Zee, 18 November 2018. *Photo: Hans Verdaat*.

After some mass strandings in the nineteenth century, there have only been strandings of solitary animals. Between 1950 and 2019, there were on average 0.22 strandings per year; there were four strandings from 1981-1989, and only one from 1990-1999 (figure 3D).

The pilot whale that stranded in 2015 died due to asphyxiation after a common sole (*Solea solea*) had become stuck in its nasal cavity, similar to the one that stranded a month earlier (IJsseldijk et al. 2015). The animal stranded in 2018 had died as a result of infectious disease (IJsseldijk & Gröne 2019b).

White-beaked dolphin (*Lagenorhynchus albirostris*)

2015-2019: 2 records
2000-2014: 57 records
Before 2000: 173 records

8/12/2017 Wijk aan Zee, Noord-Holland. Male, 262 cm (measured), 280 kg (weighed). Fresh, complete, probably stranded alive. Collected by Het Natuurhistorisch (number 17-214). Reported by Ruud van Wilgenburg. Necropsied by Utrecht University (case no. LA10).

7/8/2019 Kijkduin, Zuid-Holland. Female, 234 cm (measured), 214 kg (weighed). Collected (RMNH.MAM.59788). Live stranded. Reported by SOS Dolfijn, K. Kooimans and R. Noort. Necropsied by Utrecht University (case no. LA11).

Two white-beaked dolphins in five years is a very modest number compared to former times, when sometimes up to 13 per year were reported. Between 1960-1980, the average number of stranded individuals rose above one per decade and was soaring to an average of almost seven per year between 1981-2000; in 2010-2019 it went back to one per year (figure 3E). A study on white-beaked dolphin strandings across the North Sea over a period of 27 years confirmed a northward shift, explained as a change in habitat due to climate change and its effect on distribution of prey (IJsseldijk et al. 2018a). See also MacLeod (2009) and Lambert et al. (2014) for more discussion on this issue and Schick et al. (2020) for causes of mortality of white-beaked dolphins in the southern North Sea.

Killer whale (*Orcinus orca*)

2015-2019: 1 record
2000-2014: 5 records

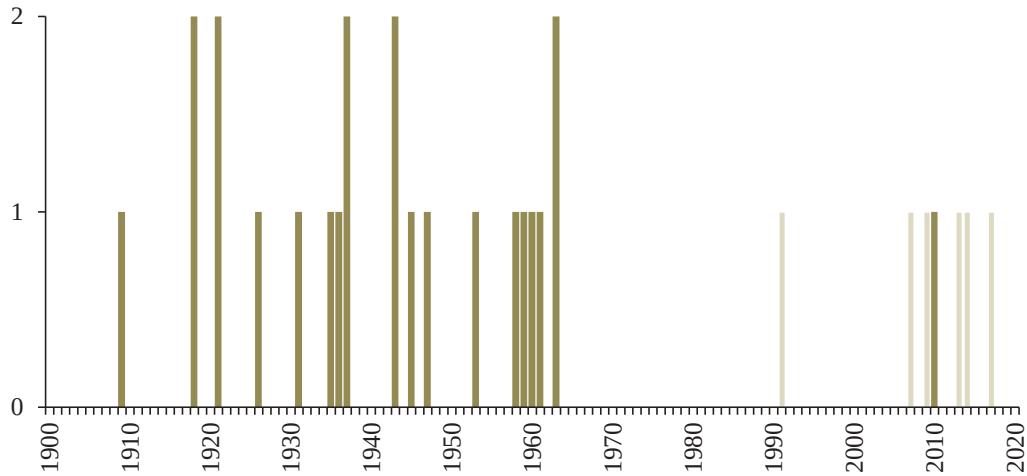

Figure 8. Strandings of killer whales (dark bars) and finds of bones (pale bars) in the Netherlands since 1900 (*n*=29).

Before 2000: 29 records

9/1/2017 Schiermonnikoog, Friesland. Part of skull. Reported by Thijs de Boer.

In the beginning of the twentieth century, some individuals apparently wandered south from the population present in the northern North Sea every now and then and got stranded in the Netherlands (figures 3f and 8). After the stranding in 1963 however, there has only been a single report, in 2010 (Keijl et al. 2016). All other records after 1963 refer to finds of bones or skulls only.

Striped dolphin (*Stenella coeruleoalba*)

2015-2019: 3 records
2000-2014: 3 records
Before 2000: 6 records

19/1/2016 Ameland, Friesland (figure 9). Female, 220 cm (measured), 120 kg (weighed). Lactating female, possibly stranded alive. Collected (no collection number yet). Reported by J. Krol. Necropsied by Utrecht University (case no. SC1).

19/1/2016 Ameland, Friesland. Female, 125 cm (measured), 29 kg (weighed). Female, possibly stranded alive. Skeleton collected (RMNH.5070365). Reported by J. Krol. Necropsied by Utrecht University (case no. SC2).

25/10/2017 Zoutelande, Zeeland. Female, 205 cm (measured), 77.5 kg (weighed, but incomplete). Rotten, virtually complete. Skeleton and tissue collected (RMNH.MAM.60361.a-b). Male fetus in uterus, length 50 cm (measured), collected (RMNH.MAM.60361.c), tissue sampled by Utrecht University (case no. SC3).

The two that stranded on 19 January 2016 were a mother and her calf. Striped dolphin has a tropical-temperate distribution. The number of strandings is increasing (figure 3G), probably due to a rising number of individuals wandering north (e.g. Santos et al. 2008, Coombs et al. 2019).

Bottlenose dolphin (*Tursiops truncatus*)

2015-2019: 3 records
2000-2014: 7 records
Before 2000: 359 records

Figure 9. Striped dolphin. Ameland, 19 January 2016. *Photo: Johan Krol.*

4/1/2015 Terschelling, Friesland. Only right jaw. Reported by D. Ruyg.

13/5/2015 Noordwijk, Zuid-Holland. Only left jaw, not very recent. Reported by R. Noort.

18/12/2015 Schiermonnikoog, Friesland. Single recent vertebra. Reported by T. de Boer.

Between 1980 and 1983 there were seven records. After 1983 and up to and including 2019, the species was recorded 'in the flesh' only in 1988, 1991, 2007 and 2013 (all single specimens) and it has become much rarer since the 1960s, after a period of regular occurrence during the decades before (figure 3H).

Harbour porpoise (*Phocoena phocoena*)

2015-2019: 2651 records
2015: 309
2016: 667
2017: 689
2018: 478
2019: 508
2000-2014: 6312 records
Before 2000: 2351 records

Numbers and density
Since the steep increase of stranded harbour porpoises in 2006, with 552 reported in that year, yearly totals have remained invariably high. The highest numbers were recorded in 2011 and 2013, with 888 and 875 respectively and, hence, the total number during 2010-2019 was much higher than that in 2000-2009 (figure 3I). The numbers, however, fluctuate between years (figure 10). The average number of 530 stranded porpoises per year during 2015-2019 was lower than the 709 during the previous period (2008-2014, Keijl et al. 2016). This is mainly caused by the extremely high numbers in 2011 and 2013 and the unexpectedly low number in 2015. It was exactly ten years back, in 2005, when a similar low number (310) was recorded. The monthly pattern, with peaks in March and July-September, did not differ significantly from that during the previous period of 2008-2014, although the

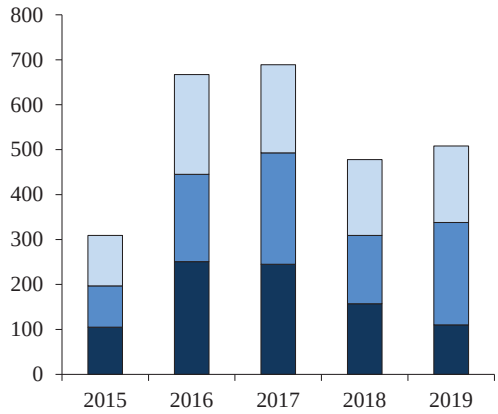

Figure 10. Number of dead harbour porpoise in 2015-2019 along the Dutch coast (www.walvisstrandingen.nl, *n*=2651). Dark blue=Delta, blue=mainland coast, light blue=Wadden Sea.

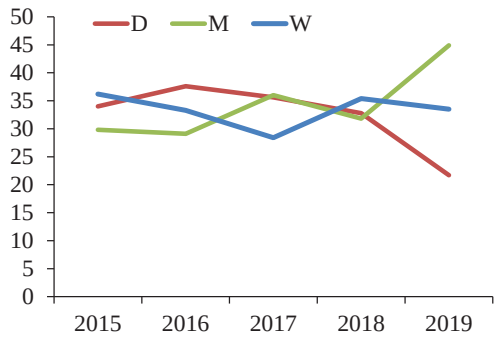

Figure 11. Proportion of dead harbour porpoise in three subareas in 2015-2019. D=Delta, M=mainland coast (= provinces of Noord-Holland and Zuid-Holland), W=Wadden Sea.

peak in March was lower and the one in summer more pronounced.

The percentage of harbour porpoise found in the three subareas – Delta, mainland coast and Wadden Sea – are comparable, with each making up about a third of the total (figure 11). This seems odd, as the coastline length of the Delta makes up 43% of the total coastline, and that of the Wadden Sea 41% (table 2). If the Western Scheldt, Eastern Scheldt and Wadden Sea proper are excluded, including the dead harbour porpoise (50 in Western Scheldt, 76 in Eastern Scheldt and 124 in Wadden Sea respectively, together making up 9.4% of the total), a higher proportion of harbour porpoise is to be found on the mainland coast, while the proportion on the beaches of the Delta and Wadden Sea islands drops slightly (table 3).

The density, expressed as the number of stranded harbour porpoise per kilometre per year, is 0.6 for the entire coastline, or 1.2 if the above mentioned 'inner waters' are excluded. The densities differ between subareas, with the highest density reported on the North Sea coast of the Wadden Sea islands (average 1.4), closely followed by the mainland coast (table 2). Within the Wadden Sea, the density is highest on the islands of Vlieland and Terschelling (close to 2). Areas with a density below 1.0 (Zeeuws-Vlaanderen, Schiermonnikoog) are probably under-recorded (Zeeuws-Vlaanderen, the beach of which is well visited, but largely by foreign tourists), or under-reported, because the area is extensive and difficult to survey (Schiermonnikoog).

Sex and age

Most people from the strandings network have seen hundreds of porpoises and are experienced in sexing individuals, even decomposed ones. However, there seems to be a tendency to report a male when a penis is visible, but to leave the sex undetermined if this is not the case. Also, some people are more prone to report the sex, or take measurements, than others. As reports of stranded harbour porpoises are frequently accompanied by digital photographs, it is often possible to sex an individual afterwards.

About half (53.5%) of the individuals in 2015-2019 was sexed, but the sexing rate differs clearly between subregions, with about three quarters sexed in the Delta and less than one fifth in Noord-Holland (even though this comprises 165 individuals). The proportion sexed has been fairly stable through the years (lowest in 2015 with 54.5%, highest in 2017 with 59.0%). The sex ratio seems to have

Table 3. Relative proportion of harbour porpoise (including number, *n*) found in the three subareas (% porpoise) compared to the relative proportion of coastal length (% km). The same is presented separately for the Delta (breakdown Delta), where the North Sea coast is seprated from the inner waters, and for the Wadden Sea (breakdown Wadden Sea), where the sandy North Sea side of the islands is separated from the generally more muddy Wadden Sea proper. At the bottom the same is presented for the three subareas without the inner waters/Wadden Sea proper.

Overall	% porpoise	% km	*n* porpoise
Delta	32.7	43.2	868
Mainland	34.5	16.2	914
Wadden Sea (total)	32.8	40.6	869
Breakdown Delta			
North Sea	85.5	30.9	742
Inner Delta	14.5	69.1	126
Breakdown Wadden Sea			
North Sea	85.7	27.9	745
Wadden Sea	14.3	72.1	124
Without inner waters			
Delta	30.9	32.6	742
Mainland	38.1	39.6	914
Wadden Sea	31.0	27.7	745

been stable during the past twenty years, with a slight skew towards males (58.0%) (58.2% in 2008-2015, 59.0% in 1998-2007). During 2008-2014, the percentage of males decreased from south to north, but this was not the case during the period under discussion, nor during 1998-2007.

From 41.3% we estimated the age (as deduced from length; <90 cm = neonate, 90-130 cm = immature, >130 cm = mature, *n*=1096; cf. Olafsdóttir et al. 2003). Over half were immature (55.3%), the minority neonate (8.7%). Of neonates 63.6% was male, of immatures 60.9%, of adults 46.5%. Most neonates are found in the Wadden Sea area (40%, *n*=135) and about a quarter (27.4%) in the Delta. The numbers however are low (only 27 per year). Between the subareas, there is not much difference in the percentage of neonates relative to the local (stranded) population (11-15%). The proportion of immatures along the coast of Zuid-Holland appears on the high side (60.8%, *n*=606) compared to the other subareas (51.8-55.6%), though lower than in the previous periods. Similar to the previous period, dead adults were (much) more common in the north of the country (46.8% compared to 14.1-23.1% in the other subareas).

Causes of death

During 2015-2019 244 harbour porpoises were examined *post-mortem* at Utrecht University, an average of 49 per year. The aim of this investigation is to determine the cause of death of each individual (see IJsseldijk et al. 2016, 2017, 2018b). A comparison of causes of death between 2008-2013 and 2016-2019 shows a modest rise in infectious disease (24% versus 30%), a decrease of by-catch (18% versus 11%) and a stable influence of grey seal attacks (25% versus 24%). There is however a notable difference in porpoises dying acutely from a grey seal attack, or dying from infection following a (failed) grey seal attack (see also Foster et al. 2019, Gilbert et al. 2020). In the first period 67% died acutely and 33% died of infected wounds (*n*=118), in the second period these percentages were virtually equal (51% *versus* 49%, *n*=55). Comparison among the causes of death between the two periods is hampered by a difference in selected harbour porpoise (all carcasses, or mainly fresh ones, in the first period, to exclusively fresh ones in the second). Other causes of death are food shortage/emaciation (15%) and 'other', among which trauma (10%) (IJsseldijk et al. 2016-2020a). The reason for investigating fresh harbour porpoise only is that it is difficult to get (all, or any) reliable pathological results from decomposed carcasses. However, it puts a bias on the results of both *post-mortem* examination and diet,

because it is likely that fresh porpoise have died near-shore, and their cause of death may differ from those that have died offshore.

Sperm whale (*Physeter macrocephalus*)

2015-2019: 9 records
2000-2014: 9 records
Before 2000: 60 records

12/1/2016 Texel, Noord-Holland. Five males, stranded alive, all died within 12 hours. Lengths 960 cm, 1110 cm, 1010 cm, 1025 cm, 970 cm respectively. Tissue samples (RMNH.MAM.5070346 - 5070350, respectively) and stomach contents collected. Reported by R. Pop and S. de Wolf. Necropsied by Utrecht University (PM3-PM7).

14/1/2016 Texel, Noord-Holland. Male, 1100 cm (but measured inaccurately). Not collected, not necropsied but tissue collected by Utrecht University (case no. PM8). Reported by S. de Wolf.

6/5/2016 Schiermonnikoog, Friesland. Single tooth, probably from upper jaw. Reported by J. Loman-Bakkeveen.

1/12/2017 Domburg, Zeeland. Male, 1256 cm, 20,000 kg (weighed). Possibly stranded alive. Skeleton and tissue sample collected (RMNH.MAM.60366). Necropsied by Utrecht University (case no. PM9).

26/6/2018 Petten, Noord-Holland. Male, 1520 cm (measured), 47,000 kg (weighed). Alive, died same day. Complete skeleton collected (RMNH.MAM.60451). Necropsied by Utrecht University (case no. PM10).

In early 2016, an exceptional stranding of thirty sperm whales took place in the North Sea within a couple of weeks, with strandings spread over most countries bordering the south (see also figure 3J). Although five sperm whales on a single spot on a single day were a unique event for our country, we were 'outnumbered' by Kaiser-Wilhelm-Koog in Germany, where eight stranded. It was presumed a natural event (IJsseldijk et al. 2018c), with increased solar activity coinciding with the timing of southward migration supposedly being the cause of sperm whales swimming south-east into the North Sea instead of following the Faeroe-Shetland Channel in a south-western direction (Vanselow et al. 2017). The animal found in 2017 was emaciated and general debilitation likely resulted in its live stranding, whilst the sperm whale found from 2018 died as a result of infectious disease (IJsseldijk & Gröne 2018a, 2018b).

Sowerby's beaked whale (*Mesoplodon bidens*)

2015-2019: 4 records
2000-2014: 5 records
Before 2000: 16 records

7/3/2016 Borssele, Zeeland (figure 12). Male, 434 cm (measured), 930 kg (weighed). No bones collected. Reported by J. van der Hiele. Necropsied by Utrecht University (case no. MB2).

10/9/2016 near Hoorn, Terschelling. Male, 405 (measured), not weighed. Skull and tissue sample collected (RMNH.MAM.60000). Reported by SOS Dolfijn. Necropsied by Utrecht University (case no. MB3).

17/5/2017 Egmond aan Zee, Noord-Holland. Male, 323 cm (measured), 384 kg (weighed). Stranded alive, died soon after. Complete skeleton collected (RMNH.MAM.60001). Reported by M. Snijders. Necropsied by Utrecht University (case no. MB4)

31/8/2017 Serooskerke, Zeeland. Female, 349 cm (measured), 378 kg (weighed). Stranded alive, died soon after. Skeleton and tissue sample collected (RMNH.MAM.60360). Reported

Figure 12. Sowerby's beaked whale. Borssele, 7 March 2016. *Photo: Joop Fama.*

by A. Dijkstra & L. van Hoven. Necropsied by Utrecht University (case no. MB5).

Sowerby's beaked whale is a rare visitor to the southern North Sea. The number of stranded individuals is low, but there seems to be a slight increase in strandings, with sixteen during the past century, but nine since 2000 (figure 3K). Almost 80% of the Sowerby's beaked whales in the Netherlands stranded during July-September.

Small whale

1/5/2016 Texel, Noord-Holland. Part of skull only (basioccipitale) of a small whale, probably a toothed whale. Reported by W. van Setten.

Dolphin

13/8/2016, Ritthem, Zeeland. Floating in Westerschelde, also reported on 14 August, possibly Bottlenose dolphin. Reported by J. van der Hiele.

15/3/2019, Wijk aan Zee, Noord-Holland. Rotting flesh and bones, skull absent. Two vertebrae collected (no collection number yet). Reported by R. van Wilgenburg.

1/4/2019 Goeree, Zuid-Holland. Part of skull, possibly bottlenose dolphin or white-beaked dolphin. Reported by S. Bout.

2/4/2019 Wassenaar, Zuid-Holland. Part of skull, possibly bottlenose dolphin or white-beaked dolphin. Reported by A. Overklift and J. Seijn.

28/5/2019 Schiermonnikoog, Friesland. Shoulder blade, probably bottlenose dolphin. Reported by T. de Boer and Y. van den Hurk.

31/8/2019 Razende Bol, Noord-Holland. Reported as 'enormous dead animal, looked very much like long-finned pilot whale'. No photographs available. Reported to Zeehondencentrum Pieterburen.

Beaked whale (*Mesoplodon* spec.)

24/4/2016 Terneuzen, Zeeland. Female, 530 cm (measured). Not collected, not necropsied.

This whale unfortunately got lost. Judging from the photographs (see www.walvisstrandingen.nl), Sowerby's beaked whale is a likely candidate.

Discussion

Harbour porpoise is our commonest cetacean, and the commonest one found stranded on the beach, but there is a considerable number of species that also visits the southern North Sea on a more or less regular basis. Of the species that have occurred here since 1900, twelve may

be regarded as more or less regular, as they have been recorded in ten or more years. Of these, bottlenose whale (*Hyperoodon ampullatus*) is nowadays probably the rarest. There have been twelve individuals of this species in ten different years, but seven strandings took place prior to 1960, while the last bottlenose whale prior to 2020 stranded more than 25 years ago (2, in 1993) (but see Keijl 2020).

It is likely that the (slight) increase of fin whales taken into the North Sea on the bow of ships is connected to both the increase of the species in the Bay of Biscay in late summer (Edwards et al. 2015, Authier et al. 2018), the increase in ship traffic (Sardain et al. 2019), and in faster ships (Martinez & Castells 2009). For protection of this species, it is important to establish their provenance, for instance by looking into the diet, and the cause of death. Examining a dead cetacean can provide us with ecological and life history data that are difficult or impossible to obtain in other ways. It is therefore recommended that all beached cetaceans are investigated by qualified researchers, and material saved for potential future research (cf. Keijl et al. 2019).

Recently, IJsseldijk et al. (2020b) have assessed patterns and biological parameters of harbour porpoise stranded between 1990-2017 on the North Sea shores of Scotland, England, Belgium, the Netherlands, Germany and Denmark. To make the data comparable to those of Hammond et al. (2017), the area was divided into six blocks. This resulted in the coast of the Netherlands being split into two sections (sections D and E), of which the southern section (D) formed a unity with Belgium and South-east England. The authors found the steepest increase in strandings in section E, the central and northern part of the Netherlands, while strandings in block D and in block F (the latter comprises the North Sea coast of Germany and Denmark), showed a less steep increase. The yearly pattern of strandings in blocks D and E were comparable, with two stranding peaks per year, as opposed to a single peak in the other blocks. Densities, expressed as number of strandings per kilometre per year, were not presented. They can, however, be calculated here for Belgium using the data from Haelters et al. (2018), who reviewed strandings during 1995-2017. The average density in Belgium increased through the years and varied between 0.05 and 2.28, being the lowest during the early years and the highest in 2013. As the pattern of strandings from the Belgian coast corresponded most with that of (the southern part of the British coast and) the southern half of the Netherlands (IJsseldijk et al. 2020b), we compared the density to the latter (figure 13). The pattern of strandings in Belgium indeed followed that from the Delta, although the density in Belgium was somewhat higher from 2003 onwards. Pattern and density however also correspond to other parts of the Dutch coastline. The strandings pattern per month in Belgium is also very similar to that in the Netherlands during 1995-2017, although the peak in spring in Belgium is slightly less pronounced.

Harbour porpoise is protected under several national and international legislation and agreements (e.g. Habitats Directive, ASCOBANS). Population structure, mortality, food quality, food availability, disturbance, habitat loss, pollution and health are important factors to be assessed in order to protect the species in the North Sea. Fishing gear, especially gill nets and trammel nets, still appear to be an important cause of death (e.g. Jefferson & Curry 1994, Bjørge et al. 2013, IJsseldijk et al. 2016-2019). Since in the Netherlands the municipalities instead of the national authority are presently responsible for the implementation of local recreational fishery legislation (www.decentraleregelgeving.overheid.nl), there is no insight in the impact of gill net and set net fisheries on harbour porpoise mortality on a national scale. Recently, a study on professional set net fishery was conducted, resulting in a calculated by-catch of on average 23 individuals per year (Scheidat et al. 2018). On basis of this study, it was concluded that the annual population mortality

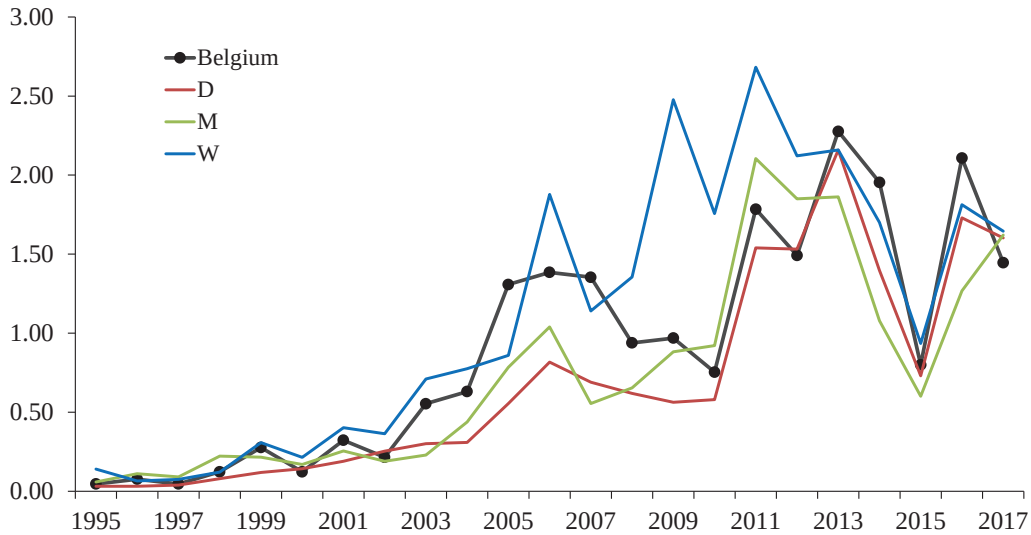

Figure 13. Density of stranded harbour porpoise in Belgium (*n*/km; Haelters et al. 2018) compared to the density in the Netherlands. D=Delta, M=mainland coast, W=Wadden Sea.

due to by-catch was lower than deemed unacceptable as defined by ASCOBANS (ASCOBANS 2005, 2016). However, only Dutch ships were monitored, while there is also extensive set net and gill net fisheries taking place in Dutch waters by foreign countries, and by local fisheries as mentioned earlier. Although harbour porpoise are notoriously difficult to count, there is, according to Hammond et al. (2017), no proof of change in the population of harbour porpoise in the North Sea. For the major shift in distribution (Hammond et al. 2002, 2013, 2017), presence (www.trektellen.nl), density (e.g. Hammond et al. 2017, Geelhoed et al. 2020) and mortality (www.walvisstrandingen.nl) between years and between seasons, several theories have been proposed.

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Samenvatting

Gestrande walvisachtigen op de Nederlandse kust in 2015-2019

Dit is de veertigste meerjarige rapportage van gestrande walvissen in Nederland. In deze rapportage, die de jaren 20015-2019 beslaat, worden 9 soorten gemeld met in totaal 2701 exemplaren. De talrijkste walvis was bruinvis met 2651 exemplaren (98,2%). Sinds 2001, het eerste jaar met meer dan 100 bruinvisstrandingen, zijn de aantallen gestegen via meer dan 500 in 2006 tot 'topjaren' 2011 met 888 en 2013 met 875. Sindsdien fluctueren de aantallen, waarbij vooral 2015 eruit springt als opmerkelijk 'mager' strandingsjaar met 309 bruinvissen. Het gemiddelde aantal per jaar in 2015-2019 was 530, lager dan de 709 in 2008-2014. Het maandelijks aanspoelpatroon, met pieken in maart en juli-september, is gelijk aan vorige jaren. Overal langs de kust lijken door de jaren heen ongeveer evenveel bruinvissen aan te spoelen: Delta, Hollandse kust en Waddengebied maken qua aantal elk ongeveer een derde van het totaal uit. Dit is opmerkelijk, want de kust van de Delta is 2,5 keer langer dan de Hollandse kust, en nagenoeg hetzelfde geldt voor het Waddengebied. Dit komt door de uitgestrekte oevers van de Westerschelde, de Oosterschelde en de Waddenzee, gebieden waar wel bruinvissen aanspoelen maar die veel slechter toegankelijk zijn voor potentiële bruinvisvinders. Dit blijkt ook uit de zeer lage aantallen, respectievelijk 50, 76 en 124 bruinvissen, slechts 9,4% van het totale aantal gevonden bruinvissen, terwijl de kustlengte van deze drie gebieden 59,2% van de totale kustlengte uitmaakt. Overigens zullen ook de aantallen bruinvissen die deze veelal brakke wateren bezoeken kleiner zijn. Als we zowel deze gebieden als de aantallen gevonden bruinvissen daar weglaten, valt het aandeel bruinvissen op de Hollandse kust wat hoger uit (38,1%), iets lager dan op grond van de kustlengte verwacht kan worden. Het aandeel bruinvissen op de Noordzeekust van de Waddeneilanden valt juist wat hoger uit dan verwacht, ook al is het aantal bruinvissen daar vermoedelijk wat onderteld. De dichtheid van aangespoelde bruinvissen, uitgedrukt als aantal per kilometer per jaar, is het laagst in de Delta (0,4) en het hoogst op de Noordzeekust van de Waddeneilanden (1,4); de Hollandse kust neemt een tussenpositie in (1,2). De dichtheid op Vlieland (1,9) en Terschelling (1,7) is het hoogst, en dat is al jaren zo. De laagste dichtheden vinden we in Zeeuws-Vlaanderen (0,4) en het Noordzeestrand van Schiermonnikoog (0,6). Dit is te wijten aan de samenstelling van het strandgaande publiek in Zeeuws-Vlaanderen (vooral buitenlandse toeristen) en aan het zeer uitgestrekte en onoverzichtelijke strand van Schiermonnikoog. Iets meer dan de helft van de bruinvissen is in de besproken periode gesekst (53,5%) en de digitale foto's die doorgaans worden meegeleverd dragen hier in hoge mate aan bij. De sekseverhouding blijft door de jaren onveranderd, met een klein mannenoverschot (58,0%). In de vorige besproken periode (2008-2014) was dit 58,2%, in de periode daarvoor (1998-2007) 59,0%. Omdat bruinvissen hun gehele leven groeien, het hardst in hun eerste levensjaren, kunnen ze op grond van lengte worden ingedeeld in leeftijdsgroepen: <90 cm noemen we hier pasgeboren, 90-130 cm onvolwassen en >130 cm volwassen. In de besproken periode kan 41,3% op deze manier worden ingedeeld. Meer dan de helft (55,3%) is onvolwassen, 8,7% pasgeboren. Van de pasgeborenen is 63,6% man, van de onvolwassen bruinvissen 60,9%, bij adulten 46,5%. Of dit de werkelijke situatie van de populatie weergeeft, of er seksegebonden sterfte optreedt, of dat er nog iets anders aan de hand is, is niet bekend. 40% van de pasgeboren bruinvissen wordt in het Wad-

dengebied gevonden en ongeveer 25% in de Delta. Ook hier is weer niet bekend of in die gebieden ook meer jongen worden geboren (en de sterfte over de gehele kust gelijk zou zijn), of dat de jongensterfte in genoemde gebieden hoger is dan aan de Hollandse kust. Misschien worden estuaria zoals de Delta en het Waddengebied geprefereerd door vrouwtjes met pasgeboren jongen. De meeste dode volwassen bruinvissen komen eveneens uit het noorden van het land (46,8%). In de huidige periode zijn 187 – uitsluitend verse – bruinvissen professioneel onderzocht op doodsoorzaken. De belangrijkste doodsoorzaak is infectie (32,1%, vaak met verhongering of vermagering als gevolg), terwijl de grijze zeehond verantwoordelijk is voor 24,1% van de dode bruinvissen. In de besproken periode is het aandeel door bijvangst omgekomen bruinvissen gedaald naar 11%. In een recente studie, waarin strandingen van bruinvissen in 1990-2017 in de gehele Noordzee zijn geanalyseerd, blijkt de sterkste toename in aantallen te hebben plaatsgevonden in het gebied ten zuiden van IJmuiden/de Belgische kust/Zuidoost-Engeland. Daarnaast vertoont alleen in die sector én in de noordelijke helft van Nederland het jaarlijkse aanspoelpatroon twee pieken (in voorjaar en nazomer), terwijl er elders in de Noordzee steeds alleen een nazomerpiek in het strandingspatroon is en de voorjaarspiek ontbreekt.

Vondsten van bijzondere soorten in de besproken periode waren dwergvinvis (8; in 2000-2019 in totaal 18), gewone vinvis (4, 15), gewone dolfijn (5, 9), griend (3, 9), witsnuitdolfijn (2, 58), gestreepte dolfijn (3, 6), potvis (8, 16) en gewone spitssnuitdolfijn (4, 8). Er waren ook vondsten van ongedetermineerd gebleven walvissen (5), waarvan 1 misschien een gewone spitssnuitdolfijn was. Overigens zijn bij al deze getallen 10 botvondsten inbegrepen, waarvan orka de meest bijzondere was. Sinds 2000 zijn ook bultrug (6), orka (1), tuimelaar (2), witflankdolfijn (4) en spitssnuitdolfijn van de Blainville (1) gevonden, maar niet in de afgelopen vijf jaren. Gewone vinvis lijkt wat gewoner te worden (11 sinds 2000, daarvoor 26). Opvallend is dat, voorzover onderzocht, de meeste gewone vinvissen lijken te zijn aangevaren door een schip. Augustus is dé maand daarvoor (5 van de 11). Ook dwergvinvis lijkt vaker te zijn aangevaren naarmate een karkas vaker goed wordt onderzocht. Er is wel een opvallende tweedeling tussen beide onfortuinlijke soorten: gewone vinvis lijkt ons land overwegend per schip binnen te komen door het Kanaal; de soort wordt vooral in de zuidelijke helft van ons land aangevoerd of spoelt daar aan, met de Maasmond als favoriete regio. Ook de in augustus 2017 op Texel aangespoelde gewone vinvis is vermoedelijk door Het Kanaal de Noordzee binnengekomen. Dwergvinvis daarentegen spoelt vooral in de noordelijke helft van het land aan. Helaas worden nog altijd niet alle dode soorten anders dan bruinvis onderzocht; de score staat zelfs op een magere 58%. De rest wordt domweg verbrand. Dit heeft met financiën te maken maar is een gemiste kans, omdat er nauwelijks andere mogelijkheden zijn om aan een walvis sekse, lengte, gewicht, leeftijd, ziekte, parasieten, dieet enzovoort te onderzoeken. Een dode walvis op het strand is weliswaar jammer voor het individu, maar het biedt een unieke gelegenheid om meer over de soort te leren. Vanwege de toenemende druk op de Noordzee door de mens – denk aan recreatie, visserij, scheepvaartbewegingen, bouwprojecten – en vervuiling is het belangrijk een vinger aan de pols te houden van de stand van walvissen in de zuidelijke Noordzee.

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