

Strandings of cetaceans in Belgium from 1995 to 2017

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Abstract: It is a tradition that regular overviews are published of strandings of cetaceans. The last overviews for Belgium covered the period 1975 to 1989 and 1990 to 1994. This overview deals with strandings between 1995 and 2017. Along the short Belgian coastline, and in Belgian marine and inland waters, 1401 dead or dying cetaceans of twelve species were found between 1995 and 2017. Most of these ($n=1364$) were harbour porpoises (*Phocoena phocoena*), a species that made a remarkable return to the southern North Sea after a virtual absence since the 1950s. Numbers of stranded harbour porpoises quickly rose since the end of the 1990s, and have remained relatively high since then, with on average almost 100 strandings per year between 2005 and 2017. The only other species currently considered as indigenous to the southern North Sea is the white-beaked dolphin (*Lagenorhynchus albirostris*), with 17 records of dead animals in Belgium between 1995 and 2017. Between 1995 and 2017, also a number of species not indigenous to the southern North Sea, or having become extirpated in this area, were recorded. This was the case for Atlantic white-sided dolphin (*Lagenorhynchus acutus*) ($n=1$), bottlenose dolphin (*Tursiops truncatus*) (2), common dolphin (*Delphinus delphis*) (2), striped dolphin (*Stenella coeruleoalba*) (1), long-finned pilot whale (*Globicephala melas*) (1), narwhal (*Monodon monoceros*) (1), sperm whale (*Physeter macrocephalus*) (2), minke whale (*Balaenoptera acutorostrata*) (3), humpback whale (*Megaptera novaeangliae*) (1), fin whale (*Balaenoptera physalus*) (5) and an unidentified dolphin. The two washed ashore bottlenose dolphins, as well as the pilot whale and one of the common dolphins, had probably drifted in from distant areas. Two of the fin whales were brought to port on the bow of an ocean-going vessel, while two other cases concerned finds of recent lower jaws. The stranding of a narwhal was by far the most remarkable one: of this Arctic species only ten stranding records are known for the whole of the North Sea. During the period considered, identified anthropogenic causes of death were incidental catch, ship collision and plastic ingestion.

Keywords: strandings, cetaceans, Belgium, North Sea.

Introduction

It is a tradition that strandings of cetaceans in the Netherlands and Belgium are regularly reported, with most of the reports published in this journal. Especially in the Netherlands the tradition dates back from many decades ago, with almost yearly reports published

by Antonius Boudewijn van Deinse (1933, van Bree 1970), an effort continued by Peter Johannes Hendrikus van Bree (1978, 1982) and Chris Smeenk (van Bree & Smeenk 1978, 1983, Smeenk 1986, 2003). Dutch strandings from 2008 to 2014 were reported by Keijl et al. (2016). In Belgium, Wim De Smet (1974) published the first overview of strandings. He made a huge effort – pre-Internet – to include all known cases, some dating back centuries, from the river Scheldt and from the ‘Flemish coasts’, rang-

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ing from Zeeland (the Netherlands) to Northern France. He published new cases (1969-1975) and additional older cases of strandings in 1981 (De Smet 1981). Subsequently, veterinarian and keen naturalist John Van Gompel (1991, 1996) reported strandings in Belgium from 1975 to 1989 and from 1990 to 1994.

In Belgium, prior to the early 1990s, scientific investigations of stranded animals were mainly conducted on a voluntary and ad hoc basis. This changed after the establishment of a legal framework, with commitments made in international fora. In 1991 ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas; now [...] of the Baltic, North-East Atlantic, Irish and North Seas) was concluded under the auspices of the Convention on Migratory Species (CMS or Bonn Convention). With the aim of meeting specific obligations which the government had accepted in the framework of ASCOBANS, Belgium established a multidisciplinary intervention and research network in 1992. The network, coordinated by the Royal Belgian Institute of Natural Sciences (RBINS), is responsible for scientific investigations of marine mammals washed ashore or bycaught in Belgium. Cetaceans are protected under the Habitats Directive of the European Commission (92/43/EEC), and Belgium implemented aspects of this Directive through legislation on the protection of the Marine Environment (Law of 20 January 1999) and more specifically on the protection of marine species (Royal Decree of 21 December 2001).

Since 1994, yearly overviews on stranded cetaceans were only published in the annual reports of Belgium to ASCOBANS, and from 2014 onwards as stand-alone RBINS reports (Haelters et al. 2016a, 2016b, 2017, 2018a). Efforts are made to report all marine mammal strandings in an online database (www.marinemammals.be), with more detailed data recorded in a database managed by the RBINS. Accounts of particular cases of harbour porpoise and other cetacean strandings were pub-

lished on an ad hoc basis in several journals.

In this contribution we continue the tradition of publishing accounts of stranded cetaceans, and cover the period from 1995 to 2017.

Material and methods

This contribution covers the short Belgian coastline (65 km), the part of the North Sea over which Belgium has jurisdiction and internal waters, including the Belgian part of the river Scheldt and its tributaries. We include not only stranded animals, but also bycaught animals delivered by fishermen, carcasses recovered at sea, animals found dead in the river Scheldt, ship-struck whales that were transferred to Belgium on the bulb of ships and a few recent remains of cetaceans found in fishermen's nets. We do not include sightings of cetaceans, although this was very tempting in one case: an entangled bowhead whale (*Balaena mysticetus*) very close inshore on 31 March and 1 April 2017, probably the first record of this species in the North Sea (Haelters 2017). In most cases, heavily entangled baleen whales die due to emaciation and starvation, or due to systemic infection arising from damage to tissues (Cassoff et al. 2011, Barratclough et al. 2014), and as such, entangled animals should be considered as lost to the population.

Due to the commitments of the government, the cooperation of coastal community services and technical advances, such as the availability of digital cameras and social media, the reporting of strandings can currently be considered as nearly complete, and certainly fast and efficient.

The interventions by the Belgian state in case of strandings of protected species have been agreed in a coastguard framework (Haelters et al. 2013). In case of a marine mammal stranding, a representative of the RBINS is usually informed very quickly, after which the most appropriate intervention is decided. This can be the collection of the carcass, the release

for destruction in case it represents a common animal in an advanced state of decomposition, or autopsy at the stranding location in case of large animals. Small stranded cetaceans, such as harbour porpoises, were in most cases submitted to an external examination, with a description and documentation of characteristics and lesions, after which they were frozen for a later autopsy. Photographs were stored in a database for possible later evaluation of lesions. Most of the stranded animals were investigated by a pathologist of the Department of Morphology and Pathology, Faculty of Veterinary Medicine, University of Liège, with recently also an involvement of veterinarians of the Department of Morphology, Faculty of Veterinary Medicine of the University of Ghent. The investigations follow standardised protocols (Kuiken & García Hartmann 1991, Jauniaux et al. 2002a). The decomposition codes (DCC) presented are: (1) live animal; (2) very fresh; (3) slightly decomposed; (4) very decomposed and (5) mummified or skeletal remains.

Relatively small live stranded animals were usually transported, using dedicated equipment, to a rehabilitation facility in the Netherlands.

Given the large number of records of stranded harbour porpoises (*Phocoena phocoena*), these are not listed on a case-by-case basis, as is done for the other species, but summarised. For the harbour porpoise we provide information on short- and long-term temporal patterns in strandings, sex ratio, age and cause of death.

Results and discussion

Harbour porpoise (*Phocoena phocoena*)

The harbour porpoise is the most common cetacean in Belgian waters, and currently it is probably always present in these waters. In comparison to the previous report (Van Gompel 1996), a remarkable increase in strandings of harbour porpoises has occurred. Where traditionally only three to five strandings were reported in the early 1990s, this number increased dramatically, with on average almost 100 animals per year since 2005 (figure 1), and with a maximum of 148 animals in 2013. In total, 1364 animals were considered, including those found at sea and collected ($n=9$), found (dead) in fish-

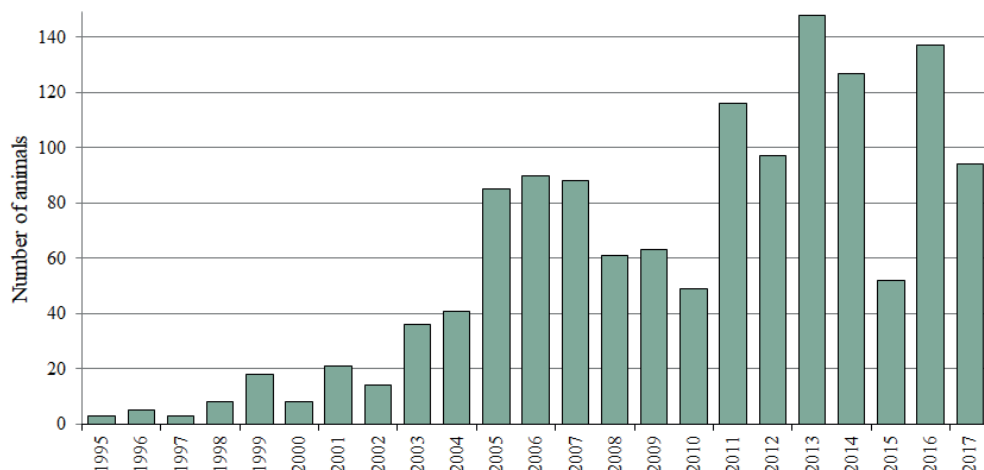


Figure 1. Number of harbour porpoises stranded, bycaught and collected, or found in harbours or in waterways in Belgium between 1995 and 2017 (data RBINS).

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Jan	0	0	0	1	0	2	0	1	4	1	3	1	2	1	6	2	3	4	3	3	2	1	1
Feb	0	0	0	0	3	0	4	1	0	1	5	2	9	3	2	2	2	4	7	4	2	4	5
Mar	0	0	1	1	3	1	3	1	4	8	4	20	8	11	6	4	6	18	11	23	5	31	7
Apr	1	0	1	0	3	1	4	0	7	9	19	17	14	9	5	6	25	13	39	14	6	23	6
May	0	1	0	2	1	0	5	2	4	6	18	16	14	7	5	7	10	11	26	7	7	14	5
Jun	0	1	0	1	1	1	2	2	1	2	7	8	4	7	4	4	4	2	20	18	8	6	9
Jul	1	1	1	1	1	2	0	1	2	7	3	1	4	5	3	2	16	9	13	14	6	14	19
Aug	0	0	0	1	0	1	1	2	8	5	13	13	13	4	10	8	25	7	6	9	3	5	13
Sep	0	2	0	0	0	0	1	4	2	0	5	5	12	3	12	5	7	18	7	24	5	17	5
Oct	0	0	0	1	0	0	0	0	1	0	4	1	4	8	8	4	5	5	12	5	5	12	13
Nov	0	0	0	0	4	0	1	0	2	1	2	3	4	3	1	3	5	1	2	0	3	6	5
Dec	1	0	0	0	2	0	0	0	1	1	2	3	0	0	1	2	8	5	2	6	0	4	6

Figure 2. Strandings of harbour porpoises per month and per year between 1995 and 2017.

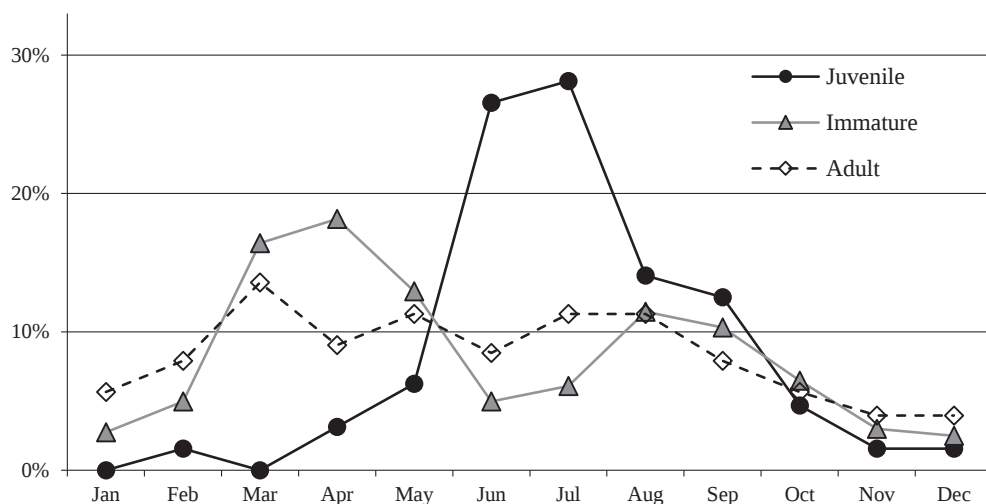


Figure 3. Distribution over the year of the strandings of juvenile harbour porpoises, immatures and adults (as percentage of the monthly total number of strandings).

ing nets on the beach or at sea and collected ($n=9$), live stranded, and died on the beach or taken to a rehabilitation facility ($n=36$), and found in a harbour ($n=28$) or an inland waterway ($n=33$). Excluded were live stranded animals that were returned to sea immediately ($n=10$), bycaught animals that survived and were released immediately ($n=2$) and animals found at sea that remained uncollected (as these could have washed ashore later, and would thus be counted twice).

In the early years of the series considered here, most strandings occurred in late winter and spring (March to May), but during the last ten years the number of stranded animals in summer and autumn (July to Octo-

ber) has increased, with a relatively high number of stranded animals in summer, especially in 2009, 2011, 2014 and 2017 (figure 2). The months with the lowest number of stranded animals were generally November to February.

We can roughly estimate the approximate age of a harbour porpoise using its length; we consider it as adult when longer than 1.3 m, immature when between 0.9 and 1.3 m and juvenile or neonate when shorter than 0.9 m (in accordance with Keijl et al. (2016)). Most of the harbour porpoises that washed ashore were immatures (77% of the animals for which this could be estimated). There were more males (55%) than females (45%), due to a

Table 1. Age classes of harbour porpoises (approximation based on length): percentage of total known per sex (and number).

Sex / Age class	Female (%; n)	Male (%; n)	Unknown (%; n)	Total
Juvenile	7% (25)	4.5% (20)	9% (19)	6% (64)
Immature	72% (273)	79.5% (361)	80.5% (170)	77% (804)
Adult	21% (81)	16% (74)	10.5% (22)	17% (177)
Unknown	(4)	(4)	(311)	(319)
Total	45% (383)	55% (459)	(522)	1364

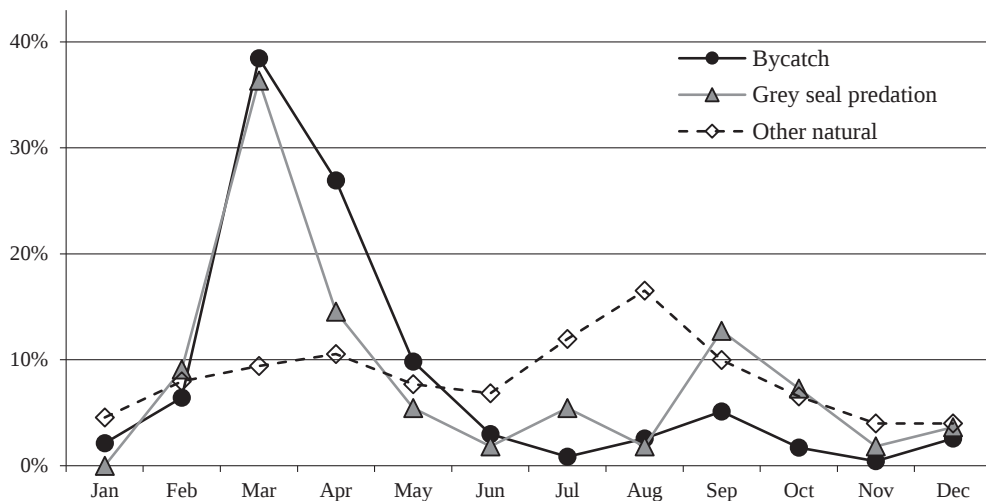


Figure 4. Distribution of the cause of death of stranded harbour porpoises over the year (as percentage of the total per cause of death).

higher number of immature males vs. females ($n=361$ vs. 273; table 1). A peak in the stranding of juveniles occurs from June to September, as can be expected, given that the majority of births of harbour porpoises in the North Sea take place between May and August (Sørensen & Kinze 1994, Lockyer 2003, Hasselmeier et al. 2004). The stranding of immatures shows a peak from March to May and (a lower one) in August and September (figure 3).

Of the 81 females considered as adult, twelve were pregnant and three were lactating (but not all could be investigated).

We could assess a likely cause of death for 640 animals (47%), in many cases using expert judgement and exclusion of other possible causes of death. Of the 640 animals, 36.5%

($n=234$) had (probably) been bycaught, while 63.5% ($n=406$) had probably died due to natural causes. Of the natural causes, predation by grey seals (*Halichoerus grypus*) accounted for 55 cases (14% of the total number of animals that died from natural causes), with the other important natural causes being infectious disease and emaciation (Jauniaux et al. 2002b; national reports to ASCOBANS – see www.ascobans.org). As is the case with strandings, also causes of death were not distributed evenly over the year (figure 4), and there were long-term trends in the causes of death.

The first case of grey seal predation in Belgium was recorded in 2010 (based on a retrospective analysis of available photographs taken from 1995 onwards; own data, unpublished), while 17 and 11 cases were recorded



Figure 5. The harbour porpoise that live stranded on 15 February 2014 on the day of the stranding (left; photo: Jan Haelters) and after rehabilitation (right; photo: SOS Dolfijn).



Figure 6. Harbour porpoise that died due to the (partial) ingestion of unsuitable prey (10 March 2016). Photo: Jan Haelters.

in 2016 and 2017 respectively. In 2015 (Anonymous 2015) the Government of Flanders took the decision to prohibit the recreational use of different types of gill and trammel nets on the beach as a protective measure for marine mammals in the intertidal zone. Until then, this recreational fishery had been responsible for a number of harbour porpoise bycatch cases every year (Haelters & Camphuysen 2009).

Remarkable harbour porpoise strandings

On 30 December 2006 a harbour porpoise died on the beach at Blankenberge. Its cause of death was assessed as accidental due to its presence in a heavy surf in shallow water. The

animal presented completely healed (unpigmented) scars which were probably inflicted during interaction with white-beaked dolphins (*Lagenorhynchus albirostris*; Haelters & Everaarts 2011).

In September 2011, two harbour porpoises washed ashore that had died shortly before. Both presented extensive lesions, with large parts of skin and blubber missing. Similar lesions had been described from neighbouring countries, however without a valid explanation of their origin. Eventually, male grey seals were identified as the prime suspects for having caused the death of both harbour porpoises (Haelters et al. 2012). Afterwards, predation events were observed in the field (Bouveroux et al. 2014), and DNA of grey seals was found in harbour porpoise lesions (Jauniaux et al. 2014a, van Bleijswijk et al. 2014).

On 15 February 2014, a live harbour porpoise was found on the beach at Koksijde. The animal had many fresh injuries, including missing parts of the left pectoral fin and fluke (figure 5). It was concluded that the injuries had been caused by scavenging foxes (*Vulpes vulpes*) (Haelters et al. 2016c). The animal was transported to a rehabilitation facility in the Netherlands (SOS Dolfijn, Harderwijk). As it was not fit for release, it was taken to Seamarco (Zeeland, the Netherlands) where it was used in non-invasive research. It died due to pneumonia on 27 December 2017.

On 10 March 2016, a very fresh 1.06 m long

male harbour porpoise washed ashore that had suffocated due to swallowing a tub gurnard (*Chelidonichthys lucerna*), a scorpaeniform fish (Scorpaeniformes) with a solid head and firm spines (figure 6). This species is not a common prey species for harbour porpoises – and apparently not a suitable one. Asphyxiation due to fish blocking the airways has been described in a number of cetacean species, with mostly spiny fish or flatfish involved (IJsseldijk et al. 2015).

White-beaked dolphin (*Lagenorhynchus albirostris*)

Together with the harbour porpoise, this is the only cetacean regularly observed in Belgian waters. In total, 17 white-beaked dolphins stranded or were found at sea (and taken to port) between 1995 and 2017 (table 2, figure 7; see also IJsseldijk et al., this volume). Given the state of decomposition, not all animals were collected for autopsy. Ten of the cases were recorded between November and January, and four animals had stranded alive.

Atlantic white-sided dolphin (*Lagenorhynchus acutus*)

An Atlantic white-sided dolphin stranded alive at Knokke-Heist (figure 8) on 4 February 1999. It was a male of 2.47 m long that weighed 167 kg. The animal was transported to Harderwijk, where it died the day after. The autopsy revealed that it was emaciated, and that it had died due to pneumonia.

Bottlenose dolphin (*Tursiops truncatus*)

The remains of a very decomposed (DCC 4) bottlenose dolphin washed ashore at Oostende on 26 April 2016. The animal, a male of 3.19 m long, was not further investigated.

The remains of a very decomposed (DCC 5) bottlenose dolphin washed ashore at Mid-

delkerke on 7 October 2017. The length of the animal was estimated at 2.5 to 3 m, and the remains weighed approximately 200 kg. While all of the skin and part of the intestines were missing, we recovered a full stomach. It contained, amongst other species, the remains of fish either not usually present or uncommon in the southern North Sea: conger eel (*Conger conger*) and sea bream spp. (Sparidae), suggesting a westerly origin.

Common dolphin (*Delphinus delphis*)

A live male common dolphin stranded at Heist on 26 February 1996; it was taken to Harderwijk where it died on 25 August 1997. At the time of the stranding, it weighed 120 kg and measured 2.1 m (Haelters 1996).

A very decomposed common dolphin (DCC 4) was found on the banks of the river Scheldt (community of Hemiksem) on 30 April 2016. It was a male of 1.62 m.

Striped dolphin (*Stenella coeruleoalba*)

On 6 May 2009 and the days after, a live dolphin was observed in and around the port of Antwerp (Verrebroekdok and Scheldt near Zwijndrecht). Images taken on the 18th of May clearly showed that it concerned a striped dolphin. On 21 May it was found dead on the banks of the Doeldok, port of Antwerp (Haelters & Verbelen 2009). The animal was a male of 1.50 m, and it weighed 38 kg. Its skin was in a very bad condition, with many lesions and algal growth (figure 9). It was very emaciated.

Long-finned pilot whale (*Globicephala melas*)

A very decomposed pilot whale washed ashore at De Haan on 21 March 1995. The remains measured 4.1 m and weighed 413 kg. Most of the intestines had disappeared. The autopsy revealed a

Table 2. White-beaked dolphins between 1995 and 2017 (DCC: decomposition code; L: length; M: weight; N/A: not available/unknown).

Date	Circumstances	Location	Comments	DCC	Sex	L (m)	M (kg)
10/01/1995	Washed ashore	Nieuwpoort		4	♂	2.82	330
14/01/1995	Live stranded	Oostende	Died at Harderwijk on 16/1/1995	1	♂	1.61	45
2/12/1997	Bycaught	At sea	Bycaught close to shore (2 miles off Westende) by otter trawl	2	♀	2.55	215
24/04/1998	Live stranded	Bredene	Died at Harderwijk on the same day	1	♀	2.4	230
25/07/2000	Washed ashore	De Haan		4	N/A	2.42	250
24/11/2004	Washed ashore	Zeebrugge		4	♀	2.2	N/A
18/12/2004	Washed ashore	Oostduinkerke		4	♀	2.52	N/A
10/05/2005	Found at sea	At sea	Skull with fleshy remains from fishermen; found near Buitenra-tel sandbank	5	N/A	N/A	N/A
27/12/2005	Washed ashore	De Panne	With lesions possibly due to fox scavenging; empty stomach; possibly bycaught	2	♂	1.67	55
12/08/2006	Washed ashore	Wenduine	Very decomposed and parts missing; the remains weighed 15kg	4	♂	1.1	N/A
17/12/2006	Washed ashore	Knokke-Heist	No lesions, probably bycaught	2	♂	2.5	250
7/09/2007	Washed ashore	Knokke-Heist		4	♀	2.2	N/A
2/12/2008	Live stranded	Oostende	Died on beach; very emaciated (figure 7)	1	♀	2.55	200
17/12/2011	Live stranded	Oostduinkerke	Euthanised; with lesions prob-ably due to fox scavenging	1	♀	2.11	240
25/03/2012	Found in harbour	Nieuwpoort harbour	Taken to destruction facility	4	♂	2.49	N/A
12/05/2013	Washed ashore	Blankenberge		3	♂	2.24	N/A
29/11/2017	Washed ashore	Oostduinkerke	Rope around tail, probably attached by fishermen putting the animal overboard; bycaught	2	♀	2.52	267

fish head-down in the oesophagus, which could point at bycatch as the cause of death.

Narwhal (*Monodon monoceros*)

On 27 April 2016 a dead narwhal was found on the bank of the river Scheldt at Bornem, 92 km from the river mouth. The male animal was 3.04 m long and its remains weighed 290 kg (figure 10). Due to its decomposition, the results of the autopsy remained inconclusive, but it is probable that the animal had died due to a long process of starvation (Haelters et al. 2018b). In the stomach a large number of

small litter items were found that were proba-bly ingested while the animals was dying. The animal had already been observed (but not identified at that moment) on 30 March 2016 in the river Scheldt at Bazel, probably shortly before it died.

Dolphin sp.

The remains of a 2.5 m long unidentified dol-phin were removed from the beach of Mid-delkerke on 22 June 2009. The weight of the remains was estimated at 200 kg. It was taken to a destruction facility.



Figure 7. White-beaked dolphin that died immediately after stranding (Oostende, 2 December 2008). *Photo: Jan Haelters.*



Figure 8. The first Atlantic white-sided dolphin recorded in Belgium (Knokke-Heist, 4 February 1999). *Photo: Norbert Minne.*

Sperm whale (*Physeter macrocephalus*)

The very decomposed (DCC 4-5) remains of a 13 m long sperm whale washed ashore at Koksijde on 26 February 2004. A month before,

the remains of this very animal had been observed at Holme (UK), and on 28 January it had washed ashore at Thornham (Norfolk, UK), where its lower jaw was removed. Due to adverse weather conditions, the carcass had



Figure 9. Striped dolphin in the port of Antwerp (21 May 2009). Photo: Jan Haelters.



Figure 10. Narwhal upon arrival at the University of Ghent (28 April 2016). Photo: Jan Haelters.

not been removed from the beach in the UK. By 15 February the sea had reclaimed it, until it finally washed ashore at Koksijde.

A live, 13.5 m long male sperm whale washed ashore at Heist on 8 February 2012. It died approximately 8 hours after its stranding. Its weight was estimated at 32 tons. Some plastic was found in its stomach (figure 11), next to a large number of cephalopod beaks and the skeletons of at least two large cod (*Gadus morhua*). From the blood of the animal the bacterial pathogen *Edwardsiella tarda* was isolated. The

sepsis could have lead directly or indirectly to the stranding, which in turn caused the death of the animal (Cools et al. 2013).

Fin whale (*Balaenoptera physalus*)

A very fresh fin whale (DCC 2) washed ashore at Oostende on 1 November 1997. It was a juvenile, emaciated female with a length of 13 m (Haelters & Rappé 1997). The autopsy revealed a severe parasitism by nematodes, which had

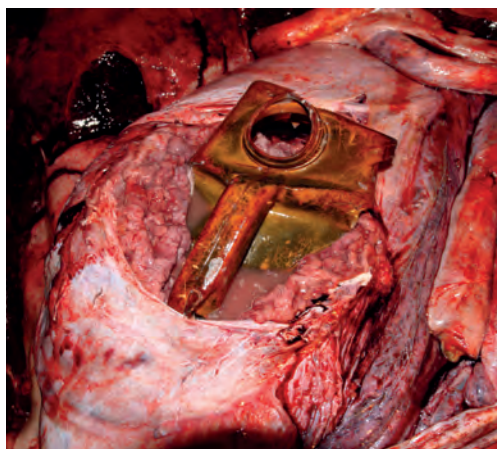


Figure 11. Parts of a jerrycan in the stomach of a sperm whale (Heist, 8 February 2012). *Photo: Jan Haelters.*

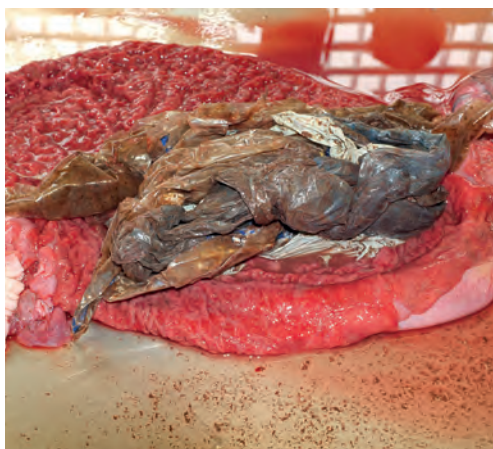


Figure 13. Plastic bags in the stomach of a minke whale (Nieuwpoort, 10 March 2013). *Photo: Jan Haelters.*



Figure 12. Fin whale on the bulb of a vessel (Port of Ghent, 9 November 2015). *Photo: Jan Haelters.*

caused a chronic and massive thrombus in the portal vein (the probable cause of death). The parasitism and lesions were associated with a morbillivirus infection, and from this animal, for the first time, specific lesions and antigen presence of morbillivirus infection were reported for a baleen whale (Jauniaux et al. 1998a, 2000).

A relatively recent jawbone of an adult fin whale (animal estimated at 18 to 20 m length)

was found by fishermen in Belgian waters on 16 December 2008.

A 19.9 m long female fin whale was brought into the port of Antwerp on 22 September 2009, on the bow of the ship *Summer Flower* (Nassau, Bahamas; 169 m long, cruising speed 22.5 kts), after a journey from Santa Marta (Colombia). The animal had been dead already for a couple of days. The autopsy revealed it had died due to the ship-strike that probably had taken

place in the Bay of Biscay or off the Spanish or Portuguese coast (Haelters & Kerckhof 2010).

In 2011 we received a relatively recent jawbone of an adult fin whale (estimated at 20 m) from a fisherman. He had found the bone in his nets in Belgian waters 'a couple of years earlier'. It did not match with the find of 2008.

An 11.6 m long male fin whale was found on the bulb of the ship *Premium do Brazil* (204 m long, cruising speed 20 kts), that had arrived at the port of Ghent on 9 November 2015 after a journey from Porto de Santos (Brazil) (figure 12). Different haemorrhages confirmed that the cause of death was traumatic and associated with the ship strike that had probably taken place in the Bay of Biscay or the (western?) Channel. The crane lifting the remains from the water registered a weight of around 10 tons, but some of the bodily fluids and part of the throat tissue were missing. The animal was heavily infested with the nematode *Crasicauda boopis* (Lempereur et al. 2017).

Northern minke whale (*Balaenoptera acutorostrata*)

On 14 December 2004 a dead minke whale was found at sea, a few km off Nieuwpoort. The female was in a very fresh condition (DCC 2) and was 4.2 m long. Although it was judged to be very emaciated, its stomach was filled with clupeids. The animal presented several lesions that pointed at bycatch.

A very emaciated male minke whale washed ashore at Nieuwpoort on 10 March 2013. It was very fresh, and had possibly stranded alive. It measured 3.40 m. It had died due to plastic ingestion: its stomach was completely blocked by several plastic bags (Figure 13; Jauniaux et al. 2014b). The inscriptions on one of the bags suggested a Scottish origin.

The remains of a dead minke whale were observed floating north of the Westhinder anchorage area on 23 March 2017. The carcass was observed a few times afterwards, and it finally washed ashore on 16 April in Zeeland,

the Netherlands. It is possible that it was ship-struck.

Humpback whale (*Megaptera novaeangliae*)

A floating carcass of a large cetacean was observed on 28 February 2006 in French waters. On 1 March it was observed a few miles off Calais (France). This was probably the humpback whale that was found on the beach of Nieuwpoort on 5 March 2006. Although from the outside it seemed fairly fresh, with still living barnacles and whale lice, internally it was relatively decomposed (DCC 3 to 4). The female of 10.5 m long showed signs of a ship strike, with internal haemorrhages and broken bones.

General discussion

Most of the finds of dead or dying cetaceans in Belgium between 1995 and 2017 were harbour porpoises (97%; $n=1364$). The results of two large-scale summer sightings surveys, respectively in 1994 and 2005 (Scans-II 2008, Hammond et al. 2002, 2013) concluded that there had been a large-scale southward shift in the harbour porpoise population of the North Sea between 1994 and 2005. The return of the species to the very southerly part of the North Sea, since its virtual disappearance in the 1950s, was recorded at an early stage in the Netherlands (Camphuysen & Leopold 1993, Camphuysen 1994, Witte et al. 1998, Addink & Smeenk 1999), implying that the distribution shift had started already prior to the first SCANS survey. From 1997 onwards, a remarkable increase in strandings (and sightings) of this species occurred also in Belgium and northern France (Kiszka et al. 2004, Haelters & Camphuysen 2009, Haelters et al. 2011).

Strong yearly fluctuations in the number of stranded harbour porpoises could be due to changes (on a relatively small geographi-

cal scale for the species) in their distribution related to changes in prey distribution and abundance, the presence of grey seals or underwater noise generated by piling offshore wind farm foundations (Haelters & Geelhoed 2015). Bycatch of harbour porpoises predominantly occurred in March and April, coinciding both with the main season for bottom set gillnet fisheries for flatfish (Pouvreau & Morizur 1995) and the period with the highest density of harbour porpoises in coastal waters (Haelters et al. 2011). The highest level of grey seal predation (almost 40% of all cases) occurred in March, probably coinciding with relatively large numbers of adult male grey seals in coastal waters of the southern North Sea (Vincent et al. 2018) and a high density of harbour porpoises close inshore.

The second most common species in strandings, indigenous to the southern North Sea, is the white-beaked dolphin ($n=17$). The numbers of white-beaked dolphins in Belgian waters vary, with periods during which observations are common and periods during which hardly any are observed (RBINS, unpublished data). White-beaked dolphins occur on average further offshore than harbour porpoises, and they are more common in the central and northern North Sea than in the southern part (Reid et al. 2003, Hammond et al. 2017, IJsseldijk et al., this volume). Their periodic occurrence in southerly waters might be food-related. Live or very fresh animals (DCC 1 or 2) were found only between November and January ($n=7$), with the exception of one live animal in April. One of the animals, a decomposed male of around 1.1 m length, washed ashore in August, was a calve. Length-at-birth is estimated at 110 to 120 cm, and births take place in summer (Galatius et al. 2013).

The Atlantic white-sided dolphin is an oceanic species that does not occur in the southern North Sea or the Channel. The stranding reported here was the first record of this species in Belgium (Kerckhof & Haelters 1999).

A population of the bottlenose dolphin existed in the southern North Sea (north-

ern France to the north of the Netherlands) up to around half a century ago (Kompanje 2001, Camphuysen & Peet 2006, Camphuysen & Smeenk 2016). One of the main reasons for its disappearance in this area could have been pollution: the species, being a long-lived cetacean, is vulnerable to the effects of persistent organic pollutants, with high levels potentially inhibiting reproduction (Jepson et al. 2016). Bottlenose dolphins that are currently observed in the southern North Sea probably originate from populations in the northern North Sea, the Channel or the adjacent Bay of Biscay. The two stranded animals were very decomposed, and had drifted at sea for a long time. The indication of a possible origin (more westerly waters) can only be provided for the animal of 2017, thanks to the analysis of its stomach contents.

Common dolphins rarely wash ashore in Belgium. However, it is a species that we could expect more frequently in the southern North Sea in the near future, due to the increasing abundance of favoured prey species such as anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*), perhaps under the influence of climatic changes (Petitgas et al. 2012, Montero-Serra et al. 2015). During the last few years, bluefin tuna (*Thunnus thynnus*) were recorded again in the North Sea. This iconic fish had disappeared from these waters in the 1960s, and its return (Bennema 2018) could be partly the consequence of an increase in temperature and the increase in favoured prey. Like the bluefin tuna (MacKenzie & Meyers 2007, Bennema 2017), common dolphins have not always been rare in the North Sea: Camphuysen & Peet (2006) describe a slow disappearance of the common dolphin from the 1950s, and stated that in more westerly and southerly waters it is often associated with bluefin tuna.

The striped dolphin prefers warmer water, and occurs more to the west and south of the North Sea (Reid et al. 2003, Hammond et al. 2017). Strandings are extremely rare in Belgium.

Long-finned pilot whale strandings are very rare in Belgium. The species occurs in deeper waters around or beyond the shelf ridge (Reid et al. 2003, Rogan et al. 2017). On rare occasions, such as in November 2014 (IJs-seldijk et al. 2015), pods of tens of animals are observed close inshore, and the possibility of mass-strandings (such as in northern France in 2015; Jauniaux et al. 2017) should not be excluded.

The narwhal record (sighting and stranding) was the first ever of this Arctic species in Belgium, and the most southerly one in Europe. For the North Sea, only ten other strandings are known, the oldest one dating back to 1588 (Haelters et al. 2018b).

Groups of male sperm whales occasionally enter the North Sea, probably from the north (De Smet 1997, Evans 1997, Smeenk 1997, Pierce et al., this volume). The shallow waters in its southern part are not a suitable habitat for this species, which is used to foraging in deep waters (Jacques & Lambertsen 1997, Jauniaux et al. 1998b). Strandings of sperm whales in the North Sea have been documented since the 16th Century (Smeenk 1997, Smeenk & Evans, Pierce et al., this volume) and seem to be on the rise over the last few decades. Especially in 2016 a high number of animals stranded, many of which had litter in their stomach (probably unrelated to their stranding or death; Unger et al. 2016). Hypotheses for increased numbers of stranded sperm whales are, amongst others, alterations in habitats and prey distribution due to climatic changes and an increase in the sperm whale population since the cessation of whaling during 1979-1987, with accompanying range extensions (Evans et al. 2005, Hobbs et al. 2007, Rødland & Bjørge 2015, Pierce et al., this volume).

Although minke whales are indigenous to the North Sea, they are very rare in its southern part. There are indications that minke whale distribution shifted slightly towards the south in the North Sea between 1994 and 2005 (Hammond et al. 2013, 2017), but sight-

ings and strandings in Belgium remain exceptional. The death of the two minke whales that were investigated was related to a human activity.

Fin whales are not indigenous to the North Sea. They prefer deeper water beyond the continental shelf edge in the Atlantic Ocean (Reid et al. 2003). Strandings in Belgium are rare. The species is vulnerable to ship-strikes, and animals that enter port on the bulb of ships undoubtedly only represent part of the total mortality due to ship-strikes (Rockwood et al. 2017).

Until 2006, the humpback whale had only been recorded once in Belgium, in 1751 (a floating carcass) (Haelters et al. 2010). The first record of a dead humpback whale in the Netherlands even dates back only to 2003 (Camphuysen & Peet 2006). In the North-Atlantic the humpback whale was hunted almost to extinction, until it was protected in 1955. Since then, numbers have increased, and sightings have risen in the North Sea, including in its southern part (Camphuysen 2007, Leopold et al., this volume). The stranding of the humpback whale in 2006 can be placed in that context. 'European' Humpback whales move between feeding grounds in the north, and breeding locations off the Cape Verde Islands as well as the West Indies (Jann et al. 2003, Stevick et al. 2003, Wenzel et al. 2009), although there might be, or have been, more than two stocks in the North Atlantic, including one using a non-tropical breeding ground (Punt et al. 2007). Threats to the species in the southern North Sea include entanglement and ship collisions (as in the case of the 2006 record).

The study of stranded cetaceans can help identify changes in their ecology and distribution, and is important to assess causes of death, in particular anthropogenic ones. It is useful to, from time to time, publish an overview of strandings, which however should also be analysed and interpreted on a wider scale, especially for Belgium with its very short coastline.

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References

- Addink, M.J. & C. Smeenk 1999. The harbour porpoise *Phocoena phocoena* in Dutch coastal waters: analysis of stranding records for the period 1920-1994. *Lutra* 41: 55-80.
- Anonymous 2015. Besluit van 13 maart 2015 van de Vlaamse Regering houdende een verbod op het gebruik van warrelnetten en kieuwnetten in de Vlaamse strandzone ter bescherming van zeezoogdieren. Belgisch Staatsblad 25 maart 2015: 2015035382.
- Barratclough, A., P.D. Jepson, P.K. Hamilton, C.A. Miller, K. Wilson & M.J. Moore 2014. How much does a swimming, underweight, entangled right whale (*Eubalaena glacialis*) weigh? Calculating the weight at sea, to facilitate accurate dosing of sedatives to enable disentanglement. *Marine Mammal Science* 30 (4): 1589-1599.
- Bennema, F.P. 2018. Long-term occurrence of Atlantic bluefin tuna *Thunnus thynnus* in the North Sea: Contributions of non-fishery data to population studies. *Fisheries Research* 199: 177-185.
- Bouveroux, T., J.J. Kiszka, M.R. Heithaus, T. Jauniaux & S. Pezeril 2014. Direct evidence for gray seal (*Halichoerus grypus*) predation and scavenging on harbor porpoises (*Phocoena phocoena*). *Marine Mammal Science* 30 (4): 1542-1548.
- Camphuysen, C.J. 1994. The harbour porpoise *Phocoena phocoena* in the southern North Sea. II: a come-back in Dutch coastal waters? *Lutra* 37: 54-61.
- Camphuysen, C.J. 2007. Foraging humpback whale (*Megaptera novaeangliae*) in the Marsdiep area (Wadden Sea), May 2007 and a review of sightings and strandings in the southern North Sea, 2003-2007. *Lutra* 50 (1): 31-42.
- Camphuysen, C.J. & M.F. Leopold 1993. The harbour porpoise *Phocoena phocoena* in the southern North Sea, particularly the Dutch sector. *Lutra* 36 (1): 1-24.
- Camphuysen, C.J. & G. Peet 2006. Whales and dolphins of the North Sea. Fontaine Uitgevers BV, Kortenhoef, Utrecht, the Netherlands.
- Camphuysen, C.J. & C. Smeenk 2016. Tuimelaar *Tursiops truncatus*. In: S. Broekhuizen, J.B.M. Thissen, K.J. Canters & J.C. Buys (eds). Atlas van de Nederlandse zoogdieren. *Natuur van Nederland* 12: 356-361. Naturalis Biodiversity Center / EIS Kenniscentrum Insecten en andere ongewervelden, Leiden, the Netherlands.
- Cassoff, R.M., K.M. Moore, W.A. McLellan, S.G. Barco, D.S. Rotstein & M.J. Moore 2011. Lethal entanglement in baleen whales. *Diseases of Aquatic Organisms* 96: 175-185.
- Cools, P., J. Haelters, G. Lopes Dos Santos Santiago, G. Claeys, J. Boelens, I. Leroux-Roels, M. Vaneechoutte & P. Deschaght 2013. *Edwardsiella tarda* sepsis in a live-stranded sperm whale (*Physeter macrocephalus*). *Veterinary Microbiology* 166 (1-2): 311-315.
- De Smet, W.M.A. 1974. Inventaris van de walvisachtigen (Cetacea) van de Vlaamse kust en de Schelde. Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen 50 (1).
- De Smet, W.M.A. 1981. Gegevens over de walvisachtigen (Cetacea) van de Vlaamse kust en de Schelde uit de periode 1969-1975. Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen 54 (4).
- De Smet, W.M.A. 1997. Five centuries of sperm whale strandings along the Flemish coast. In: T.G.

- Jacques & R.H. Lambertsens (eds). Sperm whale deaths in the North Sea: science and management. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 67, Supplement: 11-14.
- Evans, P.G.H. 1997. Ecology of sperm whales (*Physeter macrocephalus*) in the Eastern North Atlantic, with special reference to sightings & strandings records from the British Isles. In: T.G. Jacques & R.H. Lambertsens (eds). Sperm whale deaths in the North Sea: science and management. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 67, Supplement: 37-46.
- Evans, K., R. Thresher, R.M. Warneke, C.J. Bradshaw, M. Pook, D. Thiele & M.A. Hindell 2005. Periodic variability in cetacean strandings: Links to large-scale climate events. Biology Letters 1: 147-150.
- Galatius, A., O.E. Jansen & C. Kinze 2013. Parameters of growth and reproduction of white-beaked dolphins (*Lagenorhynchus albirostris*) from the North Sea. Marine Mammal Science 29: 348-355.
- Haelters, J. 1996. Stranding van een gewone dolfijn *Delphinus delphis* te Heist. De Strandvlo 16 (2): 70-72.
- Haelters, J. 2017. Arctic climate fugitives? Lutra 60 (1): 1-3.
- Haelters, J. & G. Rappé 1997. Een gewone vinvis *Balaenoptera physalus* (Linnaeus, 1758) te Raversijde. De Strandvlo 17 (4): 132-135.
- Haelters, J. & C. Camphuysen 2009. The harbour porpoise in the southern North Sea: abundance, threats and research- & management proposals. Royal Belgian Institute of Natural Sciences (RBINS) and the Royal Netherlands Institute for Sea Research (NIOZ). Report commissioned by the International Fund for Animal Welfare (IFAW), Brussels, Belgium.
- Haelters, J. & D. Verbelen 2009. Gestreepte dolfijn in Antwerpse haven. Zoogdier 20 (4): 30-31.
- Haelters, J. & F. Kerckhof 2010. Walvis verrast havenmeester Antwerpen. Zoogdier 21: 30-31.
- Haelters, J. & E. Everaarts 2011. Two cases of physical interaction between white-beaked dolphins *Lagenorhynchus albirostris* and juvenile harbour porpoises *Phocoena phocoena* in the southern North Sea. Aquatic Mammals 37 (2): 198-201.
- Haelters J. & S. Geelhoed 2015. Over enkele jaren weer zeldzaam? Minder bruinvissen in de zuidelijke Noordzee. Zoogdier 26 (4): 1-3.
- Haelters, J., F. Kerckhof & C.J. Camphuysen 2010. The first historic record of a humpback whale *Megaptera novaeangliae* from the Low Countries (Southern Bight of the North Sea). Lutra 53 (2): 93-100.
- Haelters, J., F. Kerckhof, T.G. Jacques & S. Degraer 2011. The harbour porpoise *Phocoena phocoena* in the Belgian part of the North Sea: trends in abundance and distribution. Belgian Journal of Zoology 141: 75-84.
- Haelters, J., F. Kerckhof, T. Jauniaux & S. Degraer 2012. The grey seal (*Halichoerus grypus*) as a predator of harbour porpoises (*Phocoena phocoena*)? Aquatic Mammals 38 (4): 343-353.
- Haelters, J., F. Kerckhof, S. Maebe, R. Schallier & S. Degraer 2013. Wat te doen bij waarnemingen, strandingen en incidentele vangsten van beschermde zeedieren? Gids voor informatie en actie. Koninklijk Belgisch Instituut voor Natuurwetenschappen en Kustwacht, Brussels and Ostend, Belgium.
- Haelters, J., F. Kerckhof, T. Jauniaux, M. Potin, B. Rumes & S. Degraer 2016a. Zeezoogdieren in België in 2014. Rapport MARECO 16/01. Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussels, Belgium.
- Haelters, J., T. Jauniaux, F. Kerckhof, M. Potin & T. Vandenbergh 2016b. Zeezoogdieren in België in 2015. Rapport MARECO 16/03-BMM 16/01. Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussels, Belgium.
- Haelters, J., E. Everaarts, P. Bunschoek, L. Begeman, J.W.J. Hinrichs & L. IJsseldijk 2016c. A suspected scavenging event by red foxes (*Vulpes vulpes*) on a live, stranded harbour porpoise (*Phocoena phocoena*). Aquatic Mammals 42 (2): 227-232.
- Haelters, J., F. Kerckhof, B. Rumes, M. Potin & T. Jauniaux 2017. Strandingen en waarnemingen van zeezoogdieren en opmerkelijke vissen in België in 2016. Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussels, Belgium.
- Haelters, J., F. Kerckhof, K. Moreau, M. Potin, M. Doom & T. Jauniaux 2018a. Strandingen en waarnemingen van zeezoogdieren en opmerkelijke vissen in België in 2017. Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussels, Belgium.

- Haelters, J., F. Kerckhof, M. Doom, P.G.H. Evans, T. Van den Neucker & T. Jauniaux 2018b. New extralimital record of a narwhal (*Monodon monoceros*) in Europe. *Aquatic Mammals* 44 (1): 39-50.
- Hammond, P.S., P. Berggren, H. Benke, D.L. Borchers, A. Collet, M.P. Heide-Jørgensen, S. Heimlich, A.R. Hiby, M.F. Leopold & N. Øien 2002. Abundance of harbour porpoises and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.
- Hammond, P.S., K. MacLeod, P. Berggren, D.L. Borchers, L. Burt, L. A. Cañadas, G. Desportes, G.P. Donovan, A. Gilles, D. Gillespie, J. Gordon, L. Hiby, I. Kuklik, R. Leaper, K. Lehner, M. Leopold, P. Lovell, N. Øien & J.A. Vázquez 2013. Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. *Biological Conservation* 164: 107-122.
- Hammond, P.S., C. Lacey, A. Gilles, S. Viquerat, P. Börjesson, H. Herr, K. Macleod, V. Ridoux, M.B. Santos, M. Scheidat, J. Teilmann, J. Vingada & N. Øien 2017. Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. SMRU, St Andrews, UK.
- Hasselmeier, I., K.F. Abt, D. Adelung & U. Siebert 2004. Stranding patterns of harbour porpoises (*Phocoena phocoena*) in the German North and Baltic Seas: when does the birth period occur? *Journal of Cetacean Research and Management* 6 (3): 259-263.
- Hobbs, M., C. Macleod, T. Brereton, H. Harrop, P. Cermeneno & D. Curtis 2007. A new breeding ground? The spatio-temporal distribution and bathymetric preferences of sperm whales (*Physeter macrocephalus*) in the Bay of Biscay. European Cetacean Society conference proceedings. ECS, San Sebastian, Spain.
- IJsseldijk, L., M. Leopold, E. Bravo Rebolledo, R. Deaville, J. Haelters, J. IJzer, P. Jepson & A. Gröne 2015. Fatal asphyxiation in two long-finned pilot whales (*Globicephala melas*) caused by common soles (*Solea solea*). *PLoS ONE* 10 (11): e0141951.
- Jacques, T.G. & R.H. Lambertsen (eds) 1997. Sperm whale deaths in the North Sea: science and management. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie* 67, Supplement.
- Jann, B., J. Allen, M. Carrillo, S. Hanquet, S.K. Katona, A.R. Martin, R.R. Reeves, R. Seton, P.T. Stevick & F.W. Wenzel 2003. Migration of a humpback whale (*Megaptera novaeangliae*) between the Cape Verde Islands and Iceland. *Journal of Cetacean Research and Management* 5: 125-129.
- Jauniaux T., G. Charlier, M. Desmecht & F. Coignoul 1998a. Lesions of morbillivirus infection in a fin whale (*Balaenoptera physalus*) stranded along the Belgian coast. *The Veterinary Record* 143: 423-424.
- Jauniaux T., L. Brosens, E. Jacquinet, D. Lambrigts, M. Addink, C. Smeenk & F. Coignoul 1998b. Post-mortem investigations on winter stranded sperm whales from the coasts of Belgium and the Netherlands. *Journal of Wildlife Disease* 34: 99-109.
- Jauniaux, T., G. Charlier, M. Desmecht, J. Haelters, T. Jacques, B. Losson, J. Van Gompel, J. Tavernier & F. Coignoul 2000. Pathological findings in two fin whales (*Balaenoptera physalus*) with evidence of Morbillivirus infection. *Journal of Comparative Pathology* 123: 198-201.
- Jauniaux T., M. García Hartman, J. Haelters, J. Tavernier & F. Coignoul 2002a. Echouage de mammifères marins: guide d'intervention et procédures d'autopsie. *Annales de Médecine Vétérinaire* 146: 261-276.
- Jauniaux T., D. Petitjean, C. Brenez, M. Borrens, L. Brosens, J. Haelters, J. Tavernier & F. Coignoul 2002b. Post-mortem findings and causes of death of harbour porpoises (*Phocoena phocoena*) stranded from 1990 to 2000 along the coastlines of Belgium and Northern France. *Journal of Comparative Pathology* 126: 243-253.
- Jauniaux, T., M.-M. Garigliany, P. Loos, J.-L. Bourgain, T. Bouveroux, F. Coignoul, J. Haelters, J. Karpouzopoulos, S. Pezeril & D. Desmecht 2014a. Bite injuries of grey seals (*Halichoerus grypus*) on harbour porpoises (*Phocoena phocoena*). *PLoS ONE* 9 (12): e108993.
- Jauniaux, T., J. Haelters, S. Degraer & F. Coignoul, 2014b. Fatal plastic impaction in a minke whale (*Balaenoptera acutorostrata*). 28th Annual Conference of the European Cetacean Society: Marine mammals as sentinels of a changing environment, Liège, Belgium, 5-9 April 2014. Abstract book: 168.
- Jauniaux, T., J.M. Charpentier, M. André, W. Dabin,

- J. Karpouzopoulos & L. Lempereur 2017. Mass stranding of ten long-finned pilot whales (*Globicephala melas*) on the beach of Calais (France). Poster presentation. 31st Annual Conference of the European Cetacean Society (ECS), 1-3 May 2017, Middelfart, Denmark.
- Jepson, P.D., R. Deaville, J.L. Barber, A. Aguilar, A. Borrell, S. Murphy, J. Barry, A. Brownlow, J. Barnett, S. Berrow, A.A. Cunningham, N.J. Davison, M. ten Doeschate, R. Esteban, M. Ferreira, A.E. Foote, T. Genov, J. Giménez, J. Loveridge, A. Llavona, V. Martin, D.L. Maxwell, A. Papachlimitzou, R. Penrose, M.W. Perkins, B. Smith, R. de Stephanis, N. Tregenza, P. Verborgh, A. Fernandez & R.J. Law 2016. PCB pollution continues to impact populations of orcas and other dolphins in European waters. *Nature Scientific Reports* 6: 18573.
- Keijl, G.O., L. Begeman, S. Hiemstra, L.L. IJsseldijk, P. Kamminga & Seal Centre Pieterburen 2016. Cetaceans stranded in the Netherlands in 2008-2014. *Lutra* 59: 75-107.
- Kerckhof, F. & J. Haelters 1999. Eerste stranding deze eeuw van een witflankdolfijn *Lagenorhynchus acutus* (Gray, 1828) op de Belgische kust. *De Strandvlo* 19 (2): 105-107.
- Kiszka, J., J. Haelters & T. Jauniaux 2004. The harbour porpoise (*Phocoena phocoena*) in the southern North Sea: a comeback in northern French and Belgian waters? Report AC11/Doc.24 to ASCO-BANS, Jastrzebia Góra, Poland, 27-29 April 2004.
- Kompanje, E.J.O. 2001. Review of strandings and catches of *Tursiops truncatus* (Mammalia: Cetacea, Odontoceti) in the Netherlands between 1754 and 2000. *Deinsea* 1 (8): 169-224.
- Kuiken, T. & M. García Hartmann (eds) 1991. Standard protocol for the basic postmortem examination and tissue sampling of small cetaceans. In: Proceedings of the first ECS workshop on Cetacean pathology: dissection techniques and tissue sampling, Leiden, 13-14 September 1991. ECS newsletter 17, Special Issue: 26-39.
- Lempereur, L., M. Delobelle, M. Doom, J. Haelters, E. Levy, B. Losson & T. Jauniaux 2017. *Crassicauda boopis* in a fin whale (*Balaenoptera physalus*) ship-struck in the eastern North Atlantic Ocean. *Parasitology Open* (3): e9.
- Lockyer, C. 2003. Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Biological parameters. NAMMCO Scientific Publications 5: 71-89.
- Mackenzie, B.R. & R.A. Myers 2007. The development of the northern European fishery for north Atlantic bluefin tuna *Thunnus thynnus* during 1900-1950. *Fisheries Research* 87 (2-3): 229-239.
- Montero-Serra, I., M. Edwards & M.J. Genner 2015. Warming shelf seas drive the subtropicalization of European pelagic fish communities. *Global Change Biology* 21 (1): 144.
- Pouvreau, S. & Y. Morizur 1995. Les métiers du filet fixe en France (Regions 1, 2 et 3). IFREMER, Département des Ressources Halieutiques, juin 1995.
- Petitgas, P., J. Alheit, M.A. Peck, K. Raab, X. Irigoien, M. Huret, J. van der Kooij, T. Pohlmann, C. Wagner, I. Zarraonaindia & M. Dickey-Collas 2012. Anchovy population expansion in the North Sea. *Marine Ecology-Progress Series* 444: 1-13.
- Punt, A.E., N.A. Friday & T.E. Smith 2007. Reconciling historical catches and current abundance of North Atlantic humpback whales. *Journal of Cetacean Research and Management* 9 (2): 145-160.
- Reid, J.B., P.G.H. Evans & S.P. Northridge 2003. Atlas of Cetacean distribution in north-west European waters. Joint Nature Conservation Committee (JNCC), Peterborough, UK.
- Rogan, E., A. Cañadas, K. Macleod, B. Santos, B. Mikkelsen, A. Uriarte, O. Van Canneyt, J.A. Vazquez & P.S. Hammond 2017. Distribution, abundance and habitat use of deep diving cetaceans in the North East Atlantic. *Deep Sea Research Part II: Topical Studies in Oceanography* 141: 8-19.
- Rockwood, R.C., J. Calambokidis & J. Jahncke 2017. High mortality of blue, humpback and fin whales from modeling of vessel collisions on the U.S. West Coast suggests population impacts and insufficient protection. *PLoS ONE* 12 (8): e0183052.
- Rødland, E.S. & A. Bjørge 2015. Residency and abundance of sperm whales (*Physeter macrocephalus*) in the Bleik Canyon, Norway. *Marine Biology Research* 11 (9): 974-982.
- SCANS-II 2008. Small Cetaceans in the European Atlantic and North Sea. Final Report to the European Commission on Project LIFE04NAT/GB/000245. URL: <http://biology.st-andrews.ac.uk/scans2/>.

- Smeenck, C. 1986. Strandingen van cetacea op de Nederlandse kust in 1981, 1982 en 1983. *Lutra* 29: 268-281.
- Smeenck, C. 1997. Strandings of sperm whales *Physeter macrocephalus* in the North Sea: History and patterns. In: T.G. Jacques & R.H. Lambertsen (eds). Sperm whale deaths in the North Sea: science and management. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 67, Supplement: 15-28.
- Smeenck, C. 2003. Strandingen van Cetacea op de Nederlandse kust in 1993-1997; met aanvullingen en correcties op strandingen van 1987-1990. *Lutra* 46: 45-64.
- Sørensen, T.B. & C. Kinze 1994. Reproduction and reproductive seasonality in Danish harbour porpoises (*Phocoena phocoena*). *Ophelia* 39 (3): 159-176.
- Stevick, P.T., J. Allen, M. Bérubé, P.J. Clapham, S.K. Katona, F. Larsen, J. Lien, D.K. Mattila, P.J. Palsbøll, J. Robbins, J. Sigurjónsson, T.D. Smith, N. Øien & P.S. Hammond 2003. Segregation of migration by feeding ground origin in North Atlantic humpback whales (*Megaptera novaeangliae*). *Journal of Zoology* 259: 231-237.
- Unger, B., E.L. Bravo Rebolledo, R. Deaville, A. Gröne, L.L. IJsseldijk, M.F. Leopold, U. Siebert, J. Spitz, P. Wohlsein & H. Herr 2016. Large amounts of marine debris found in sperm whales stranded along the North Sea coast in early 2016. *Marine Pollution Bulletin* 112 (1-2): 134-141.
- van Bleijswijk, J.D.L., L. Begeman, H.J. Witte, L.L. IJsseldijk, S. Brasseur, A. Gröne & M.F. Leopold 2014. Detection of grey seal *Halichoerus grypus* DNA in attack wounds on stranded harbour porpoises *Phocoena phocoena*. *Marine Ecology - Progress Series* 513: 277-281.
- van Bree, P.J.H. 1970. Jaaroverzichten strandingen Cetacea in 1942 t/m 1951. Bundeling publicaties van Deinse uit Het Zeepaard. Report Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Amsterdam, the Netherlands.
- van Bree, P.J.H. 1978. Strandingen van Cetacea op de Nederlandse kust in 1976 en 1977. *Lutra* 20: 13-18.
- van Bree, P.J.H. 1982. Strandingen van Cetacea op de Nederlandse kust in 1978, 1979 en 1980. *Lutra* 25: 19-29.
- van Bree, P.J.H. & C. Smeenck 1978. Strandingen van Cetacea op de Nederlandse kust in 1976 en 1977. *Lutra* 20: 13-18.
- van Bree, P.J.H. & C. Smeenck 1983. Strandingen van Cetacea op de Nederlandse kust in 1978, 1979 en 1980. *Lutra* 25: 19-29.
- van Deinse, A.B. 1933. Aanspoelingen van Cetacea in Nederland in de jaren 1931 en 1932. *Natuurhistorisch Museum Rotterdam* 2: 7-20.
- Van Gompel, J. 1991. Cetacea aan de Belgische kust, 1975-1989. *Lutra* 34: 27-36.
- Van Gompel, J. 1996. Cetacea aan de Belgische kust, 1990-1994. *Lutra* 39: 45-51.
- Vincent, C., Y. Planque, C. Brévert, F. Leviez, J. Karpouzopoulos, S. Monnet, L. Dupuis, M.H. Fremau, T. Ruellet, M. Decombe, F. Caurant & J. Spitz 2018. Eco-Phoques: Bases scientifiques pour une meilleure connaissance des phoques et de leurs interactions avec les activités humaines en Manche Nord-Est. Rapport final pour la région Hauts-de-France et l'AFB.
- Wenzel, F.W., J. Allen, S. Berrow, C.J. Hazevoet, B. Jann, R.E. Seton, L. Steiner, P. Stevick, P. López Suárez & P. Whooley 2009. Current knowledge on the distribution and relative abundance of humpback whales (*Megaptera novaeangliae*) off the Cape Verde Islands, Eastern North Atlantic. *Aquatic Mammals* 35 (4): 502-510.
- Witte, R.H., H.J.M. Baptist & P.V.M. Bot 1998. Increase of the harbour porpoise *Phocoena phocoena* in the Dutch sector of the North Sea. *Lutra* 40 (2): 33-40.

Samenvatting

Strandingen van walvisachtigen in België van 1995 tot 2017

Het laatst gepubliceerde overzicht van strandingen van walvisachtigen in België dateert reeds van de periode 1990-1994. Hier behandelen we de aansluitende periode: 1995 tot en met 2017. Langs de korte Belgische kustlijn, en in het Belgische zeegebied en inlandse wateren, werden tussen 1995 en 2017 in totaal 1401 dode of stervende walvisachtigen, behorend tot twaalf soorten, aangetroffen. De meeste stran-

dingen (1364) betroffen bruinvissen (*Phocoena phocoena*), een soort die na een afwezigheid van vele decennia weer algemeen voorkomt in de zuidelijke Noordzee. Tussen 2005 en 2017 registreerden we jaarlijks gemiddeld bijna 100 strandingen van dit dier. Van de witsnuitdolfijn (*Lagenorhynchus albirostris*), de enige andere soort die momenteel als inheems kan beschouwd worden in de zuidelijke Noordzee, werden 17 strandingen of vondsten op zee genoteerd. Verder registreerden we een witflankdolfijn (*Lagenorhynchus acutus*), de eerste stranding voor deze soort in België, twee tuimelaars (*Tursiops truncatus*), twee gewone dolfinen (*Delphinus delphis*), een gestreepte dolfin (*Stenella coeruleoalba*), een gewone griend (*Globicephala melas*), een narwal (*Monodon monoceros*), twee potvissen (*Physeter macrocephalus*), een bultrug (*Megaptera novaeangliae*), drie dwergvinvissen (*Balaenoptera acutorostrata*), vijf gewone vinvissen (*Balaenoptera physalus*) en een niet-geïdentificeerde dolfinachtige. De twee tuimelaars, de griend en één van de gewone dolfinen verkeerden in

verregaande staat van ontbinding en zijn vermoedelijk gestorven in een gebied op relatief grote afstand van Belgische wateren. Eén van de dwergvinvissen was langzaam verhongerd, doordat enkele plastic zakken de maag van het dier volledig geblokkeerd hadden. De bultrug was gestorven door een aanvaring. Twee van de gewone vinvissen werden binnengebracht in een haven op de voorsteven van een schip, en waren vermoedelijk aangevaren in de Golf van Biskaje of de aanpalende Atlantische Oceaan. Twee andere meldingen van gewone vinvissen betroffen recente skeletdelen die door vissers in Belgische wateren gevonden zijn. De meest opmerkelijke walvisachtige in België was een narwal, die eerst levend gezien werd in de Schelde, en een maand later in ontbonden toestand aan de oevers gevonden werd. Het was niet enkel de eerste narwal voor België, maar het was ook bijna 70 jaar geleden dat deze Arctische soort in de Noordzee geregistreerd was.

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