From nought to 100 in no time: how humpback whales (*Megaptera novaeangliae*) came into the southern North Sea

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Abstract: The humpback whale (*Megaptera novaeangliae*) has a cosmopolitan distribution: it occurs in all oceans and in many seas. Remarkably, the species was missing from the southern North Sea until recently. Even strandings of dead animals have always been very rare but from the 1990s onward this started to change. A trickle of dead humpback whales was the first sign that things were about to change, followed by sightings of live whales from 2001 on. Many of the first whales to arrive in the southern North Sea did not survive, and stranded, but this too has changed. Today, humpback whales visit the region every year in small numbers and both adults and juveniles are involved. The whales rarely fluke in the shallow coastal waters where they are mostly seen but a few well-marked individuals have been seen in different years and some stayed up to several months in the area. It remains unclear what might have triggered this range extension. Numbers of humpback whales in the Atlantic are increasing after the cessation of whaling, but numbers are still short of the pre-whaling population size (when the species was absent from the southern North Sea). Some forage fish species, like herring (*Clupea harengus*) are also on the increase, but stocks are still depleted compared to the past. Most likely, therefore, something has changed in the whales themselves, causing them to be more inquisitive and to explore new waters. Once they have arrived in the southern North Sea, their behaviour shows that they can find sufficient food here.

Keywords: humpback whale, *Megaptera novaeangliae*, North Sea, distribution, range extension, forage fish, explorative behaviour.

Introduction

The humpback whale (*Megaptera novaeangliae*) is a migratory baleen whale, found in all oceans and in many marginal seas (Bettridge et al. 2015). Like all large whales, humpback whale numbers have been severely depleted by commercial whaling, but populations of the species have been recovering since the end of whaling and its global conservation status is now considered "Least Concern" (Reilly et al. 2008).

The southern North Sea, taken here as south of 56˚N, down to the line Calais-Dover, ca. 50˚52'N, has long been an anomaly in the worldwide distribution of the humpback whale. The species probably never was part of the regular southern North Sea fauna. While there are extensive records of strandings of large whales, most notably of sperm

Figure 1. The first recent case of a humpback whale in the southern North Sea: Wilhelmshaven, Germany, 15 April 1991. Its skeleton is kept at the Natural Museum in Oldenburg. *Photo courtesy: Ursula Siebert*.

whales (*Physeter macrocephalus*) (Sliggers & Wertheim 1992, Smeenk 1997, Pierce et al. 2007, Smeenk & Evans, this volume), historic records of humpback whales, dead or alive, are very scarce in these parts. Only four historic strandings of dead animals are known: near Blankenberge, Belgium, 1751; Vogelsand, Elbe estuary, Germany, November 1824; near Berwick upon Tweed, Scotland, September 1829; and near Newcastle-upon-Tyne, September 1839 (van Deinse 1918, Camphuysen & Peet 2006, Haelters et al. 2006). A slightly greater number of historic strandings is known from further north, from NE Scotland, Norway, northern Denmark, and the Baltic (eleven cases, 1545-1918; van Deinse 1918, Camphuysen & Peet 2006). These northern strandings, including the 1829 and 1839 cases just south of 56˚N in SE Scotland and NE England may have been related to the then regular presence of the species in the northern North Sea. Here, the species was hunted from shore stations in Shetland between 1903-14 (49 animals taken) (Thompson 1928). This practice probably led to local near-extinction and when whaling was resumed after World War I, only two more were killed, between 1920-1927 (Thompson 1928). Since then, the species became a rarity in Shetland waters, but returned in small numbers in summer in the 1990's (Evans et al. 1996, Evans 2006). If we consider that the two historic strandings in NE Scotland are an extension of a northerly occurrence rather than indicative of occurrence in the southern North Sea, only two historic records remain for this region: the Blankenberge (1751) and Vogelsand (1824) whales.

The status of the humpback whale in the southern North Sea has rapidly changed from "vagrant" to "annual visitor" in recent years. In this contribution, we aim to summarise the recent situation and to consider possible explanations for its new status.

Recent finds of dead humpbacks

The first two observations of humpback

Figure 2. Humpback whale, entangled in rope and (orca) rake-marked. Stranded fresh, 22 June 2004, Vlieland. the Netherlands *Photos: Dirk Bruin and Carl Zuhorn (detail of rake marks).*

whales in the southern North Sea in recent times were of two floating carcasses in German waters, in the early 1990s. The first was seen on 15 April 1991, floating near Wilhemshaven (Meyer 1994) (figure 1). The second was observed (but not recovered) on 12 October 1994, 50 km west of Helgoland; both were emaciated juvenile females (Lick et al. 1995, Camphuysen & Peet 2006). The whale found in 1994 was necropsied at sea and its (incomplete) skeleton preserved in the Marine Museum of Stralsund (Lick et al. 1995). Possibly related to the latter case was the "catch" of a rather fresh scapula of a juvenile humpback whale at the Cleaver Bank (55°40'N, 3°50'E) by the Dutch beam trawler UK 43 in February 1995 (Kompanje 1996). Six years passed without further finds, but from 2003 to 2013, twelve strandings and floaters were found in the southern North Sea, including the first case (Nieuwe Waterweg; port entry to Rotterdam, and four subsequent cases for the Netherlands; Camphuysen 2007) and the first case for Belgium (Nieuwpoort, 5 March 2006; Verbelen & Haelters 2011). A rather curious case concerns a freshly dead humpback whale, entangled in rope and (orca) rake-marked, found freshly dead on Vlieland, the Netherlands, 22 June 2004 (figure 2). The carcass was buried on the beach, but exhumed again when it was realised how rare this find was; its skeleton is now on display at museum Ecomare, Texel, the Netherlands. In addition, a single humpback whale vertebra of unknown origin was found on March 2012 in the Dutch Wadden Sea (collection Ecomare, Texel). Strandings varied from bare bones and long-dead animals to strandings of animals that were seen alive close by, just days before. All cases in these years concerned juveniles. In contrast to recent sightings of humpback whales around Shetland (May through Sep-

Figure 3. The first stranded humpback whale on the UK side of the southern North Sea in recent times. Pegwell Bay, Kent, England, 21 March 2001. This animal stranded alive, and was euthanised soon afterwards. *Photo and ©: CSIP-ZSL; http://ukstrandings.org/how-to-identify-a-stranding/.*

tember; Evans 1996, 2006, Evans et al. 2003), these strandings in the southern North Sea occurred in all seasons.

Live strandings of animals that died at the location of stranding

The first animal ever seen alive in the southern North Sea was an emaciated, 10.66 m long whale that stranded alive in Pegwell Bay, Kent, UK, 21 March **2001** (figure 3) (further details on this and all other cases are in the Appendix). This animal was only found after it had stranded; there were no previous live sightings at sea. A second animal got itself caught in the Humber Estuary between the river bank and jetties at the entrance to King George Dock, Hull, 22 September **2006**. This animal, a 9 m long immature female, died as well, despite rescue attempts by British Divers Marine Life Rescue (BDMLR). Another sad case concerns a whale seen alive on 10 September **2009**, just off Gravesend in the River Thames, England. The animal was found dead on 12 September 2009, still in the River Thames, near the Queen Elizabeth II Bridge. The animal was necropsied and found to be a starved immature male, 9.5 m long (Deaville & Jepson 2011; UK Cetacean Strandings Investigation Programme). A fourth live stranding occurred in the Netherlands (another first!) on 12 December **2012** at the offshore sandflat Razende Bol, Texel (52˚59'N, 4˚42'E) (figure 4). This whale, a 10.34 m long immature female that got named "Johanna", died four days later, despite several attempts to rescue her. Her remains are kept at Naturalis, the Netherlands.

Live sightings at sea

The vast majority of cases involve live sightings at sea, both nearshore and offshore. The Netherlands had the first live sightings at sea, of a mother/calf pair swimming just off the beach near Scheveningen, on 18 December **2003** (figure 5). Unfortunately, the calf washed up dead at Katwijk two days later, entangled in local fishing gear (Camphuysen 2007). After the calf had died, the larger whale remained in the area and was occasionally seen until 25 January **2004** (Camphuysen 2007). A photograph of this animal, taken on 16 December 2003 (figure 6), could be matched to photographs of the same animal, nine years later, off the Dutch coast (figures 10 and 11): the first whale known to return to roughly the same area within the southern North Sea. Another adult, supposedly another animal, was seen on 21 January 2014 from the offshore platform Papa 18, only 10 nautical miles (18.5 km) west of Scheveningen. It may indeed have been another adult, as two "equally large adults" were seen in the area four days later.

Across the North Sea, in UK waters, a live whale was seen at sea five miles off Hartle-

Figure 4. Humpback whale "Johanna" live-stranded, Razende Bol, off Texel, the Netherlands, 12 December 2012. *Photo: Susanne Kühn, Wageningen Marine Research*.

Figure 5. Mother-calf pair off Scheveningen, the Netherlands, 18 December 2003. *Photo: A. Verbaan, KNRM.*

pool, England, 7 September **2006**. Presumably the same animal was seen slightly further south, off Whitby, a month later. Like the first case of a live whale in the Netherlands, this ended badly, with a dead, quite rotten whale (Decomposition Code, DCC 3-4) found ashore on 19 October (UK Cetacean Strandings Investigation Programme).

The first truly offshore sighting was made by de Boer et al. (2010) in the Tail End (NE part) of the Dogger Bank, 3 May **2007**, from a distance too great for photography. This may well have been an animal in transit, as an (immature) humpback arrived in the Marsdiep tidal inlet, between Den Helder and Texel, the Netherlands, on 10 May, where it was extensively

Figure 6. The mother of the calf, that would die later, off Scheveningen, the Netherlands, 16 December 2003. *Photo: A. Verbaan, KNRM*.

watched and photographed while swimming and feeding (Camphuysen 2007). The animal was well-marked on its dorsal and head and was subsequently re-sighted off Toe Head (near Cork), Ireland on 28 September 2007. It returned to Dutch waters (IJmuiden) where it stayed from 16-21 November 2007 (Strietman 2008, www.waarneming.nl) and may have swam back south, as a humpback with a white-rimmed dorsal was filmed off Boulogne sur Mer (18 February) and Wimereux (22 February), in the Manche (Channel) area of NW France (Strietman 2018 and https://www.youtube.com/watch?gl=UG&hl=en-GB&v=3dD74bSZ-6g). A further sighting of this animal, confirmed by fluke photographs, came more than four years later (17 November 2012), from nearshore waters off Tromsø, Norway (Broms 2013).

From 3 December 2008 to 7 February 2009, several sightings of a single humpback whale, swimming and feeding in coastal waters between IJmuiden and Texel (the Netherlands) were reported to www.waarneming.nl. It is unclear if more than one animal was involved but several photographs taken show that these records do not relate to the animal that was previously seen off Texel, Southern Ireland, IJmuiden, and Norway (dorsal not white-rimmed). The animal was first seen and photographed from a distance on 3 December **2008** (Tamara van Polanen Potel, Wageningen Marine Research), from a ship working near the two offshore wind farms west of Egmond aan Zee. Subsequently, it was photographed by a helicopter crew (Bristow Helicopter Group) on 27 December, off Texel, re-sighted here from the beach (Texel) on 3 January 2009 (Thijs den Otter), and slightly further south in the Marsdiep tidal inlet on 7 January (by the crew of the Texel ferry). Presumably the same animal was briefly followed by warden vessel MV *Phoca*, watched feeding, and photographed off Texel on 9 January (Strietman 2009; figure 7), and was last seen on 7 February 2009, again from a Bristow helicopter, slightly further offshore off Texel, at 53˚10.6'E, 4˚47.6'E. This animal may have succumbed too, as a whale was reportedly seen alive near Omonville-la-Rogue, Normandy, France on 14 February, but found dead here in fishing gear a day later.

Also in **2009**, another small humpback whale was spotted off the Farne Islands,

Figure 7. Three images of the same, feeding, humpback whale off Texel, the Netherlands, 9 January 2009. Note the northern gannets (*Morus bassanus)* in attendance. *Photos: Bram Fey.*

Figure 8. Humpback whale off the Farne Islands, 18 September 2009. *Photo: Julie Forrest.*

Figure 9. Variation in dorsal shapes in humpback whales photographed off Whitby, UK. Left: 4 September 2010. Right: 20 October 2012. *Photos: Robin Petch, Sea Watch Foundation.*

Northumberland, UK (55˚39'N, 1˚36'W), from 7 until 20 September (Daniel 2009; figure 8). Like the whale seen earlier near Texel, this animal was followed by a flock of northern gannets (*Morus bassanus*), and photographed. About two months later, a much larger animal was reported by sea anglers near Whitby, North Yorkshire, UK. The Whitby area would evolve as a hotspot for humpback whale sightings in the following years (Parkin & Parkin 2010).

A small (juvenile) whale was filmed off Whitby, tail-slapping on 11 September **2010**, from the Whitby Coastal Cruises vessel *Specksioneer* (http://www.youtube.com/watch?v=IG7RY7gd5s4). A presumed second animal was intermittently reported between Whitby and Whitburn Coastal Park, some 70 km NW of Whitby, from 2 September 2010 until New Year's Day (Robin Petch, Sea Watch Foundation; figure 9).

The next animal was seen in Dutch waters, but only once, on 31 January **2011**, by the crew of the MS *Frans Naerebout* (Rijkswaterstaat), ca 10 km NW of Westkapelle, Walcheren. Even though the animal was heading NE, i.e. deeper into Dutch waters, it was not seen again (www.waarneming.nl). However, probably the same animal had been seen earlier, in the English Channel (NW France), already from 15 December 2010 onward (Jan Haelters, personal communica-

tion). It was photographed by Sylvain Pezeril, of OCEAMM (Observatoire pour la Conservation et l'Etude des Animaux et Milieux Marins) on 11 January 2011 off Sangatte, near Calais, and filmed off Boulogne-sur-Mer (just south of Calais), on 19 January, by fisheries biologists from IFREMER, on board RV *Thalassa* (http://www.zeezoogdieren.org/wordpress/?p=5209#more-5209). The next day, the animal was seen breaching close to the Belgian border (Zuydcoote), and again a day later off Hardelot Plage (21 January), feeding in the company of some harbour porpoises (*Phocoena phocoena*), and further south, ca 2 km off Wimereux (France, 50˚46'N) on 24 January 2001 (http://www.zeezoogdieren.org/wordpress/?p=5248#more-5248). If indeed these sightings were of the same animal as seen off Walcheren, Netherlands on 31 January, it was swimming up and down the coast, from NW France to SW Netherlands, rather than passing by. During this chain of events, the animal produced the first (recent) record for Belgium, on 19 January 2011 (http://www.marinemammals.be/observations/view/5716).

The next humpback whale that turned up in Dutch waters was an immature with a dorsal shaped differently from previous whales seen (http://waarneming.nl/waarneming/view/53659129). This animal was filmed on 19 April 2011 in Dutch waters, some 25 km off Katwijk by Ed Barneveld on board the coastguard vessel Zeearend, (http://www.youtube.com/watch?v=AzYRQSoYn9o), and seen on the same day in Belgium (http://www.marinemammals.be/observations/view/5910). Like the previous case, this whale probably swam up and down the coast for some time. Immature humpbacks were reported subsequently, from 15 May to 16 June 2011 near Den Helder and off the Dutch Wadden Islands, from Terschelling to Schiermonnikoog. The distance between Terschelling, where it was last seen off the Wadden Isles on 15 June and Den Helder, where it turned up on 16 June, is ca 60 km via the shortest route. The time between these two sightings was 19 hours and 45 minutes, so a swimming speed of 3 km/h would have sufficed to cover the distance. Subsequent records, of humpback whales seen in the Belgian sector of the North Sea (2 July, by Johan Tas) and in the English Channel, between Brighton and the French Coast (5 July) may refer to the same animal leaving the North Sea.

From Whitburn, Durham, England, seawatchers reported a fluking humpback whale on 6 August 2011 (M. Newsome, P. Hindess and D. Gilmore, www.trektellen.com), and again a humpback two days later, without further details. On 30 September 2011 and again on 1 and 5 October a humpback whale was reported from the Thornton Bank, 13.5 nautical miles (25 km) off Zeebrugge, Belgium (Verbelen & Haelters 2011).

The first live sighting of a humpback whale in the German sector of the North Sea was made from the air, during a harbour porpoise line transect survey, on 26 May **2012** (Anita Gilles, personal communication). Four days later, yachtsman Paul Brinkhof and family spotted a whale, between the Dutch Wadden isles Texel and Vlieland. Estimated length was circa 9 m, it was later identified as a humpback whale. A similarly small animal (estimated 8-9 m) was spotted by the crew of harbour patrol vessel *RPA15*, on 14 August 2012, at the entrance to the port of Rotterdam (Maasmond). The animal was filmed breaching and was ushered out of harm's way (Westlanders.nu 2012, http://www.portofrotterdam.com/nl/actueel/pers-en-nieuwsberichten/Pages/walvis-dartelt-in-havenmond.aspx).

Almost concurrently with the whale sighted off Rotterdam, another (?) young humpback whale came up to two 10 m long angler's boats and rubbed itself alongside them, in an area of sea known as 9-mile ground off Whitby, UK (54°36'N, 0°27'W), on 7 August 2012. The animal was filmed during the encounter (http://www.seawatchfoundation.org.uk/?p=2179) and, probably the same whale, was seen again on 17 August, a little further north off Skinningrove (54°35'N, 0°54'W) (http://www.sea-

Figure 10. Humpback whale off Callantsoog, the Netherlands, 20 December 2012, feeding along 10 m isobath on large schools of sprat. *Photo: Hans Verdaat, Wageningen Marine Research*.

Figure 11. The same humpback whale as shown in figures 10 and 6 (compare dorsals), off Callantsoog, the Netherlands, 20 January 2013. *Photo: Steve Geelhoed*.

watchfoundation.org.uk/?p=2660).

Two months later, on 18 October 2012, Robin Petch of Sea Watch, on board MV *Specksioneer* observed two humpback whales off Whitby: a juvenile and a larger individual. Subsequently, a single humpback whale was seen here on 20 and 21 October 2012 (http://www.seawatchfoundation.org.uk/?p=2949 and http://www.dolphinspotter.co.uk/). On that same day, 21 October 2012, another lone humpback whale was reported some 100 nautical miles up the coast, at the north-western limit of our study area, at Belhaven Beach, Dunbar, East Lothian, Scotland (56°0'N,

Figure 12. The same whale as in figures 10 and 11, now seen in close proximity of Offshore Wind farm Egmond aan Zee (OWEZ), 12 January 2013. Note flock of gulls in attendance. *Photo: Roelof de Beer (www.walvisstrandingen.nl).*

Figure 13. Emaciated humpback whale, spotted during an aerial survey circa 11 km off Middelkerke, Belgium, 3 September 2013. *Photos: Jan Haelters/RBINS.*

2°31'W), by Graeme Ferris (http://seawatchfoundation.org.uk/legacy_tools/region.php?output_region=4). The largest group to date, three humpback whales, was reported

Figure 14. Sequence of a breaching humpback whale photographed from the ferry from Newport, UK, to IJmuiden, the Netherlands, 15 July 2013 (http://orcaweb.worldpress.com).

on 13 December **2012**, off Hartlepool, Durham (54°41'N, 1°13'W), heading north (http://www.seawatchfoundation.org.uk/?p=3192).

Along the eastern seaboard of the southern North Sea, seawatcher Rob Berkelder spotted two whales, swimming south past The Hague, the Netherlands (52˚05'N, 4˚01'E), in high winds on 29 November 2012. Blows were clearly visible; one animal was appreciably larger than the other. The whales were tentatively identified as humpbacks. On 2 December, these whales were seen by many observers, between the towns of Castricum (52˚33'N) and Bergen aan Zee (52˚39'N) and were now positively identified, photographed, and filmed (from a distance: www.waarneming.nl). The animals were constantly accompanied by flocks of gulls, mostly kittiwakes (*Rissa tridactyla*) and sometimes by flocks of auks. The two whales were seen together again, NW off Egmond aan Zee (52˚38'N) by seawatchers on 4 December, but disappeared thereafter.

A 10.34 m long juvenile animal live-stranded on 12 December 2012 at the Razende Bol, Texel (figure 4). Possibly this was one of the two animals (i.e. the smaller one of these two) sighted two weeks earlier off the Dutch mainland coast. This possibility is supported by a sighting of a larger, solitary whale, feeding off Callantsoog (52˚35'N, 4˚35'E) on 20 December 2012. Photographs taken at close range (figure 10) while the animal was apparently feeding, showed it to be the same individual as the adult female (with calf) seen nine years earlier off Scheveningen (figure 6). On the vessel's echo-sounder, large fish schools were continuously in view and sampling proved these fish to be sprat (*Sprattus sprattus*) (Leopold et al. 2013).

As close-up photographs of the other animal seen here earlier are lacking, we cannot ascertain whether this could be the other animal sighted here. However, a life guard boat sent to the scene an hour later reported two animals together, a larger and a smaller one. As the animal that was sighted first was clearly alone, three different humpback whales may have been involved: a single adult and a mother-calf pair. All whales disappeared from sight the same day, but one re-appeared briefly on 4 January **2013** (12:18h Hondsbossche Zeewering: 52˚44'N; 15:30h Castricum: 52˚33'N) only to disappear again. At least one humpback was seen by many observers off the same stretch of coastline, from 9-18 January 2013, but two animals were seen together here on 9, 10, 12 and 13 January (www.trektellen.nl). Several photographs have been taken, but always of just one animal, which on several images clearly was the same individual already seen on 20 December 2012 (figures 10-12).

No photographs could be obtained from the pair reported earlier in these parts, so the identity of the larger one remains unclear. The whole area was surveyed by plane on 12 January 2013. The observers claim that with certainty only a single humpback was present in the area between IJmuiden (52˚28'N) and the

Figure 15. The Eastern Scheldt whale, followed from a distance by a Dutch government patrol vessel, 16 February 2015. *Photo: Liliane Solé.*

Hondsbossche Zeewering (52˚44'N) which was photographed from the plane (www.trektellen.nl). However, two animals, a larger one accompanying a smaller individual, were reported in the middle of the area surveyed, off Bergen aan Zee (52˚37'N), only two hours later (www.trektellen.nl).

Another case for Belgium was found during an aerial survey, circa 6 nautical miles (11 km) off Middelkerke, 3 September 2013 (figure 13). The animal was alive but appeared emaciated, even though many schools of pelagic fish were spotted from the plane, presumably herring (*Clupea harengus*) or sprat (Verbelen & Haelters 2013).

Passengers on the Newcastle ferry were given a show by a breaching humpback whale on 15 July 2013, some 50 km out of port (figure 14). Probably the same whale was seen twice, nearly three weeks later (3 August): off Whitburn, Sunderland, and at Cresswell, Northumberland (Sea Watch database).

Further south along the UK East coast, a humpback whale was seen on at least 13 occasions, between Happisburgh, Norfolk and Minsmere, Suffolk, from 13 September to 19 November 2013. Further offshore, a humpback whale produced only a single sighting on 9 April **2014**. The animal was seen 80 nautical miles (ca. 150 km) out of the Humber estuary, from a DFDS ferry service from Immingham (near Hull) to Cuxhaven in Germany, by volunteer researcher Carol Farmer-Wright, for conservation charity MARINElife. Several unconfirmed sightings followed in 2014 and early 2015 (see Appendix), but an unmistakeable humpback whale entered the semi-enclosed estuary Eastern Scheldt, on 14 February **2015**. The animal entered this water body by swimming through one of the openings in the barrier dam, made a tour through the estuary (figure 15) and swam out again two days later.

Two or three more humpback whales were sighted in 2015: the first one was seen off the Norfolk (UK) coast, 17-23 November, and overlapping with this time span, during which the whale was not reported each day, e.g., not from 10-13 November, a single humpback whale sighting was made near IJmuiden, Netherlands, some 200 km to the east. Subsequently, a humpback was spotted near the mouth of the River Scheldt (NL) on 2 December and an unidentified whale was

Figure 16. Humpback whale breaching off Castricum, the Netherlands, 26 January 2017. *Photo: Hans Verdaat, Wageningen Marine Research*.

reported from Terschelling on 29 December. Early in **2016**, the trickle of humpback whale sightings continued along the eastern North Sea seaboard. A humpback whale was briefly filmed near the entrance to the port of Rotterdam om New Year's Day; on 16 January one was reported breaching, in the company of a flock of gulls, off Camperduin (NL). All these records could in fact relate to the same whale. However, on 28 January, two humpback whales were seen together, just 200 m from the coast at Raversijde Duinenkerkje in the Belgium sector of the North Sea (Jan Haelters, personal communication). All went quiet again until a humpback whale turned up in the Sloehaven, Vlissingen, in the Western Scheldt on 22 October 2016.

On 16 January **2017**, a humpback whale was seen close to the Dutch mainland coast, off Noordwijk (www.waarneming.nl). What first seemed to be just another isolated sighting, turned out to be the start of a long series of observations in Dutch waters. Presumably the same animal was found back on 20 January and seen on almost each subsequent day until 4 February (excepting 23-25 January) (figure 16). The animal was sometimes joined by a second whale, as on several occasions two whales were seen together. They travelled up and down the coast between the towns of Castricum and Bergen, and were often seen being followed by flocks of gulls and apparently feeding. After the last sighting on 4 February the animal(s) disappeared but one turned up later in the naval port of Den Helder where it stayed from 27 February to 3 March (www.waarneming.nl).

Two more humpback whales were seen in Dutch waters in 2017: one from 10-22 July off Scheveningen and one on 7 October close to the Maasvlakte 2 (Rotterdam). All whales seen in 2017 attracted crowds of observers that came to witness the spectacle, unheard of just 15 years before. The final observation to date is of a humpback whale seen offshore in the UK sector of the North Sea, from the ferry Stena Hollandica by the Rugvin Foundation on 14 April **2018** (https://observation.org/waarneming/view/154742031#).

Feeding and diet

Not much is known about the food taken by humpback whales in the southern North

Figure 17. Small sprats were caught in the wake of a feeding humpback whale, off Texel, the Netherlands, 9 January 2009. *Photo: Bram Fey*.

Sea. In other parts of the Atlantic, humpback whales are known to feed mostly on crustaceans and small schooling pelagic fishes, like capelin *Mallotus villosus*, herring and sandeels (Ammodytidae) (Mitchell 1973, Whitehead & Carscadden 1985, Payne et al. 1986, Christensen et al. 1992, Friedlaender et al. 2009), and humpbacks have been observed feeding on shoals of sprat (confirmed by sampling) off the west coast of Scotland (P.G.H. Evans, personal observations). Observations of apparently feeding humpback whales in the southern North Sea are in line with this. Whales were on occasions followed by flocks of gulls that seemed to profit from the whale's feeding behaviour. Verbelen & Haelters (2013) observed many fish schools, thought to be herring or sprat, near the whale seen in Belgian waters in September 2013. This whale, however, appeared to be starving. The whale that was followed by MV *Phoca* off Texel on 9 January 2009 was feeding and surrounded by northern gannets (Strietman 2009). A small trawl was lowered in the wake of the whale, and small sprats and brown shrimps *Crangon crangon* were caught, suggesting that the whale was feeding on these (figure 17).

Necropsies of stranded humpback whales in the North Sea either did not include a thorough examination of stomach and gut contents, or came up empty (Lick et al. 1995). Only in the gut of "Johanna", the whale that stranded on 12 December 2012 at the offshore sandflat Razende Bol, Texel and that died here four days later, we found a few remains of sprats (vertebrae, pro-otic bullae and a few very worn sagittal otoliths). A diet of sprat would be consistent with observations of several humpback whales feeding of the Dutch mainland coast, around the 10 m isobaths, where large concentrations of sprat were found in winter (Leopold et al. 2013).

Discussion

The status of the humpback whale in the southern North Sea has changed 'overnight' from a very rare vagrant to a yearly visitor. Whales have been mainly spotted near the coast, both along the eastern and western seaboard of the southern North Sea, but there are also several offshore sightings, in waters with fewer observers. Clearly, the whales must come from somewhere outside the North Sea, and travelling whales may thus be encountered anywhere in the study area (figure 18). Some 45 cases, often of lone whales but occasionally of small groups of whales could be tentatively identified (see Appendix) in the present century (figure 19). At first, mostly dead whales were found floating at sea or washing ashore, or live whales that died soon after they were first seen. From 2007 onward, however, most whales seen were alive, and seemed to be doing well: some were observed feeding and some became long-stayers.

In the light of the absence of the species for centuries, it is unlikely that something, relevant to the whales, has changed suddenly and dramatically in the southern North Sea in the last 20 years or so. Fish stocks have fluctuated greatly, but most have been relatively sta-

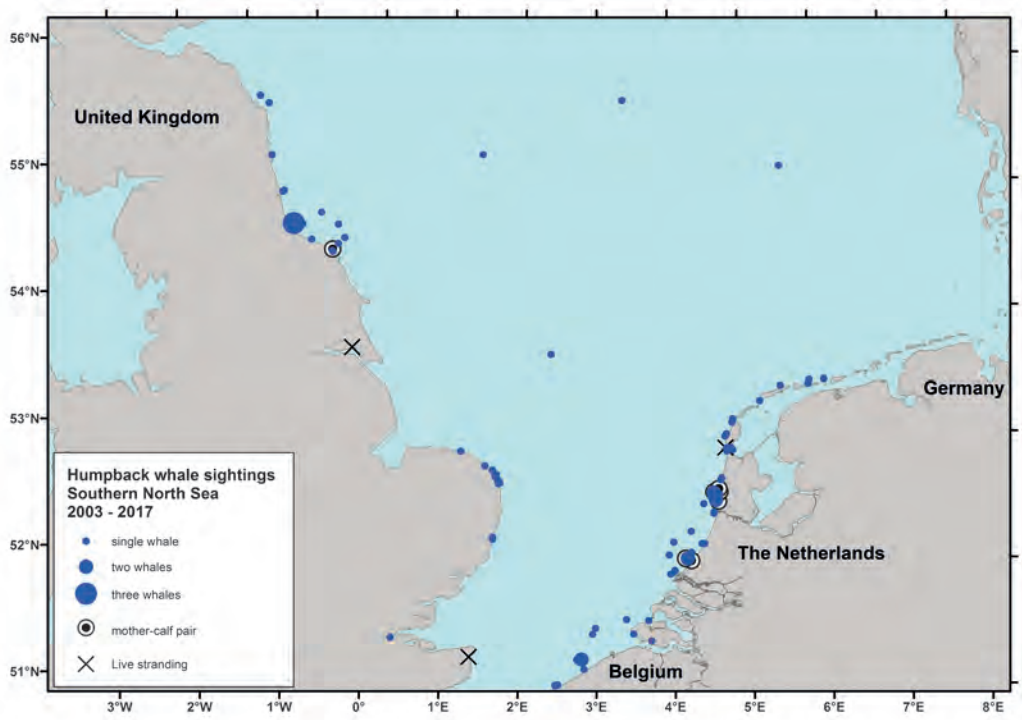

Figure 18. Distribution of sightings of live humpback whales in the southern North Sea, 2003-2017.

ble over the past 20 years. Even though some stocks have been increasing, e.g., herring, this increase was modest compared to earlier changes (ICES 2017) and stocks were probably much larger centuries ago (when humpback whales were absent from the southern North Sea). Rather, therefore, relevant changes must have occurred elsewhere, or in the whales themselves. Numbers of humpback whales worldwide are rapidly increasing, with annual growth rates >10% reported from waters between Iceland and Greenland (Wedekin et al. 2017). Whale numbers are still lower than in the pre-whaling era (when humpback whales were absent from the southern North Sea), so the recent population increase alone cannot explain why these whales now venture deeply into the North Sea. Something in the behaviour of (some of) the whales must have changed as well. Today, the whales may be more inclined to test new waters, and once they have entered the southern North Sea, they can find good feeding opportunities and some animals became long-stayers. As many whales that come into the North Sea are immatures, new individuals are probably coming into the North Sea each year, which raises the question how whales "know" that good feeding grounds lie ahead if they turn into the North Sea on migration. Some individuals evidently have come back multiple times (Strietman 2008, 2009; this paper) but as humpback whales do not tend to travel in groups and most animals seen were single individuals, most probably found their way there by themselves. Communication and cultural transmission of new information are known in humpback whales (Allen et al. 2013). It is tempting to speculate that whales somehow "tell" each other that swimming into the North Sea would be a good idea. In any case, (some) humpback whales have dis-

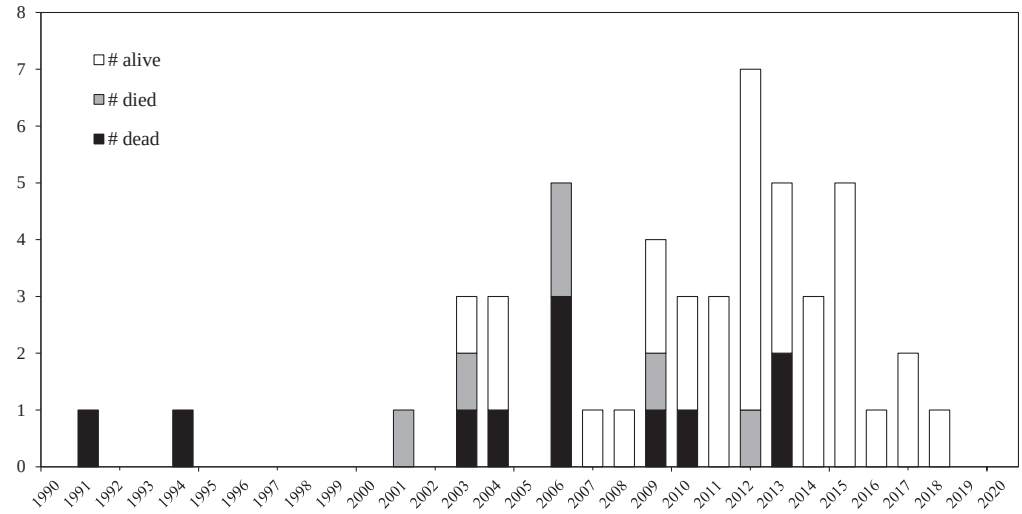

Figure 19. Numbers of cases tentatively identified per year. Strings of observations of presumably the same animal(s) are assigned to the same case, and to the year in which they were first seen. Groups of more than one whale are also considered one case. See Appendix for further details.

covered the southern North Sea as a new, suitable habitat, and numbers of these massive visitors have been increasing steeply, since the first were found (dead) in the 1990s.

It is worth noting that humpback sightings have also increased markedly elsewhere around the British Isles in the last twenty years. This may be the result of a steady recovery of the North Atlantic population following cessation of whaling (Clapham & Evans 2008). Both sprat and herring are abundant again in the southern North Sea, after a supposed increase in the region since the 1990s (Heessen et al. 2015, ICES 2017) and humpback whales need not starve here.

As humpback whales are seen in the southern North Sea in all months of the year, the sudden occurrence of humpback whales does not seem to be simply related to migration, with some animals entering the North Sea either willingly or by accident. The fact that more animals are present in the northern North Sea may have led to more individuals ranging further south. However, whereas humpback numbers have been decimated by past whaling, and are recovering, numbers are still much lower than in pre-whaling times, when the species was never seen in the southern North Sea. Therefore, a recovery of whale numbers cannot entirely explain the increase in the North Sea: it is not so much a come-back as a new phenomenon, which is not entirely understood at present.

Whatever the reasons for the regular presence of humpbacks now in the North Sea, mortality in the region appears to be disturbingly high. One clear anthropogenic cause is that of entanglement in creel lines and other fishing gear (Camphuysen 2007, Ryan et al. 2016), presenting serious concern for the conservation of what must still be a rather small population.

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Samenvatting

Hoe de bultrug plotseling verscheen in de zuidelijke Noordzee

De bultrug is een walvis die wereldwijd voorkomt. De soort is in alle oceanen te vinden, maar is in zijn verspreiding niet beperkt tot diepere wateren en komt ook voor in de meeste randzeeën. De zuidelijke Noordzee, tussen Het Kanaal en de Doggersbank, vormde tot voor kort de uitzondering op de regel. Van voorbije eeuwen zijn slechts vier strandingen van dode bultruggen bekend, dit in tegenstelling tot de geschiedenis van tal van andere soorten grote walvissen in de zuidelijke Noordzee. Aan deze opvallende absentie van de bultrug is echter een einde gekomen. Achteraf gezien is de ommekeer begin jaren negentig ingezet, met het aandrijven van enkele dode dieren, eerst in Duitsland (1991 en 1994), daarna in Nederland (2003, bij de Nieuwe Waterweg) en in België (2006, bij Nieuwpoort). Ondertussen werden ook de eerste levende exemplaren gezien. De eerste in de monding van de Thames, Engeland, in 2001, maar dit dier strandde en moest worden geëuthanaseerd. Een bultrug die (vers) dood op Vlieland aanspoelde in 2004, met een touw om zijn lichaam, heeft vermoedelijk ook op eigen kracht de zuidelijke Noordzee weten te bereiken. Scheveningen had de primeur van de eerste levende bultruggen die niet meteen strandden: een moeder met een kalf. Het kalf spoelde echter na een paar dagen dood op het strand aan. Foto's van het moederdier toonden aan dat deze walvis negen jaar later weer terugkeerde voor de Nederlandse kust: een andere primeur. Vanaf 2006 worden bultruggen jaarlijks waargenomen in de zuidelijke Noordzee. De meeste dieren worden dicht onder de kust gezien in Nederland (waar zich veel waarnemers op het strand bevinden en waar enkele dieren weken tot maanden verbleven) en in Engeland, bij Whitby, waar walvistochtjes worden georganiseerd. In België zijn de waarnemingen nog relatief schaars en in Duitsland is nog slechts een enkele bultrug levend gezien. Een verklaring voor het feit dat bultruggen, na eeuwenlange afwezigheid, opeens jaarlijks opduiken in de zuidelijke Noordzee is moeilijk te geven. Er zijn voortdurend veranderingen in hydrografie of in de visstand van de Noordzee, maar die zijn de afgelopen 30 jaar, in vergelijking met wat zich eeuwenlang aan veranderingen heeft voorgedaan, niet zo groot geweest dat ze deze omslag kunnen verklaren. Het aantal bultruggen neemt wereldwijd weer toe, na een lange periode van walvisvaart met het ineenstorten van populaties walvissen als gevolg. Het aantal bultruggen is echter nog niet op het niveau van vóór de walvisvaart en toen kwam de soort ook niet voor in de zuidelijke Noordzee. Er lijkt dus iets veranderd in de walvissen zelf. Wellicht zijn ze wat ondernemender geworden en meer geneigd tot het bezoeken van nieuwe gebieden. En eenmaal gearriveerd in de zuidelijke Noordzee, vinden bultruggen hier voldoende te eten, wat het soms lange verblijf van sommige individuen hier kan verklaren.

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Appendix. List of all sightings presented in this paper, with further details. Strings of sightings, of presumably the same animal(s), have been given the same case number, with an increasing decimal for each subsequent sighting. Sightings outside the study area are marked in red. m-c = mother-calf. See http://www.zoogdierwinkel.nl/lutra for an extended version, with more details, of this list.

Day	Month	Year	Status	Type	Group composition	North	East	Country	Location	Case
30	11	1751	Dead	Floater	single	51.333	3.117	Belgium	Blankenberge	historic-1
	11	1824	Dead	Stranding	single	54.000	8.546	Germany	Vogelsand, Elbe mouth	historic-2
	9	1829	Dead	Stranding	single	55.763	-1.989	UK	Berwick upon Tweed	historic-3
	9	1839	Dead	Stranding	single	55.000	-1.413	UK	Newcastle	historic-4
15	7	1991	Dead	Floater	single	53.833	8.250	Germany	Jadebusen near Wilhelmshaven	Semi-recent 1
12	10	1994	Dead	Floater	single	54.183	7.117	Germany	50 km west of Helgoland	Semi-recent 2
	2	1995	Dead	Sunk: bone	single	53.667	3.833	Netherlands	Klaverbank	Semi-recent 2.1
21	3	2001	Died	Live stranding	single	51.311	1.377	UK	Pegwell in Sandwich Bay, Kent (Thames mouth)	Recent 1
29	9	2003	Dead	Floater	single	52.020	3.950	Netherlands	Nieuwe Waterweg	Recent 2
18	12	2003	Alive	Live m-c pair	m-c pair	52.100	4.150	Netherlands	Scheveningen	Recent 3
20	12	2003	Dead	Stranding	single	52.216	4.402	Netherlands	Katwijk aan zee	Recent 3.1
21	1	2004	Alive	Live nearshore	single	52.216	4.402	Netherlands	13:00: 4 nm off Scheveningen	Recent 3.2
25	1	2004	Alive	single mother	single	52.217	4.367	Netherlands	at least up to Katwijk	Recent 3.3
21	1	2004	Alive	Live offshore	single	52.128	3.939	Netherlands	off the Hague	Recent 4
25	1	2004	Alive	Live nearshore	two adults	52.100	4.179	Netherlands	off the Hague	Recent 4.1
22	6	2004	Dead	Stranding	single	53.243	4.906	Netherlands	Vliehors, Vlieland	Recent 5
5	3	2006	Dead	Stranding	single	51.155	2.726	Belgium	Nieuwpoort	Recent 6
13	6	2006	Dead	Stranding	single	52.186	1.408	UK	Kingsdown beach near Deal in Kent	Recent 7
12	9	2006	Dead	Stranding	single	51.465	0.258	UK	near Dartford Bridge, Thames	Recent 8
22	9	2006	Died	Live stranding	single	53.741	-0.279	UK	King George Dock (Hull)	Recent 9
7	9	2006	Alive	Live nearshore	single	54.700	-1.033	UK	five miles east of Hartlepool	Recent 10
	10	2006	Alive	Live nearshore	single	54.500	-0.608	UK	off Whitby	Recent 10.1
19	10	2006	Dead	Stranding	single	54.532	-0.747	UK	Runswick Bay, North Yorkshire	Recent 10.2
3	5	2007	Alive	Live offshore	single	55.749	3.356	Netherlands	North of Tail End, Dogger Bank	Recent 11.0?
10-13	5	2007	Alive	Live nearshore	single	52.975	4.750	Netherlands	Marsdiep (Texel-den Helder)	Recent 11.1
28	9	2007	Alive	Live nearshore	single	51.475	-9.233	Ireland	off Toe Head, near Cork	Recent 11.2
15-21	11	2007	Alive	Live nearshore	single	52.465	4.532	Netherlands	IJmuiden	Recent 11.3
18	2	2008	Alive	Live nearshore	single	50.750	1.583	France	Boulogne sur mer	Recent 11.4
22	2	2008	Alive	Live nearshore	single	50.775	1.550	France	Manche, off Wimereux	Recent 11.5
17	11	2012	Alive	Live nearshore	single	69.875	18.233	Norway	off Tromso	Recent 11.6
3	12	2008	Alive	Live, offshore	single	52.533	4.400	Netherlands	Between IJmuiden and OWEZ	Recent 12
3	1	2009	Alive	Live, nearshore	single	53.068	4.696	Netherlands	off Texel	Recent 12.1
7	1	2009	Alive	Live, nearshore	single	52.976	4.766	Netherlands	Marsdiep	Recent 12.2
9	1	2009	Alive	Live, nearshore	single	53.087	4.717	Netherlands	west of Texel	Recent 12.3
7	2	2009	Alive	Live, offshore	single	53.177	4.793	Netherlands	west of Texel, last sighting	Recent 12.4
15	2	2009	Dead	Bycatch	single	49.706	-1.829	France	off Omonville-la-Rogue, Normandy	Recent 12.5

8	10	2009	Dead	Stranding	single	53.430	5.629	Netherlands	Ameland, Hollum	Recent 13
10	9	2009	Alive	Live nearshore	single	51.446	0.371	UK	off Gravesend (Thames)	Recent 14
12	9	2009	Dead	Stranding	single	51.463	0.258	UK	Queen Elizabeth II Bridge, River Thames	Recent 14.1
7	9	2009	Alive	Live nearshore	single	55.700	-1.733	UK	off Lindisfarne, Northumberland	Recent 15
13&20	9	2009	Alive	Live nearshore	single	55.646	-1.604	UK	Longstone Island, Farne Islands, Northhumberland	Recent 15.1
	11?	2009	Alive	Live nearshore	single	54.500	-0.608	UK	near Whitby, Yorkshire	Recent 16
15	8	2010	Dead	Floater	single	50.206	-5.431	UK	Just off the beach at The Towans, Hayle, Cornwall	Recent 17
18	8	2010	Dead	Stranding	single	52.206	4.392	Netherlands	Katwijk	Recent 17.1
2-11	9	2010	Alive	Live nearshore	single	54.500	-0.608	UK	near Whitby, Yorkshire	Recent 18.1
20	9	2010	Alive	Live nearshore	single	54.492	-0.600	UK	near Whitby, Yorkshire, very closely inshore	Recent 18.2
mid	10	2010	Alive	Live nearshore	single	54.558	-0.533	UK	near Whitby, Yorkshire, 5 miles offshore	Recent 18.3
late	12	2011	Alive	Live nearshore	single	54.958	-1.317	UK	moving north, past Whitburn Coastal Park (70 km NW of Whitby)	Recent 18.4
1	1	2011	Alive	Live nearshore	single	54.958	-1.317	UK	passing Whitburn Coastal Park (ca 70 km NW of Whitby)	Recent 18.5
19	12	2010	Alive	Live nearshore	single	51.092	2.475	France	off Zuydcoote	Recent 19
20	12	2010	Alive	Live nearshore	single	51.096	2.508	France	off Bray Dunes	Recent 19.1
30	12	2010	Alive	Live nearshore	single	50.979	1.833	France	Pas-de-Calais	Recent 19.2
11	1	2011	Alive	Live nearshore	single	50.967	1.750	France	Sangatte	Recent 19.3
19	1	2011	Alive	Live nearshore	single	51.123	2.458	France	off Zuydcoote	Recent 19.4
19	1	2011	Alive	Live nearshore	single	50.733	1.550	France	Boulogne	Recent 19.5
21	1	2011	Alive	Live nearshore	single	50.634	1.568	France	off Hardelot plage	Recent 19.6
24	1	2011	Alive	Live nearshore	single	50.770	1.590	France	off Wimereux	Recent 19.7
31	1	2011	Alive	Live nearshore	single	51.617	3.383	Netherlands	10 km off Walcheren, Zeeland	Recent 19.8
19	4	2011	Alive	Live nearshore	single	52.230	4.000	Netherlands	20 km off Den Haag; different animal	Recent 20
14	5	2011	Alive	Live nearshore	single	53.504	6.083	Netherlands	Ameland Westgat	Recent 20.1
15	5	2011	Alive	Live nearshore	single	53.498	6.030	Netherlands	just seaward of ebb-tidal delta Ameland-Schiermonnikoog	Recent 20.3
1	6	2011	Alive	Live nearshore	single	52.963	4.729	Netherlands	den Helder	Recent 20.5
2	6	2011	Alive	Live nearshore	single	52.950	4.717	Netherlands	den Helder	Recent 20.6
2	6	2011	Alive	Live nearshore	single	52.974	4.717	Netherlands	Den Helder - Breewijd	Recent 20.7
7	6	2011	Alive	Live nearshore	single	53.496	5.833	Netherlands	Ameland	Recent 20.8
9	6	2011	Alive	Live nearshore	single	53.468	5.819	Netherlands	Ameland paal 16	Recent 20.9
15	6	2011	Alive	Live nearshore	single	53.344	5.167	Netherlands	Terschelling, westpunt	Recent 20.10
16	6	2011	Alive	Live nearshore	single	52.972	4.778	Netherlands	den Helder	Recent 20.11
2	7	2011	Alive	Live nearshore	single	51.221	2.842	Belgium	1 NM off Raversijde	Recent 20.12
5	7	2011	Alive	Live offshore	single	50.417	0.500	UK	English Channel, between Brighton and the French Coast	Recent 20.13
6	8	2011	Alive	Live offshore	single	54.950	-1.333	UK	Whitburn, Durham	Recent 21
8	8	2011	Alive	Live offshore	single	54.950	-1.333	UK	Whitburn, Durham	Recent 21.1
30	9	2011	Alive	Live offshore	single	51.547	2.987	Belgium	Thorntonbank. 25 km off Zeebrugge	Recent 22
1	10	2011	Alive	Live offshore	single	51.547	2.987	Belgium	Thorntonbank. 25 km off Zeebrugge	Recent 22.1
5	10	2011	Alive	Live offshore	single	51.547	2.987	Belgium	Thorntonbank. 25 km off Zeebrugge	Recent 22.2
23	3	2012	Dead	single vertebra	single			Netherlands	Wadden Sea, NE of Texel	
26	5	2012	Alive	Live offshore	single	55.207	5.530	Germany	German sector of the North Sea	Recent 23
30	5	2012	Alive	Live nearshore	single	53.204	4.801	Netherlands	off the Eierlandse Gronden, NW Texel	Recent 23.1

7	8	2012	Alive	Live offshore	single	54.608	-0.450	UK	9 mile ground, off Whitby	Recent 24
17	8	2012	Alive	Live offshore	single	54.583	-0.900	UK	Skinningrove	Recent 24.1
14	8	2012	Alive	Live nearshore	single	52.001	4.012	Netherlands	Maasmond, off Hook of Holland	Recent 25
18-21	10	2012	Alive	Live m-c pair	m-c pair	54.513	-0.608	UK	north of Whitby, Yorkshire: seven sightings of (max) two whales	Recent 26
13	12	2012	Alive	Live nearshore	gr. of three	54.700	-1.158	UK	Hartlepool	Recent 26.1
16	12	2012	Alive	Live nearshore	m-c pair +1	56.546	-2.567	UK	Arbroath	Recent 26.2
29	11	2012	Alive	Live m-c pair	m-c pair	52.083	4.225	Netherlands	off the Hague, moving south	Recent 27
2	12	2012	Alive	Live m-c pair	m-c pair	52.551	4.589	Netherlands	off Castricum, Noord-Holland (southernmost position that day)	Recent 27.1
2	12	2012	Alive	Live m-c pair	m-c pair	52.652	4.598	Netherlands	off Bergen, Noord-Holland (northernmost position that day)	Recent 27.2
4	12	2012	Alive	Live m-c pair	m-c pair	52.628	4.609	Netherlands	off Egmond, Noord-Holland	Recent 27.3
20	12	2012	Alive	Live nearshore	single	52.583	4.500	Netherlands	mother and calf seen near single, lone, large animal	Recent 27.4
9-10	1	2013	Alive	Live nearshore	m-c pair	52.623	4.605	Netherlands	mother and calf seen from land, off Egmond	Recent 27.5
12	1	2013	Alive	Live nearshore	m-c pair	52.614	4.588	Netherlands	mother and calf seen from land, off Egmond	Recent 27.6
13	1	2013	Alive	Live nearshore	m-c pair	52.627	4.534	Netherlands	mother and calf seen from land, off Egmond (last sighting of 2 animals)	Recent 27.7
12	12	2012	Died	Live stranding	single	52.979	4.700	Netherlands	Razende Bol, SW Texel	Recent 28
20	12	2012	Alive	Live nearshore	single	52.588	4.543	Netherlands	Full-sized animal, off Callantsoog feeding in band of sprat	Recent 29
20	12	2012	Alive	Live nearshore	single	52.557	4.593	Netherlands	one animal,off Castricum, southernmost position that day	Recent 29.1
4	1	2013	Alive	Live nearshore	single	52.735	4.638	Netherlands	one animal, northernmost position that day: HBZ	Recent 29.2
11-18	1	2013	Alive	Live nearshore	single	52.605	4.611	Netherlands	one animal, numerous sightings, southernmost position (Castricum)	Recent 29.3
12	1	2013	Alive	Live nearshore	single	52.615	4.589	Netherlands	aerial survey (Pim Wolf & Sander Lilipaly), slightly further offshore	Recent 29.4
24	3	2013	Dead	Stranding	single	51.467	0.767	UK	Thames mouth, at Sheerness	Recent 30
20	5	2013	Dead	Stranding	single	53.617	-0.083	UK	Mud flats beside Sunk Island village, Kingston upon Hull, Yorkshire	Recent 31
15	7	2013	Alive	Live offshore	single	54.800	-0.783	UK	Newcastle ferry	Recent 32
3	8	2013	Alive	Live nearshore	single	54.950	-1.333	UK	Whitburn, Sunderland	Recent 32.1
3	8	2013	Alive	Live nearshore	single	55.233	-1.517	UK	Cresswell, Northumberland	Recent 32.2
4	9	2013	Alive	Live offshore	single	51.297	2.747	Belgium	11 km off Middelkerke	Recent 33
13	9	2013	Alive	Live nearshore	single	52.267	1.650	UK	Dunwich, Suffolk	Recent 34
29	10	2013	Alive	Live nearshore	single	52.833	1.533	UK	Happisburgh, Norfolk	Recent 34.1
29	10	2013	Alive	Live nearshore	single	52.700	1.733	UK	Hemsby, Norfolk	Recent 34.2
30	10	2013	Alive	Live nearshore	single	52.717	1.717	UK	Winterton-Sea Palling	Recent 34.3
30	10	2013	Alive	Live nearshore	single	52.767	1.683	UK	Horsey, Norfolk	Recent 34.4
31	10	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.5
4	11	2013	Alive	Live nearshore	single	52.250	1.650	UK	Minsmere, Suffolk	Recent 34.6
9	11	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.7
10	11	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.8
13	11	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.9
14	11	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.10
15	11	2013	Alive	Live nearshore	single	52.833	1.533	UK	Happisburgh, Norfolk	Recent 34.11
17	11	2013	Alive	Live nearshore	single	52.800	1.633	UK	Sea Palling, Norfolk	Recent 34.12
9	4	2014	Alive	Live offshore	single	53.725	2.392	UK	80 miles out of the Humber esturary, en route to Cuxhaven	Recent 35

31	5	2014	Alive	Live offshore	single	54.712	-0.544	UK	Central North Sea	Recent 36
25	12	2014	Alive	Live nearshore	single	52.723	4.627	Netherlands	Camperduin	Recent 37
1	6	2015	Alive	Live offshore	single	55.307	1.420	Netherlands	Doggerbank	Recent 38
14-16	2	2015	Alive	Live nearshore	single	51.608	3.668	Netherlands	Eastern Scheldt, via barrier dam, in and out again	Recent 39
7	11	2015	Alive	Live nearshore	single	52.947	1.212	UK	Sheringham, Norfolk	Recent 40.1
9	11	2015	Alive	Live nearshore	single	52.696	1.714	UK	Hemsby, Norfolk	Recent 40.2
14	11	2015	Alive	Live nearshore	single	52.751	1.667	UK	Horsey, Norfolk	Recent 40.3
18-23	11	2015	Alive	Live nearshore	single	52.715	1.704	UK	Winterton, Norfolk	Recent 40.4
12	11	2015	Alive	Live nearshore	single	52.455	4.527	Netherlands	IJmuiden	Recent 41
2	12	2015	Alive	Live nearshore	single	51.501	3.474	Netherlands	Western Scheldt	Recent 42
29	12	2015	Alive	Live nearshore	single	53.459	5.447	Netherlands	Terschelling, North-East	Recent 42.1
1	1	2016	Alive	Live nearshore	single	52.006	4.010	Netherlands	Maasmond	Recent 42.2
16	1	2016	Alive	Live nearshore	single	52.723	4.627	Netherlands	Camperduin	Recent 42.3
28	1	2016	Alive	Live nearshore	pair	51.300	2.808	Belgium	Oostendebank	Recent 42.4
22	10	2016	Alive	Live nearshore	single	51.445	3.705	Netherlands	Sloehaven	Recent 43
16	1	2017	Alive	Live nearshore	single	52.315	4.229	Netherlands	off Noordwijk	Recent 44
20	1	2017	Alive	Live nearshore	two	52.621	4.534	Netherlands	Egmond aan Zee	Recent 44.1
4	2	2017	Alive	Live nearshore	two	52.561	4.559	Netherlands	Egmond aan Zee	Recent 44.2
27	2	2017	Alive	Live nearshore	single	52.959	4.791	Netherlands	Den Helder	Recent 44.3
3	3	2017	Alive	Live nearshore	single	52.959	4.791	Netherlands	Den Helder	Recent 44.4
10-22	7	2017	Alive	Live nearshore	single	52.147	4.227	Netherlands	Scheveningen	Recent 44
7	10	2017	Alive	Live nearshore	single	51.976	3.956	Netherlands	Maasvlakte 2	Recent 45
14	4	2018	Alive	Live offshore	single	52.023	2.097	UK	55 km SE of Lowestoft	Recent 46