Beached bird surveys in The Netherlands

winter 2020/21

C.J. Camphuysen 2021

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Citation:

Camphuysen C.J. (2021). Beached bird surveys in The Netherlands, winter 2020/21. NIOZ Report, RWS Centrale Informatievoorziening BM 21.16, Sep 2021. Royal Netherlands Institute for Sea Research, Texel.

Front cover: Sanderling *Calidris alba* inspecting, and feeding on, dead Razorbill *Alca torda*, Texel, 19 Dec 2020 (photo Suse Kühn).

Summary - This is the annual report on beached bird survey (BBS) results in The Netherlands winter 2020/21. Significant declines in oil rates were reported in recent decades (especially since ~2005), but several oiled auks were reported in December 2020, particularly at Texel. Nevertheless, measuring over an entire season, consistently low oil rates are found in all species, and that includes the auks, Razorbills *Alca torda* and Common Guillemot *Uria aalge*. The sample size for Common Guillemots much larger than the year before, more than sufficient for the OSPAR subregions covered in this study that are bordering the North Sea, and now also just sufficient for the interior Wadden Sea. The oil-rate (percentage of oiled Common Guillemots of all complete Common Guillemots found dead) reached a very low value of only 3.8% (n= 208) for the North Sea coast of OSPAR areas 8 and 9 combined. This current figure is the second lowest value ever measured within The Netherlands, it is well below 10%, and it consolidates the sharp drop in oil-rates that occurred after winter 2014/2015. The most recent data conform the declining trend once more, as a result of which the 5-year running mean of oil rates in Common Guillemots has now arrived at 5.5 ± 1.6% (mean ± S.D.) for all North Sea beaches combined. Not only has the OSPAR target of 20% over periods of at least 5 years for 2020 been exceeded, but even that for 2030 (10%) has been surpassed.

Winter 2020/21 was again a mild season overall, but with a short, sharp spell of cold weather and icing that inflicted some winter mortality to occur, mostly affecting some waterbirds and gulls. This cold-spell aside, a major die-off of mostly waterbirds occurred in coastal areas of Germany, The Netherlands and in the UK affecting mainly wildfowl, waders, and raptors, as a result of a highly pathogenic avian influenza (HPAI) virus, H5N8, in an epidemic season that began in October 2020 in Europe. Casualties were found throughout much of the Northern Hemisphere, from the UK and France in the west to the Shiga Prefecture in Japan in the east (AIimpact2021 agenda, 18 Dec 2020 – Thijs Kuiken, Erasmus MC, Rotterdam). In the Netherlands, most certain casualties were found inland in Friesland (particularly Barnacle Geese *Branta leucopsis*), while a mass mortality of Red Knots *Calidris canutus* was witnessed at Nordstrand, Schleswig-Holstein (Germany). Waterbirds (various species) with symptoms as well as proven cases were found scattered throughout the Dutch Wadden Sea area and there is little doubt that beached bird surveys may have picked up several cases, unwittingly. Details of the effects of the avian influenza outbreak in the Netherlands will be published later and elsewhere, for beached bird surveys formed only one small part of the data collections initiated by Erasmus University and partners.

Winter 2020/21 yielded some rather rare finds, including two 'firsts' for the long-term dataset covering 1901-2021, and these were a Kingfisher *Alcedo atthis* and a European Roller *Coracias garrulus*. For seabirds, apart from an influx of dead Northern Fulmars in spring, nothing unusual has occurred

Vogelstrandingen langs de Nederlandse kust, winter 2020/21

Samenvatting - Dit is de jaarlijkse weergave van de resultaten van systematische strandtellingen langs de Nederlandse kust, met een verslag over het seizoen 2020/21. Het langjarige onderzoek liet een gestage, lange termijn afname in oliebevuilingspercentages bij de Zeekoeten zien die versnelde vanaf 2005. Alle laatste seizoenen hebben bijzonder lage oliebevuilingspercentages laten zien. Over 2020/21 werd langs de Noordzeekust een niveau van slechts 3.8% olieslachtoffers onder Zeekoeten gevonden (n= 208). Het meerjarig gemiddelde is inmiddels op een niveau van 5.5 ± 1.6% beland, waarmee de doelstellingen van OSPAR voor zowel 2020 als voor 2030 niet alleen bereikt maar zelf overschreden zijn.

Introduction

This is the annual update of seabird strandings reports and results of systematic beached bird surveys for The Netherlands for winter 2020/21. As always, the emphasis of this study is on Common Guillemots *Uria aalge*, because the Marine Strategy Framework Directive demanded an indicator for oil pollution, in order to evaluate the effectiveness of measures to reduce chronic oil pollution (Commission Decision of 2010, Chapter 8.2, Effects of contaminants, EU 2010). To monitor levels of chronic marine oil pollution, beached bird surveys have been suggested in the late 1990s (Camphuysen & Heubeck 2001), but the information need for the monitoring and assessment of oil fouling of seabirds was established much later in the form of an Ecological Quality Objective (EcoQO) for OSPAR. In the legal Dutch Kader Richtlijn Marien document (page 78; "Vervuilende stoffen"; Anon. 2012), the EcoQO indicator is explicitly implemented. In the EcoQOs for the North Sea, "the Proportion of oiled Common Guillemots among those found dead or dying on beaches" was subsequently listed Under Issue 4 (Seabirds), EcoQO element (f). The "Oiled Guillemot EcoQO", as agreed by the 5th North Sea Conference, was defined as: *"The proportion of such birds should be 10% or less of the total found dead or dying, in all areas of the North Sea"* (Anon. 2002), later refined to target mean proportions of 20% in 2020 and 10% in 2030 over periods of at least 5 years (Anon. 2012).

Further details are provided for several other pelagic species (the Northern Fulmar *Fulmarus glacialis*, the Northern Gannet *Morus bassanus*, the Black-legged Kittiwake *Rissa tridactyla* and the Razorbill *Alca torda*). Four coastal species, including the often-highlighted Common Eider *Somateria mollissima*, Common Scoter *Melanitta nigra*, Herring Gull *Larus argentatus*, and Great Black-backed Gull *Larus marinus*, have not produced indications that oil pollution is a current threat in nearshore waters (see for details the last 5-10 annual reports, or the summary provided in Camphuysen 2019). Only the pelagic seabirds, are therefore analysed in depth and these should highlight trends in chronic oil pollution at greater distances from the nearest coast. Densities span the entire ~60 years period for which solid data are available (winter 1959/60 – winter 2020/21), whereas the analysis of oil rates spans a period of the most recent 44 winters (winter 1977/78 to 2020/21). Particular events causing elevated levels of sea- or waterbird mortality along the coast have been highlighted, whether or not the mortality had been caused by oiling.

Oil-rates (% oiled) of Common Guillemots are provided for the Dutch contributions to OSPAR areas 8, 9, and 10, and for the Dutch North Sea coast as a whole (areas 8 and 9 combined). Raw data are provided in Appendices. Given the nature of the underlying database (historical data can be merged with earlier published material whenever they are provided by volunteers walking our beaches to enlarge earlier sample sizes), the exact values may deviate slightly from earlier publications.

Meteorological background

Winter 2020/21 may be remembered by the general public as a cold winter, or even an 'ice-winter' given the fact that outdoor skating (recreation) was possible for some days, but the factual information is different. November 2020 was very mild, sunny, and dry, December 2020 was mild and fairly wet with a very short colder spell in the beginning of the month, January 2021 had normal temperatures but was a wet and dull month, February 2021 was sunny, dry, and overall mild, but with a cold spell lasting exactly one week (7-13 February), and March 2021 was characterised as rather dry and sunny and with a normal monthly mean temperature and particularly high temperatures in the end of the month (21-24°C De Bilt, locally up to 26.1°C). Only April 2021 was characterised as quite sunny and particularly cold (mean temperature 6.7°C against a long-term normal of 9.8°C), but it was exceptional only against the 'new normal' (based on temperatures measured since 1991) with it frequent exceptionally mild winters. Ice-induced water bird mortality was therefore limited, but the cold spell in February has affected ice-sensitive species such as Little Egrets *Egretta garzetta* and Kingfishers *Alcedo atthis*, and perhaps some waterfowl and waders.

Observers and observer effort

In winter 2020/21, beached bird surveys (NSO files) and strandings reports (mostly derived from published records in waarneming.nl) were used from Colin Aalbers (3), Nick Agterberg (1), Patrick Agterberg (3), Ruwan Aluvihare (1), Jaap Anders (1), Floor Arts (1), Nicole v As (1), Ramonda B. (1), Rik Bak (1), Bert en Monica Bakker (1), José M.R. Bakker (1), Theo Bakker (2), Martin Baptist (2), Marian Barendtszen (1), Marijke Barhorst (1), Jori Bastiaansen (1), Jordy van der Beek (1), Corstiaan Beeke (1), Jasper Beijeman (1), Dick Belgers (1), Robert Benjamins (3), Edwin Benschop (1), Jos van den Berg (1), Vasco van den Berg (1), S vd Berg-Blok (5), Ad van den Berge (2), Arnold Berghorst (1), Remco Bisschop (1), Reinier Blok (1), Kenny de Boer (1), Peter de Boer (1), Reinder E. de Boer (1), T de Boer (3), Linda Bongers (2), Arend Boosman (1), Ido Borkent (2), Hans Bos (2), Richard Bosker (1), Meindert Boskma (1), Rixte Boskma-Buitenwerf (1), Jacob Bosma (2), Niels Bot (1), H Bouma (3), Gijs Bouwmeester (1), Lonnie Bregman (2), Sjoerd Bresser (1), Bram Brinkman (1), Christian Brinkman (2), G. Brouwer (1), Maarten Brugge (1), Thom de Bruijn (1), Bernd-Jan Bulsink (1), Martijn Bunskoek (2), T. Buren (1), Piet Bus (1), Lars Buth (1), Wijnand van Buuren (1), Arie Buurman (1), C.J. Camphuysen (14), R Costers (9), Ruud Costers (1), Noah De Croock (1), Mark Daelmans (1), Martin Damen (1), Walter Das (2), Marco Deenik (1), Jurriën van Deijk (2), Jan Willem Dekker (1), M Dekker (2), R Dekker (2), Ton Denters (1), H. Deraedt (1), Arie van Dijk (1), Jan Dijk (1), Vincent van Dijk (1), Jasper Dijkema (1), Arjen Dijkstra (1), Swaving Dijkstra (1), J.van Dillen-Staal (5), Dirk van Doorn (1), Dick van Dorp (1), Vincent Douwes (1), Robin Drenth (1), Kaoutar Beni Driss (1), Bas Dros (2), Henk van Duijn (2), Pieter Duin (2), Enno Ebels (2), Joop van Eerbeek (3), Dirk Eijkemans (1), Jaap Faber (1), Savannah Fidom (1), Thijs Fijen (2), Rudy Fopma (1), JA van Franeker (15), M. Frederiks (1), André Geelhoed (1), Frank Geerlings (1), Jan Gerrits (1), Thijs Glastra (1), Marc Goedbloed (2), Wouter van Goor (1), Erwin Goutbeek (1), familie De Graaf (1), Chris Grobbe (2),

Gerard Groeneveld (1), R Gronert (1), Avifauna Groningen (1), Ton de Groot (1), Axel Gunderson (2), Dirk Haaijema (1), Jonatan den Haan (2), Wouter van der Ham (1), Jarco Havermans (2), Max Hazenoot (2), Gert van der Heide (1), Dika Hekman (1), Ruud van der Helm (1), Y Hermes (6), Jannes Heusinkveld (1), Jannes Heusinkveld (1), Jaap van der Hiele (3), Milan van Hirtum (1), Mark Hoekstein (1), Nelly Hofman (1), Gert-Jan Hoksberg (1), Dirk Hoogendoorn (1), Willem Hoogland (1), Gijs van Hoorn (1), Wiljan Hoornsman (1), J ten Horn (13), Arnoud Huberts (1), Henk Huige (1), Rens Huizinga (1), Jan Hullen (3), Henk Hupkes (1), Wilco Jacobusse (1), Nicole Janinhoff-Verdaat (1), Gerard Jansen (1), Joep Jansen (1), Maarten Jansen (1), Patrick Jansen (3), Rob Jansen (2), W Jansen (1), Jacos Jes (1), Jaap de Jong (2), Klaas de Jong (1), William de Jong (1), Joyz Jonker (1), Jacob Jorritsma (1), Freek Kalsbeek (1), GO Keijl (3), Robert Keizer (1), Leon Kelder (6), Pauline Kelk (1), Marijn Kempe (2), Wilbert Kerkhof (2), Stef Keulen (1), Theo Kiewiet (1), Jose de Kleijn (1), Ad Kliphuis (1), Marcel Klootwijk (1), L Knijnsberg (1), Maurice Knijnsberg (4), Thijs Knol (1), Rob Koekoek (1), Wim Kolber (1), Aad de Koning (1), RTZ Kop van Goeree (3), Jan Koreneef (1), Michel Korpel (1), Peter Koster (1), Esther Kraaijeveld-de Jong (1), Edo van de Kraats (1), Henk Krajenbrink (1), Edo Kreuzen (1), Jaap Krulder (1), S Kühn (31), Joeri Lamers (1), Bertus de Lange (1), Anja Langendoen (1), Hugo Langezaal (1), Karel Leeftink (1), Ronald Leenstra (1), Sylvia van Leeuwen (2), Anneke Leferink (1), Marco Leloux (1), Marina Lemoine (1), MF Leopold (9), Sander Lilipaly (2), johannes van der Linden (1), Peter Lindenburg (1), Germen Lont (1), B Loos (1), Bernard Lucas (2), Arjan van der Lugt (1), Annelies Marijnis (2), Harm Meek (1), Frank van der Meer (1), Jaap van der Meer (1), Peter van der Meer (2), A Meijboom (2), F de Meijer (3), Arian van der Meulen (1), Joost de Moel (1), Albert Molenaar (1), Wouter Monster (1), Guus Muller (1), G Neijsen (1), Rob Noort (1), Shirley O'Brien (2), Wouter Oe (1), Evelien de Olde (1), Frank Oling (2), Kees Olsthoorn (1), Jesse van Oort (1), Ronald Oortwijn (1), Tim Oortwijn (2), Kees Oosterhof (2), Lidia den Oudendammer-Peters (1), Raymond Pahlplatz (1), Leon Peters (1), Mariëtta Peters (1), Theo Peters (1), C.J.M. Philippart (1), Maarten Platteeuw (1), Gert Polet (1), Chantal Polman (1), Toon Pop (1), Dedy Postmus (1), Marinka van Puijenbroek (1), Towi van der Putten (1), Ruud Raats (1), Sjoerd Radstaak (1), Niels Raes (1), Menno Reemer (1), Christophe Reijman (2), Henk Remijn (1), Stan van Remmerden (1), Willem Renema (1), Jasper Rennen (1), Laurie Rijsdijk (1), L Robertson (1), Lucette Robertson-Proot (6), Rutger Rotscheid (1), Paul Ruiters (1), Theo Ruppert (1), Nel Saelman (1), Jeroen Sampers (1), Virry Schaafsma (1), Aat Schaftenaar (2), Rogier Schinkel (1), T Schipper (1), Sjouke Scholten (1), Taric Schrader (1), Flip Schreurs (1), TAW Schreurs (11), Paul Schrijvershof (3), Wessel J Schrik (2), Peter Schutten (2), Thomas Schuurman (1), Victor Simoncelli (2), Rob Sjouken (1), Richard Slagboom (2), D Slagter (1), Gert Sleeuwenhoek (1), Maarten Sluijter (10), Ted C.J. Sluijter (9), Stijn Smits (3), Henry Soyer (1), Tom van Spanje (4), Marian Sponselee (1), Marchel Stienstra (2), Vincent Stork (4), Ronald Sunnotel (2), George Tanis (2), Lot Tönis (1), Johan Torn (1), Leo Tukker (1), Arie Twigt (4), Gijsbert Twigt (1), D Veenendaal (5), Johan van der Vegt (1), Sjek venhuis (1), Hans Verdaat (4), Floris Visser (1), Gerard Visser (1), Menko Vlaardingerbroek (2), André van Vliet (1), Wilma van der Vliet (1), Rani van der Vlist (1), Frits Vloemans (2), Koen Vogelzang (1), Holmer Vonk (2), Joas de vreugd (3), Andrea de Vries (1), Arnout W.R. de Vries (4), Jacob Jan de Vries (10), Jet de Vries (2), Rien de Vries (1), Edwin de Weerd (7), Jerry Weidema (1), Ivar Wellner (1), Gerard Westerhuis (2), Marcel Wijnalda (5), J. van Wijngaarden (1), Bas de Wilde (1), Witse Williams (1), Rutger Wilschut (1), Willem Wind (1), Jan van der Winden (1), Loes de Winter (1), Bert Winters (3), Rob Witbaard (2), Pim Wolf (1), Ingrid Wolff (1), Louis H. Zandbergen (12), Tom Zeegers (1), Emma Zorgdrager (1), Carl Zuhorn (3). Total observer effort comprised 554 reports of stranded wildlife which reflected ~865km surveyed or visited between 1 November 2020 and 30 April 2021 (Table 1).

Table 1. Beached surveys (n counts) and overall coverage (km surveyed) in winter (Nov-Apr) over the last 62 years. The effort since 1977/78 was used for the analysis of trends in oiling. All effort was used to assess fluctuations in densities over the entire period.

Winter	Reports	km		Winter	Reports	km		Winter	Reports	km
1959/60	7	43						2000/01	316	1730
1960/61	38	452		1980/81	313	2125		2001/02	397	1969
1961/62	17	41		1981/82	287	1968		2002/03	370	1869
1962/63	48	145		1982/83	388	3126		2003/04	262	1310
1963/64	19	92		1983/84	336	2448		2004/05	299	1499
1964/65	7	28		1984/85	298	1869		2005/06	241	1250
1965/66	28	300		1985/86	287	1833		2006/07	270	1109
1966/67	19	164		1986/87	189	1420		2007/08	246	934
1967/68	30	322		1987/88	207	1839		2008/09	204	921
1968/69	23	541		1988/89	231	1671		2009/10	164	776
1969/70	60	832		1989/90	237	1506		2010/11	126	685
1970/71	21	510		1990/91	215	1406		2011/12	310	1030
1971/72	25	605		1991/92	164	1208		2012/13	124	463
1972/73	19	465		1992/93	147	1182		2013/14	164	555
1973/74	30	138		1993/94	167	1128		2014/15	151	482
1974/75	49	393		1994/95	130	923		2015/16	171	533
1975/76	35	255		1995/96	138	956		2016/17	305	535
1976/77	20	244		1996/97	121	833		2017/18	314	487
1977/78	49	408		1997/98	141	953		2018/19	405	1042
1978/79	93	579		1998/99	318	1795		2019/20	249	362
1979/80	88	721		1999/00	350	1979		2020/21	551	865
	725	7276			4664	32168			5639	20405

Table 2. Species found and reported, winter 2020/21.

Euring	Soort	Species	English name	n=
20	Roodkeelduiker	*Gavia stellata*	Red-throated Diver	6
30	Parelduiker	*Gavia arctica*	Black-throated Diver	1
40	IJsduiker	*Gavia immer*	Great Northern Diver	2
90	Fuut	*Podiceps cristatus*	Great Crested Grebe	4
100	Roodhalsfuut	*Podiceps griseigena*	Red-necked Grebe	1
120	Geoorde Fuut	*Podiceps nigricollis*	Black-necked Grebe	1
129	ongedeterm. fuut	*Podiceps spec.*	unidentified grebe	1
220	Noordse Stormvogel	*Fulmarus glacialis*	Northern Fulmar	79
460	Noordse Pijlstormvogel	*Puffinus puffinus*	Manx Shearwater	1
550	Vaal Stormvogeltje	*Oceanodroma leucorhoa*	Leach's Storm-petrel	1
710	Jan van Gent	*Sula bassana*	Northern Gannet	98
720	Aalscholver	*Phalacrocorax carbo*	Great Cormorant	15
1220	Blauwe Reiger	*Ardea cinerea*	Grey Heron	2
1520	Knobbelzwaan	*Cygnus olor*	Mute Swan	1
1574	Toendrarietgans	*Anser fabalis rossicus*	Tundra Bean Goose	1
1590	Kolgans	*Anser albifrons*	Greater White-fronted Goose	5
1610	Grauwe Gans	*Anser anser*	Greylag Goose	8
1639	ongedeterm. grijze gans	*Anser spec.*	unidentified goose	7
1670	Brandgans	*Branta leucopsis*	Barnacle Goose	22
1680	Rotgans	*Branta bernicla*	Brent Goose	14
1699	ongedeterm. gans	*Anser/Branta spec.*	unidentified goose	5
1730	Bergeend	*Tadorna tadorna*	Common Shelduck	19
1790	Smient	*Mareca penelope*	Eurasian Wigeon	10
1820	Krakeend	*Mareca strepera*	Gadwall	1
1860	Wilde Eend	*Anas platyrhynchos*	Mallard	3
1890	Pijlstaart	*Anas acuta*	Northern Pintail	6
2030	Kuifeend	*Aythya fuligula*	Tufted Duck	1

Euring	Soort	Species	English name	n=
2040	Toppereend	*Aythya marila*	Greater Scaup	2
2060	Eidereend	*Somateria mollissima*	Common Eider	184
2130	Zwarte Zeeëend	*Melanitta nigra*	Black Scoter	59
2150	Grote Zeeëend	*Melanitta fusca*	Velvet Scoter	1
2180	Brilduiker	*Bucephala clangula*	Common Goldeneye	1
2210	Middelste Zaagbek	*Mergus serrator*	Red-breasted Merganser	5
2269	ongedeterm. eend	*unidentified duck*	unidentified duck	3
2670	Havik	*Accipiter gentilis*	Northern Goshawk	1
3040	Torenvalk	*Falco tinnunculus*	Common Kestrel	1
3090	Smelleken	*Falco columbarius*	Merlin	2
4290	Meerkoet	*Fulica atra*	Common Coot	1
4500	Scholekster	*Haematopus ostralegus*	Eurasian Oystercatcher	14
4560	Kluut	*Recurvirostra avosetta*	Avocet	1
4860	Zilverplevier	*Pluvialis squatarola*	Grey Plover	1
4960	Kanoetstrandloper	*Calidris canutus*	Red Knot	11
5120	Bonte Strandloper	*Calidris alpina*	Dunlin	1
5190	Watersnip	*Gallinago gallinago*	Snipe	1
5290	Houtsnip	*Scolopax rusticola*	Eurasian Woodcock	33
5340	Rosse Grutto	*Limosa lapponica*	Bar-tailed Godwit	4
5410	Wulp	*Numenius arquata*	Eurasian Curlew	10
5460	Tureluur	*Tringa totanus*	Common Redshank	27
5610	Steenloper	*Arenaria interpres*	Ruddy Turnstone	5
5680	Kleinste Jager	*Stercorarius longicaudus*	Long-tailed Skua	1
5690	Grote Jager	*Stercorarius skua*	Great Skua	2
5820	Kokmeeuw	*Chroicocephalus ridibundus*	Black-headed Gull	24
5900	Stormmeeuw	*Larus canus*	Mew Gull	29
5910	Kleine Mantelmeeuw	*Larus fuscus*	Lesser Black-backed Gull	16
5920	Zilvermeeuw	*Larus argentatus*	Herring Gull	82
6000	Grote Mantelmeeuw	*Larus marinus*	Great Black-backed Gull	35
6005	ongedeterm. gr. meeuw	*Larus spec.*	large gull	2
6020	Drieteenmeeuw	*Rissa tridactyla*	Black-legged Kittiwake	64
6150	Visdief	*Sterna hirundo*	Common Tern	1
6340	Zeekoet	*Uria aalge*	Common Guillemot	399
6360	Alk	*Alca torda*	Razorbill	108
6470	Kleine Alk	*Alle alle*	Little Auk	3
6540	Papegaaiduiker	*Fratercula arctica*	Atlantic Puffin	3
6655	Postduif	*Columba 'domestica'*	domestic pigeon	3
6680	Holenduif	*Columba oenas*	Stock Pigeon	1
7670	Ransuil	*Asio otus*	Long-eared Owl	2
8310	IJsvogel	*Alcedo atthis*	Common Kingfisher	1
8410	Scharrelaar	*Coracias garrulus*	European Roller	1
11870	Merel	*Turdus merula*	Common Blackbird	7
11980	Kramsvogel	*Turdus pilaris*	Fieldfare	3
12010	Koperwiek	*Turdus iliacus*	Redwing	3
12020	Grote Lijster	*Turdus viscivorus*	Mistle Thrush	1
15600	Kauw	*Corvus monedula*	Eurasian Jackdaw	1
15820	Spreeuw	*Sturnus vulgaris*	Common Starling	12
23510	Bruinvis	*Phocoena phocoena*	Harbour Porpoise	2
24310	ongedeterm. zeehond	*unidentified pinniped*	unidentified seal	5
24320	Grijze Zeehond	*Halichoerus grypus*	Grey Seal	3
24330	Gewone Zeehond	*Phoca vitulina*	Common Seal	4
27832	Kortsnuitzeepaardje	*Hippocampus hippocampus*	Short-nosed Seahorse	2
30002	Konijn	*Oryctolagus cuniculus*	Rabbit	3

Results

Numbers of pelagic seabirds washing ashore - The long-term fluctuations in densities are shown in **Fig. 1**, but these should be treated with caution, given that an increasing number of reports is currently without proper effort correction (reports not included within a systematic count). Data from waarneming.nl are seriously biased towards 'unusual' or otherwise particular species, and for example the apparent increase in densities of Northern Gannets can only be explained as an artefact, not as a genuine increase in numbers. It is in these unusual species (but also divers, skuas, procellariiforms and rare auks) that a rigorous check for 'doubles' (*i.e.* recorded more than once or by multiple observers at the same time and under their own name) is essential. The Common Guillemot is the indicator species for as far as oil contamination on European beaches is concerned, but it is always useful to evaluate the results in the context of other species of the open seas: the pelagic seabirds. Guillemot densities in winter 2020/21 were again lower than in winter 2018/19 when a small wreck of guillemots had occurred (Jan-Feb 2019). Oil rates are expectedly low during wrecks, for most of the mortality is largely 'food driven' (the result of starvation of the birds involved), but, as in 2019/20, there were no indications for higher oil rates in 2020/21. In fact, with only 3.8% oiled (n= 208), the second lowest oil rate ever was recorded for the North Sea coastline. The few oiled Guillemots 20 were all only slightly contaminated and had starved to death as a result of hypothermia.

Northern Gannet entangled in orange nylon fibres ("pluis") Rinus van der Molen waarneming.nl Schiermonnikoog, September 2020

Guillemots, Razorbills and Black-legged Kittiwakes share particular resources within the North Sea ecosystem and can often be seen feeding in the same or in similar habitats, if not even in close association. More aerial pelagic seabirds, the Northern Fulmar and the Norther Gannet, less prone to oil contamination simply as a result of their lifestyle, tend to have much lower densities than the three species mentioned earlier (**Fig. 2**). Numbers of gannets washing ashore tended to be fairly consistent (but see above), whereas densities of Northern Fulmar may fluctuate more widely, sometimes as a result of influxes of birds from elsewhere (e.g. from Arctic regions) into the North Sea. In recent years, however, numbers of Northern Gannets

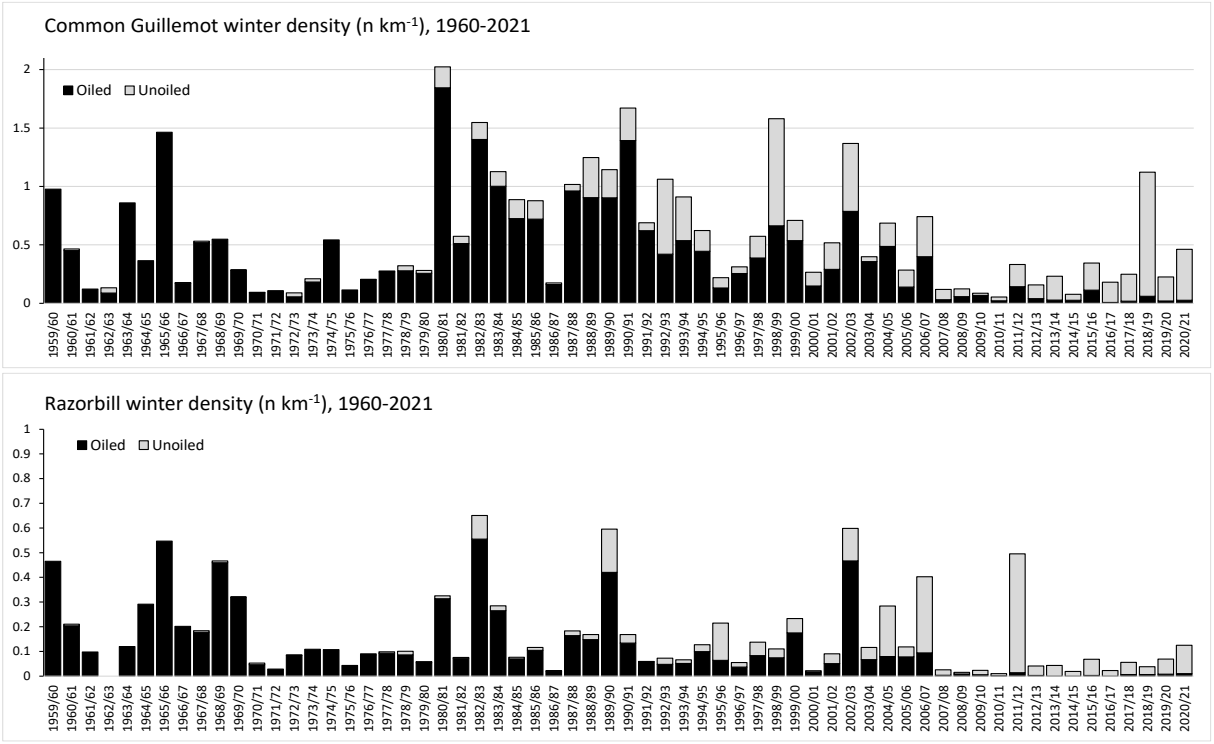


Figure 1. Densities (n km^{-1}) of Common Guillemots and Razorbills washing ashore in winter, 1959/60-2020/21 along the North Sea coast in The Netherlands.

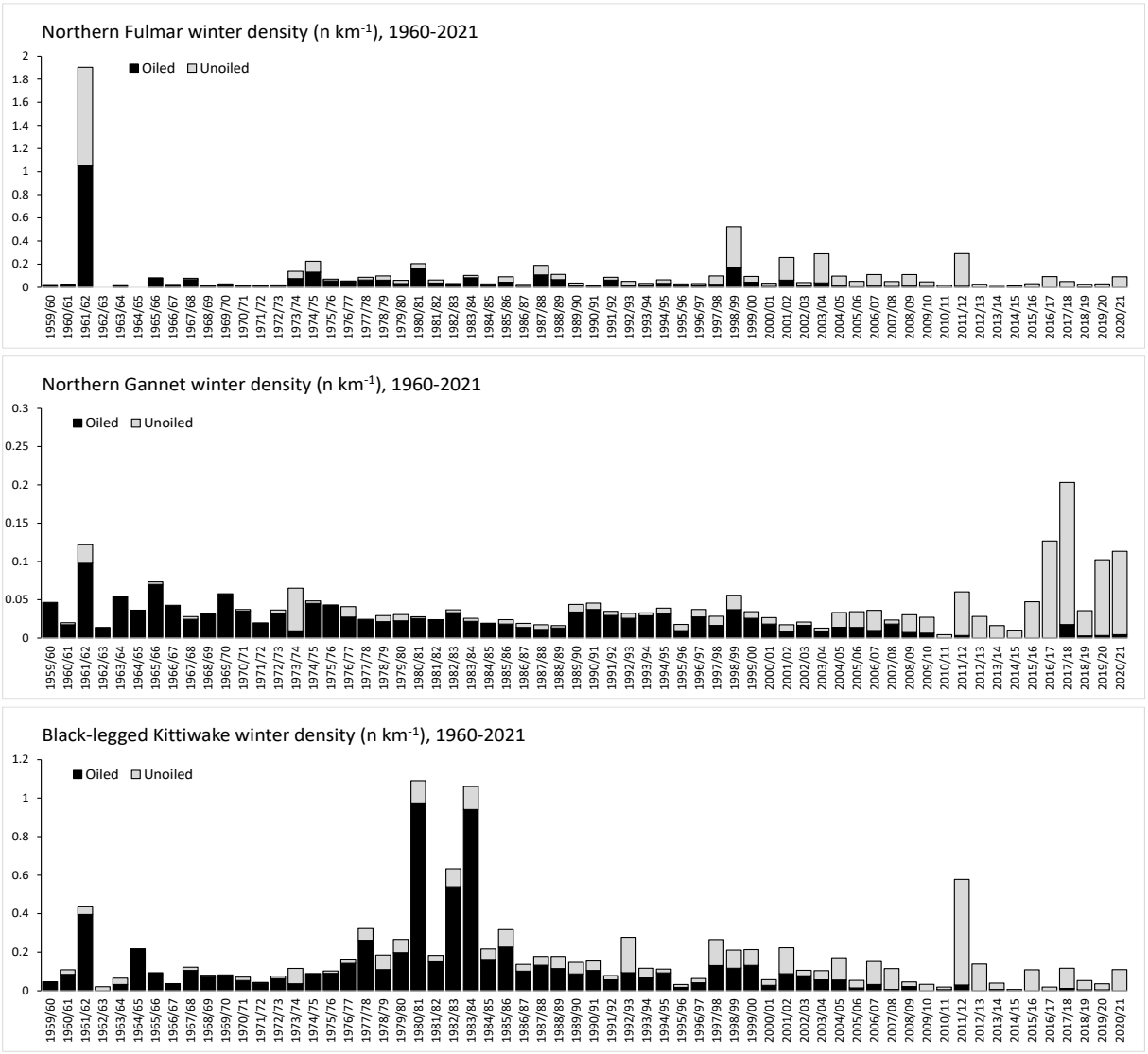


Figure 2. Densities (n km^{-1}) of some more aerial pelagic seabirds washing ashore in winter, 1959/60-2020/21 along the North Sea coast in The Netherlands.

washing ashore were relatively high, and densities were again relatively high in 2020/21. Evidently, mineral oil played only a minor role in the strandings of these seabirds. Two Northern Gannets were found entangled in fishing gear in early autumn (photo above), only a single entangled Gannet was found during the period of study (in April 2021).

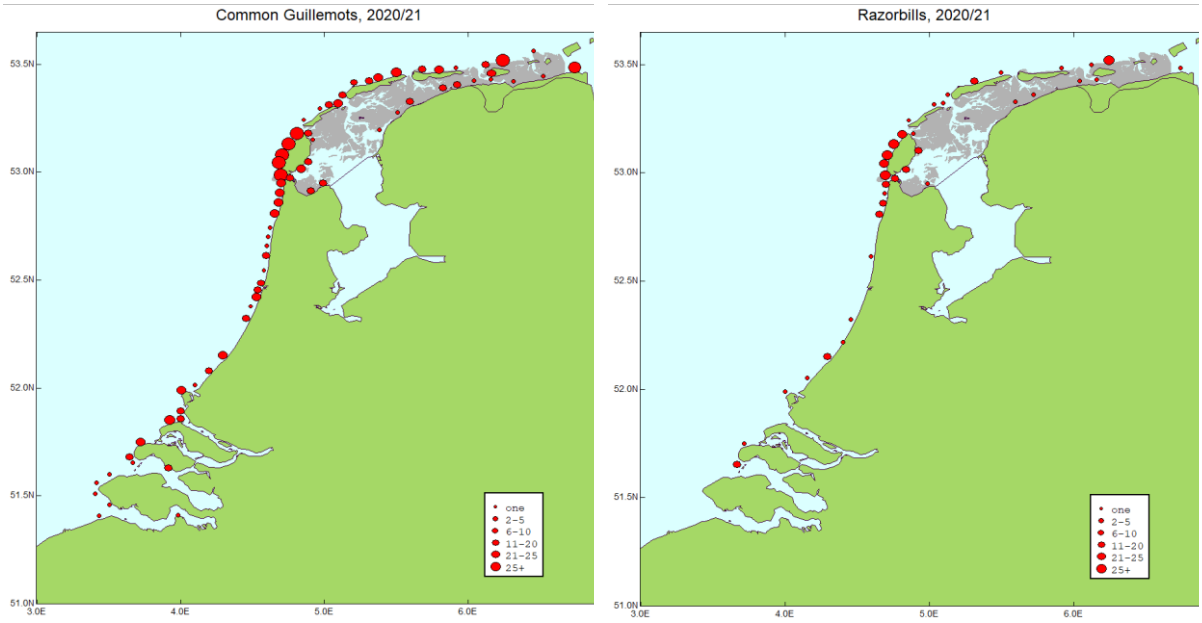


Figure 3. Spatial pattern in Common Guillemots (left) and Razorbills washing ashore, winter 2020/21.

Pelagic seabird strandings were widespread and included inland finds (**Figs 3-4**). The slightly higher densities of large auks around Texel is likely an artefact resulting from particularly intense searches. Northern Fulmars were distinctly more numerous than in most previous seasons and most strandings occurred fairly late in the season (1x November, 1x December, 3x January, none February, 11x March, 63x April, plus another 20 in May 2021 just after the study period). Northern Gannets peaked in April (57 records), Common Guillemots in March-April (254), Razorbill finds were 9x Nov, 9x Dec, 24x Jan, 10x Feb, 37x Mar, 19x Apr.

Uncommon seabirds found were one Leach's Storm Petrel *Oceanodroma leucorhoa* (30 November 2020, Lauwersoog), one Manx Shearwater (15 Jan 2021, Katwijk aan Zee and another one on 3 October 2020, Hondsbossche Zeewering before the study period), two Great Skuas (both November, Ameland and Ouddorp), one Long-tailed Skua (*Stercorarius longicaudus*, 14 March 2021 Kerkwerve, plus an earlier juvenile in September 2020 (Westenschouwen), 3 Little Auks *Alle alle* (1x Nov, 1x Mar, 1 x Apr, plus an earlier one in October 2020), and 3 Atlantic Puffins *Fratercula arctica* (1x Nov, 2x Dec). None were oiled.

Little Auk, 18 October 2020 Texel,

Atlantic Puffin, 24 Nov 2020 Texel

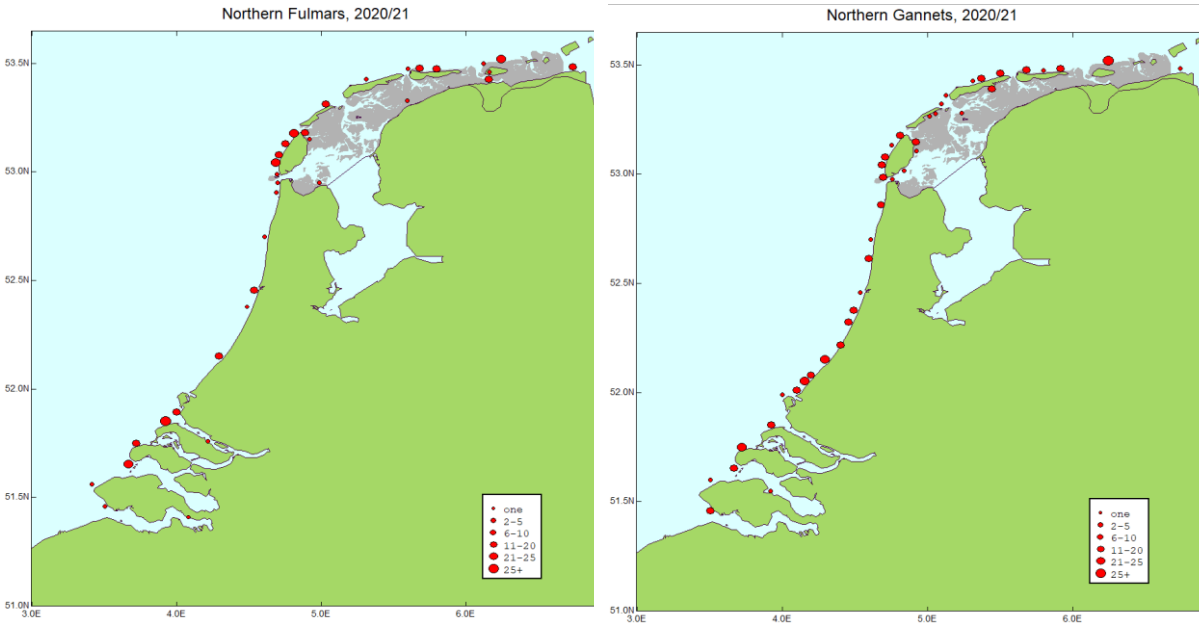


Figure 4. Spatial pattern in Northern Fulmars (left) and Northern Gannets (right) washing ashore, winter 2020/21.

Numbers of coastal seabirds washing ashore - For nearshore seabirds and coastal species (wildfowl and shorebirds), both the cold spell in February 2021, however short it might have been, and the avian influenza outbreak, had significant effects on observed mortality patterns.

Divers Gaviidae were not commonly found, as in most recent winters and in the absence of chronic oil pollution, but the two Great Northern Divers *Gavia immer* are both unusual and noteworthy (Kwade Hoek, 6 Dec 2020, Zierikzee, 30 March 2021). None of these birds were oiled and the identification has been checked; a third claim (Schiermonnikoog, November 2020) was without any evidence. The cold spell did not drive many grebes out into the North Sea and most certainly did not trigger any extra-mortality, as happened in earlier (but notably colder) winters (Camphuysen 1989, Camphuysen & Derks 1989).

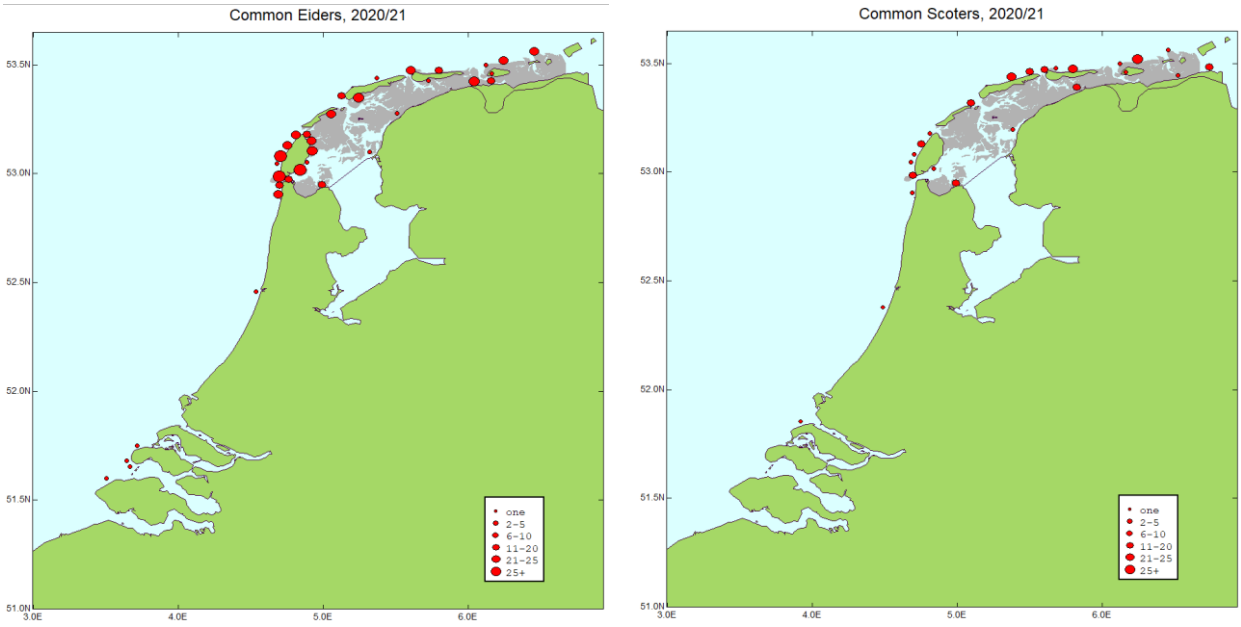


Figure 5. Spatial pattern in Common Eiders (left) and Common Scoters (right) washing ashore, winter 2020/21.

There was a more or less constant trickle of cormorants on beaches, without any peaks or particular (mass-) strandings. Records of Common Eiders *Somateria mollissima* slowly increased after December and peaked Feb-Mar. Total numbers washing ashore were likely somewhere in hundreds rather than thousands this winter (184 found and reported), with no unusual peaks in strandings rates (**Fig. 6**). The exact same pattern was found in scoters, but reported numbers were three times lower (59 found). Most other coastal species (other seaduck and waterfowl, waders and gulls) all peaked in February, if there was a peak in strandings at all, and most strandings occurred during and immediately following the cold spell in that month (**Fig. 7**).

Serious oil-related events all date back to the 1960s-1980s, while some other and more recent mortality events were food- or disease rather than oil related. It should be noted that an important modern source of information for recent bird strandings (https://waarneming.nl) is a poor source for strandings data of commoner species such as Herring Gulls and Greater Black-backed Gulls, so that several strandings will have been overlooked and densities are compromised by a lack of reporting. Yet, there is no evidence for oil-related mortality in any of the coastal species. A possible small incident affecting some Black-headed Gulls *Croicocephalus ridibundus* in Den Helder is discussed below, but if this 'incident' caused mortality at all, it was missed during our surveys.

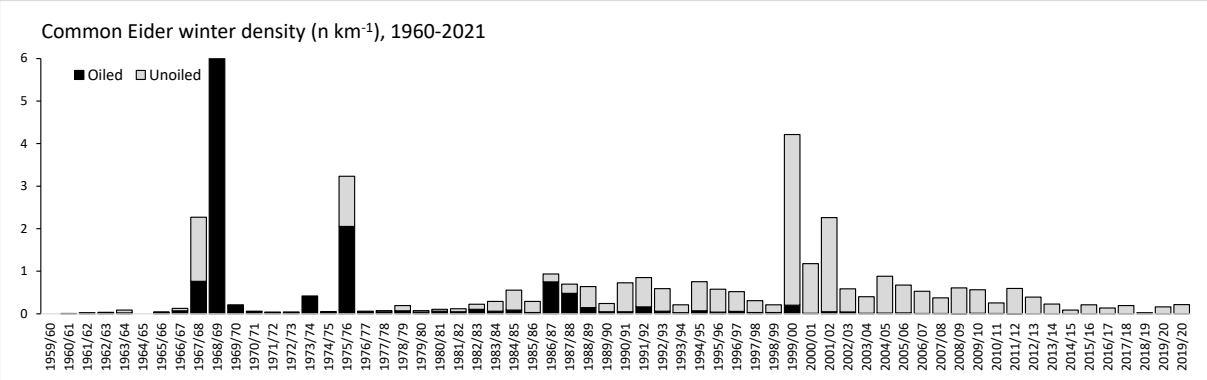


Figure 6. Densities (n km^{-1}) of Common Eiders *Somateria mollissima* washing ashore in winter in The Netherlands, 1959/60- 2020/21.

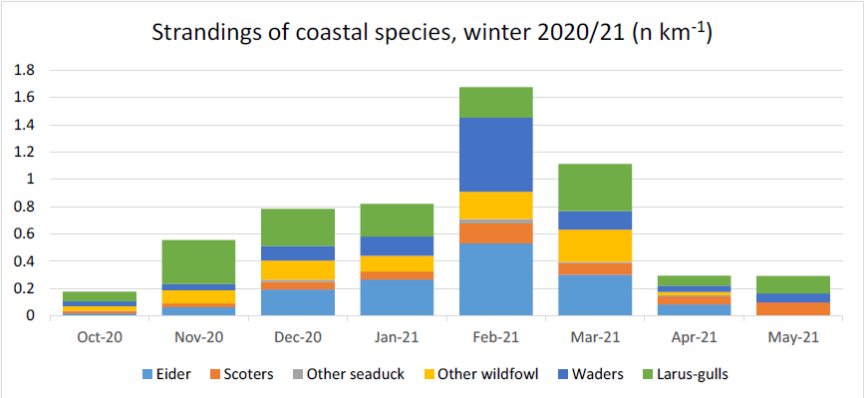


Figure 7. Monthly densities (n km-1) of all major groups of coastal seabirds and waterbirds combined, showing a fairly consistent species composition and a peak in February, triggered by the cold-spell that took place at that time.

Oil rates updated

For the analysis, only intact carcasses were selected, since only these were considered fit for purpose: to assess the fraction of birds washing ashore that was, or was not, contaminated with mineral oil. The values produced are all tabulated in the Appendix, whereas the proportions and a long-term running mean and a logit-transformed presentation of the oil rates allowing a linear regression to examine the trends are shown in this chapter.

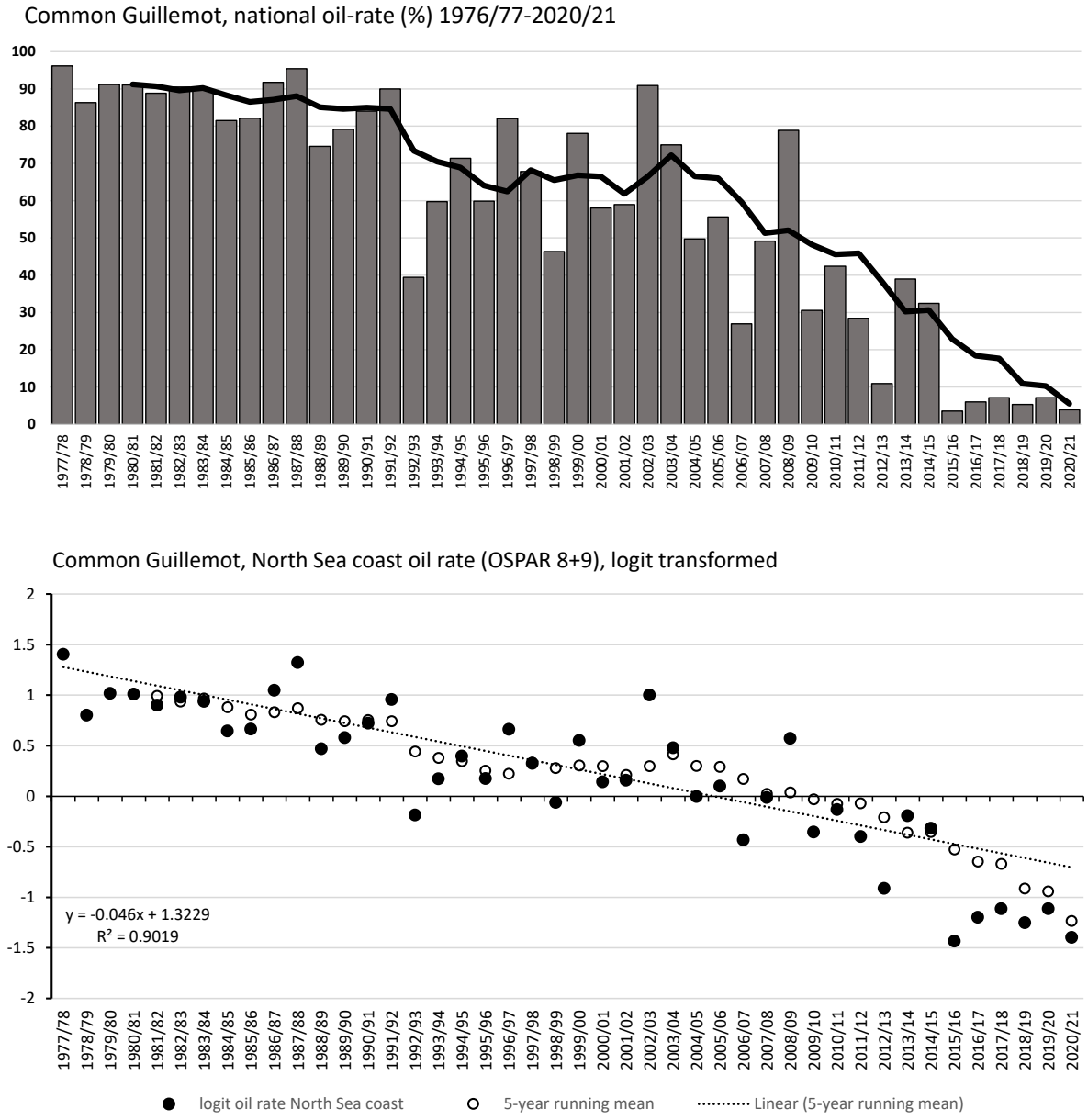


Fig. 8. Proportions oiled and 5-year running mean in oil rates (top panel) and a significant decline in logit-transformed oil rates in Common Guillemots, 1977/78-2019/21.

A warning beforehand, is that the logit transformation is impossible for any values equal to 100% or 0% (e.g. all birds oiled, or none of the birds oiled), for a logit transformation would lead to $+\infty$ or $-\infty$ respectively. In cases where 0% of the birds found were oiled, the outcome

was therefore transformed to logit -2 (e.g. ~1% oiled), as a more reliable and workable guesstimate of the actual oil rate to be used in the regression analysis. The problem of 'no oil' is increasingly common in recent years, now that chronic oil pollution is really pushed back.

The significant decline in oil rates in Common Guillemots continued, and in winter 2020/21 the second lowest oil rate ever was recorded (**Fig. 8**). The five-year running mean (5.5 ± 1.8%) is well below what has to be achieved by 2030 according to OSPAR and much exceeded earlier, conservative expectations for 2020. For the other pelagic seabirds (**Fig. 9**) highly similar trends and patterns were found, although the data were slightly more erratic in species in which the sample sizes are small. Oil rates in recent years were often nihil (0%), something that never occurred prior to 2008. Oil rates (including 5-year running means) tend on average to be slightly lower in the aerial species than in the more sensitive auks, but the difference is small and smaller in recent years (**Table 2**).

Razorbill, oil contamination 100%, Ameland, 20 Jan 2021, Arian van der Meulen

Table 2. Proportions oiled and 5-year running means (±SD) in pelagic seabirds in 2020/21. () = small sample.

Species	Oiled (%)	n=	Mean		SD
Common Guillemot	3.8	208	5.5	±	1.6
Razorbill	5.5	55	8.4	±	6.1
Northern Fulmar	0.0	44	1.7	±	4.1
Northern Gannet	2.3	43	5.2	±	6.2
Black-legged Kittiwake	(0.0)	20	5.7	±	7.0

For the more coastal species, a trend analysis is pointless in recent years, for the oil rates are essential nihil with occasional casualties every now and then. For these species, in this part of the world, chronic oil pollution is no longer an issue of concern, even though an accidental spill could still potentially kill thousands of birds on a single occasion. Oil rates equalling 0% predominate in recent years.

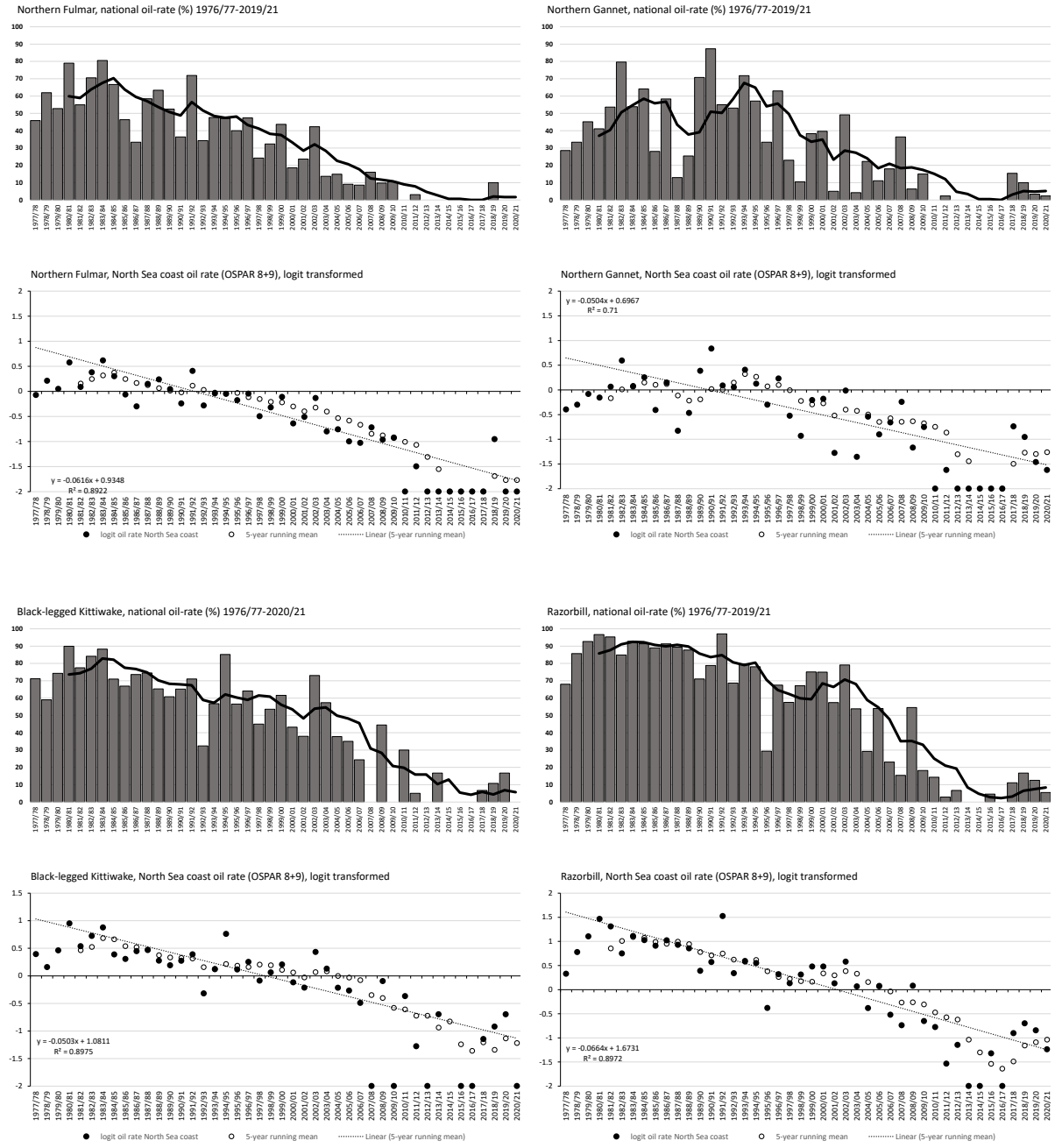
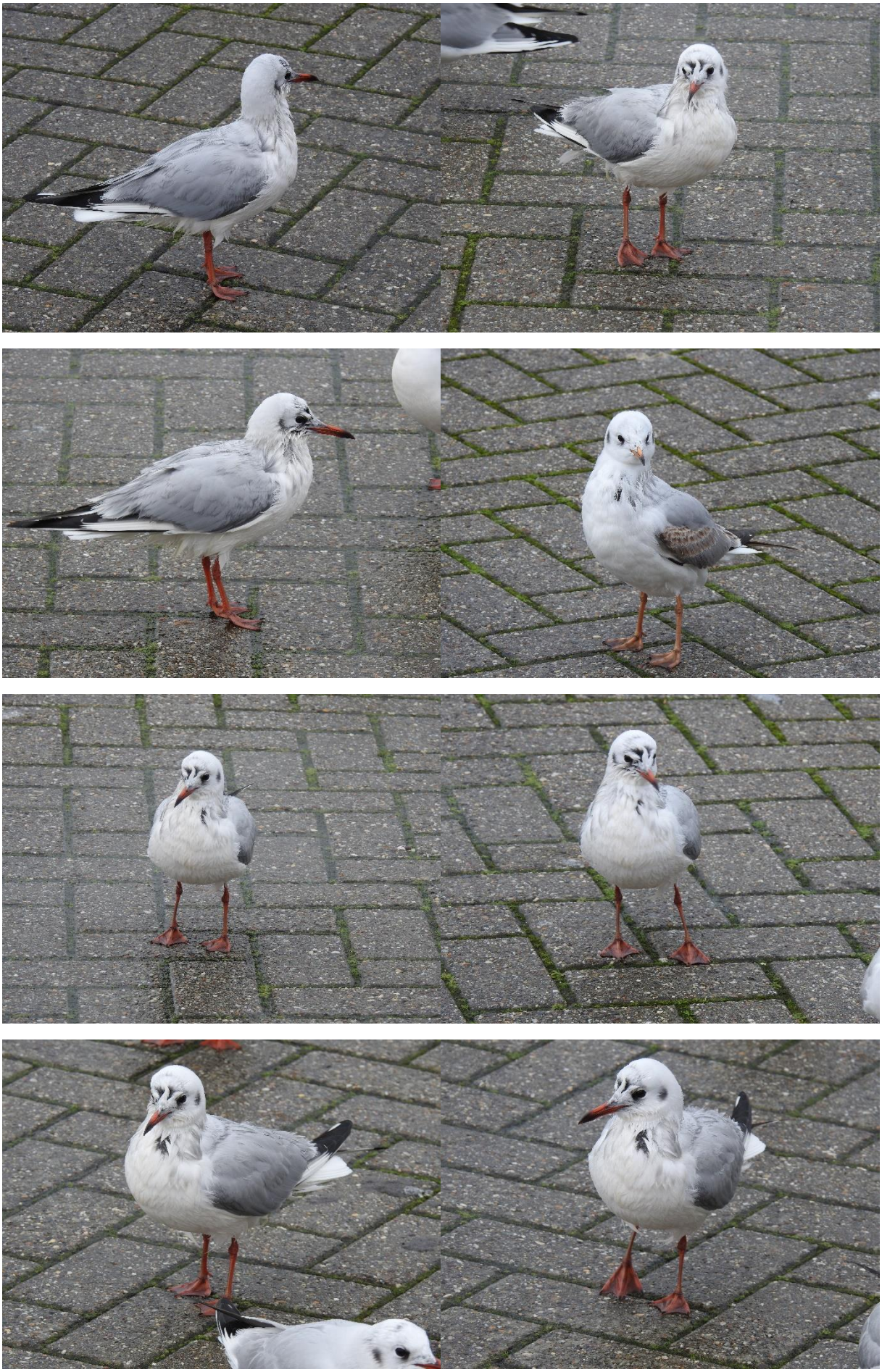


Fig. 9. Proportions oiled and 5-year running mean in oil rates (top panels) and a significant decline in logit-transformed oil rates (lower panels) in the four commoner pelagic species: Northern Fulmar (top left), Northern Gannet (top right), Black-legged Kittiwake (bottom left), and Razorbill (bottom right), 1977/78-2019/20.

Harbour oil spill, 28 January 2021 Den Helder

On 27 January 2021, the effects of a possible oil spill was witnessed in Den Helder harbour, given the sudden appearance of a small group of soaked Black-headed Gulls (5 birds affected in a flock of 75 birds at first; photo's). In the first weeks following this initial sighting more soaked gulls were seen in the area, suggesting that the leakage of some light oil, or of another light lipophilic substance contaminating the plumage of these birds continued to occur. No elevated mortality was witnessed and given the condition of the plumage of the birds, most individuals may have been successful self-cleaning their feathers (Birkhead *et al.* 1973, Camphuysen 2011).



Black-headed Gulls affected by a possible oiling incident, Den Helder (Photo’s M.F. Leopold)

Highly pathogenic avian influenca H5N8

On 20 October, Wageningen Bioveterinary Research (WBVR) tested two dead Mute Swans *Cygnus olor* positive for highly pathogenic H5N8 avian influenza. This was the first case of bird flu that was discovered in the Netherlands in 2020. https://www.wur.nl/en/show/Highly-pathogenic-avian-influenza-H5N8-found-in-wild-mute-swans.htm. What followed was an outbreak that continued to cause (mostly) waterbird mortality well into May and June 2021. Casualties were found throughout much of the Northern Hemisphere, from the UK and France in the west to the Shiga Prefecture in Japan in the east (AIimpact2021 agenda, 18 Dec 2020 – Thijs Kuiken, ErasmusMC, Rotterdam). In the Netherlands, most confirmed casualties were found inland in Friesland (particularly Barnacle Geese *Branta leucopsis*), while a mass mortality of Red Knots *Calidris canutus* was witnessed at Nordstrand, Schleswig-Holstein (Germany). Waterbirds (various species) with symptoms as well as proven cases were found scattered throughout the Dutch Wadden Sea area and there is little doubt that beached bird surveys may have picked up several cases, unwittingly.

Barnacle Goose killed by H5N8, Friesland (Photo NOS)

In The Netherlands, Barnacle Goose *Branta leucopsis* and Grey-lag Goose *Anser anser* were among the most common (confirmed) victims of the outbreak, but elevated mortality was also found in swans, various species of ducks, raptors and some other species. During beach bird surveys, more geese were found than in most years, but it is unclear if there (always) was a

relation with the outbreak and few animals were or could be tested (geese tend to get scavenged quite early while afloat at sea or when washed ashore). The outbreak was carefully assessed by a team around Thijs Kuiken (Erasmus University Rotterdam), and various groups and organisations were involved in the discussions as well as in the data collection during the event. Beached bird survey data collection were also brought to the table in an attempt to help monitoring 'unusual patterns' in mortality throughout the country, even if this set produced mostly data from North Sea beaches. The analysis of the AI outbreak is not finished yet, but is led by Kuiken and co-workers. This is not the place to present preliminary data of the results, but the next annual report may discuss some of the more relevant findings for this winter.

Unusual finds

Beached bird surveys always yield unexpected finds of all sorts, and that includes unusual bird species. Some species are just 'rarely' encountered and the two Merlins *Falco columbarius* are examples thereof. The juvenile and the adult male, both found on 22 Nov 2020 on Texel by Rob and Marja Dekker were only numbers 5 and 6 recorded since 1901 (earlier finds Feb 1971, Mar 1971, Nov 1981, and Mar 2007). The Kingfisher *Alcedo atthis* (Texel, 21 Feb, Mardik Leopold) was a first, and this find was almost certainly related to the short cold spell that month that basically exterminated the local wintering (?) population. Frequent sightings occurred before the cold spell, while Kingfishers were simply rare after the cold spell and became more frequent not before August 2021 (https://texel.waarneming.nl/soort/view/37?from=2020-09-08&to=2021-09-08). An exceptional find, in all respects, was another first, the find of the remains of a European Roller *Coracias garrulus* on 25 March 2021 (Sanne van den Berg-Blok). European Rollers are rare in the Netherlands and most sightings are in summer (May-Jul) or early autumn (Sep). There are recent nor historical records for the entire winter period (Dec-Apr) apart from a case in December 1975 (https://waarneming.nl/species/323/statistics/, Van den Berg & Bosman 2001).

Discussion

This is the 41st annual report of beached bird surveys in The Netherlands (Camphuysen 1980), and the world has changed considerably since, with respect to oil pollution. In that first report, 1189 intact corpses of birds were considered (all species combined), of which 54% were oiled. In the winter covered in the present report, of 743 birds reported, only 2% were somehow contaminated with oil. In winter 2020/21, overall densities of oiled birds and oil rates were again lower, signaling a further improvement in marine ecosystems for as far as chronic oil pollution is concerned. The oil-rate (percentage) of Common Guillemots of all complete Common Guillemots found dead) reached a very low value of only 3.8% (n= 208) for the North Sea coast of OSPAR areas 8 and 9 combined. This current figure is the second lowest value ever measured within The Netherlands, it is well below 10%, and it consolidates the sharp drop

Female Merlin (Rob Dekker)

Male Merlin (Rob Dekker)

Female Merlin (same bird; Rob Dekker)

Kingfisher adult female (Mardik Leopold)

European Roller (Sanne van den Berg-Blok)

European Roller (Sanne van den Berg-Blok)

in oil-rates that occurred after winter 2014/2015. The most recent data conform the declining trend once more, as a result of which the 5-year running mean of oil rates in Common Guillemots has now arrived at 5.5 ± 1.6% (mean ± S.D.) for all North Sea beaches combined. Not only has the OSPAR target of 20% over periods of at least 5 years for 2020 been exceeded, but even that for 2030 (10%) has been surpassed.

The Dutch data collected for OSPAR regions 8 and 9 must be seen as contributions to the data set. An international coordinator, or OSPAR itself, will have to combine Dutch, Belgian and German data for these areas in order to arrive at OSPAR area specific oil rates for Common Guillemots in the southeastern North Sea.

As said in previous reports, beached bird surveys are a vital part of both the Oiled-Guillemot EcoQO, but also for the plastic particle monitoring conducted by using Northern Fulmar carcasses around the North Sea (Suse Kühn & SNS Fulmar Study Group, WMR Project Fulmar-EcoQO-NL2020-26, 4315100164). Northern Fulmars have been rather scarce in recent years, so that the study group had to struggle to get sufficient carcasses for inspection. This season formed an exception, as a result of what could be called an influx of Northern Fulmars in the Southern Bight which generated quite a number of strandings.

Unfortunately, more and more people prefer to post their findings directly online on internet as a way of rapid communication and data storage (without logging observer effort). Hence, to complete the overview over strandings in The Netherlands, more opportunistic reports from www.waarneming.nl, and especially reports that include clear photographic material were screened for double counts and identification errors, even though the sample size of stranded seabirds didn't need to be enhanced. The first contacts to enhance waarneming.nl applications have now been established, but the budget to modify applications such that systematic beached bird surveys are better accommodated, is missing. While studies of the variability in and the backgrounds of seabird strandings will remain intact, measuring actual densities is an increasing problem.


Great Northern Diver, 26 March 2021 Zierikzee, Great Bl-b Gull in fishing gear, 20 Oct 2020 Texel Hans Verdaat

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Appendices

The tables below show raw data underlying the graphs in this report, except the long-term trends in densities. Shown are the oil rates (%), in parentheses when the sample size was <25 intact carcasses in a given winter and/or area, and the sample size (n), for each of the OSPAR regions (8-10) and for the North Sea coast as a whole (8+9).

(1) Common Guillemot

	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		ration	n=	mean
1977/78	96.3	82	(100.0)	23			1977/78	96.2	105	
1978/79	83.9	93	91.3	46			1978/79	86.3	139	
1979/80	94.1	118	85.9	64	(66.7)	3	1979/80	91.2	182	
1980/81	90.4	3061	96.0	448	91.8	233	1980/81	91.1	3509	91.2
1981/82	86.8	675	95.5	202	92.2	115	1981/82	88.8	877	90.7
1982/83	87.6	2494	95.6	1449	91.9	434	1982/83	90.5	3943	89.6
1983/84	87.4	1625	95.2	660	77.9	163	1983/84	89.6	2285	90.3
1984/85	77.1	855	89.5	474	87.2	47	1984/85	81.5	1329	88.3
1985/86	78.3	803	90.2	378	81.1	159	1985/86	82.1	1181	86.5
1986/87	89.7	107	96.1	51	(88.2)	17	1986/87	91.8	158	87.1
1987/88	96.1	1177	92.7	288	78.3	83	1987/88	95.4	1465	88.1
1988/89	73.0	1224	82.7	248	49.6	133	1988/89	74.6	1472	85.1
1989/90	79.5	1266	76.6	158	73.5	83	1989/90	79.1	1424	84.6
1990/91	83.9	1861	85.4	144	42.9	35	1990/91	84.0	2005	85.0
1991/92	88.9	522	92.2	268	(100.0)	6	1991/92	90.0	790	84.6
1992/93	41.4	794	28.7	150	40.7	123	1992/93	39.4	944	73.4
1993/94	60.8	559	56.4	179	52.8	106	1993/94	59.8	738	70.5
1994/95	69.1	246	75.8	124	71.1	83	1994/95	71.4	370	68.9
1995/96	58.6	111	62.3	61	(57.1)	7	1995/96	59.9	172	64.1
1996/97	84.2	146	77.5	71	(66.7)	6	1996/97	82.0	217	62.5
1997/98	69.5	285	64.6	144	(61.9)	21	1997/98	67.8	429	68.2
1998/99	43.3	1054	51.5	631	24.1	411	1998/99	46.4	1685	65.5
1999/00	78.7	675	76.8	310	60.4	149	1999/00	78.1	985	66.8
2000/01	48.1	108	63.5	197	42.9	49	2000/01	58.0	305	66.5
2001/02	62.6	340	55.0	320	50.7	138	2001/02	58.9	660	61.8
2002/03	95.9	1992	58.9	314	46.8	77	2002/03	90.9	2306	66.5
2003/04	83.7	141	69.3	215	45.9	61	2003/04	75.0	356	72.2
2004/05	61.5	265	39.7	312	42.7	103	2004/05	49.7	577	66.5
2005/06	53.7	82	56.8	132	47.9	71	2005/06	55.6	214	66.0
2006/07	28.4	356	23.5	153	13.2	76	2006/07	26.9	509	59.6
2007/08	(50.0)	18	48.8	43	(35.0)	20	2007/08	49.2	61	51.3
2008/09	(86.4)	22	76.5	68	(66.7)	9	2008/09	78.9	90	52.1
2009/10	(23.1)	13	34.8	23	(66.7)	9	2009/10	30.6	36	48.2
2010/11	(55.6)	9	37.5	24	( )	0	2010/11	42.4	33	45.6
2011/12	29.2	106	27.5	91	0.0	28	2011/12	28.4	197	45.9
2012/13	3.6	28	18.5	27	(33.3)	3	2012/13	10.9	55	38.2
2013/14	(0.0)	16	53.5	43	(12.5)	16	2013/14	39.0	59	30.3
2014/15	(55.6)	18	(10.5) 19	( )	0		2014/15	32.4	37	30.6
2015/16	(10.5)	19	2.5	122	4.0	25	2015/16	3.5	141	22.9
2016/17	2.7	37	10.0	30	(16.7)	6	2016/17	6.0	67	18.4
2017/18	0.0	26	13.3	30	(0.0)	20	2017/18	7.1	56	17.6
2018/19	9.8	51	4.7	382	(0.0)	15	2018/19	5.3	433	10.9
2019/20	7.7	39	6.5	31	(14.3)	14	2019/20	7.1	70	10.3
2020/21	1.3	75	5.3	133	20.0	25	2020/21	3.8	208	5.5
								5.5	5yr mean	
								1.6	SD	

(2) Razorbill

	Subregion 8		Subregion 9		subregion 10		National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		ratio	n=	
1977/78	92.6	27	(100.0)	23			1977/78	68.0	50	
1978/79	84.0	25	(88.2)	17			1978/79	85.7	42	
1979/80	96.8	31	(80.0)	10	(0.0)	0	1979/80	92.7	41	
1980/81	96.2	496	100.0	77	88.5	26	1980/81	96.7	573	85.8
1981/82	94.8	77	96.7	30	(100.0)	19	1981/82	95.3	107	87.7
1982/83	84.7	1299	85.9	311	85.8	141	1982/83	84.9	1610	91.1
1983/84	92.9	547	91.9	37	96.8	31	1983/84	92.8	584	92.5
1984/85	90.1	71	93.3	45	(100.0)	2	1984/85	91.4	116	92.2
1985/86	87.4	127	93.5	46	(100.0)	4	1985/86	89.0	173	90.7
1986/87	(88.2)	17	(100.0)	6	(0.0)	0	1986/87	91.3	23	89.9
1987/88	94.3	175	75.4	61	(85.0)	20	1987/88	89.4	236	90.8
1988/89	87.5	152	88.9	36	(81.8)	11	1988/89	87.8	188	89.8
1989/90	72.0	690	60.6	66	48.0	25	1989/90	71.0	756	85.7
1990/91	79.3	174	76.5	34	(100.0)	2	1990/91	78.8	208	83.7
1991/92	97.6	42	96.3	27	(100.0)	6	1991/92	97.1	69	84.8
1992/93	72.9	59	(37.5)	8	(33.3)	6	1992/93	68.7	67	80.7
1993/94	83.7	49	(66.7)	15	(0.0)	2	1993/94	79.7	64	79.1
1994/95	77.4	53	79.3	29	(73.3)	15	1994/95	78.0	82	80.5
1995/96	28.9	121	30.4	46	(25.0)	4	1995/96	29.3	167	70.6
1996/97	62.5	24	75.0	16	(33.3)	3	1996/97	67.5	40	64.6
1997/98	58.4	77	55.2	29	(100.0)	2	1997/98	57.5	106	62.4
1998/99	71.4	77	61.4	57	(55.6)	18	1998/99	67.2	134	59.9
1999/00	75.7	259	73.3	86	(53.8)	13	1999/00	75.1	345	59.3
2000/01	(70.0)	10	77.8	18	(50.0)	2	2000/01	75.0	28	68.5
2001/02	58.4	77	55.3	38	(33.3)	18	2001/02	57.4	115	66.4
2002/03	87.8	841	38.2	178	(26.1)	23	2002/03	79.1	1019	70.7
2003/04	45.6	57	63.3	49	(66.7)	6	2003/04	53.8	106	68.1
2004/05	34.8	135	22.9	118	(13.0)	23	2004/05	29.2	253	58.9
2005/06	50.0	24	55.8	52	91.4	35	2005/06	53.9	76	54.7
2006/07	25.5	145	16.0	50	(22.2)	18	2006/07	23.1	195	47.8
2007/08	(16.7)	6	(14.3)	7	(0.0)	4	2007/08	15.4	13	35.1
2008/09	(60.0)	5	(50.0)	6	( )	0	2008/09	54.5	11	35.2
2009/10	(25.0)	8	(0.0)	3	(100.0)	1	2009/10	18.2	11	33.0
2010/11	(0.0)	4	(33.3)	3	( )	0	2010/11	14.3	7	25.1
2011/12	1.9	209	4.1	145	0.0	36	2011/12	2.8	354	21.0
2012/13	) 0.0)	10	(20.0)	5	(0.0)	1	2012/13	6.7	15	19.3
2013/14	) 0.0)	10	(0.0)	7	(0.0)	2	2013/14	0.0	17	8.4
2014/15	( )	0	(0.0)	7	( )	0	2014/15	0.0	7	4.8
2015/16	(0.0)	2	(5.0)	20	(0.0)	5	2015/16	4.5	22	2.8
2016/17	(0.0)	4	(0.0)	5	(0.0)	0	2016/17	0.0	9	2.2
2017/18	(11.1)	9	(11.1)	9	(0.0)	0	2017/18	11.1	18	3.1
2018/19	(0.0)	2	17.9	28	(0.0)	1	2018/19	16.7	30	6.5
2019/20	(7.7)	39	(33.3)	3	(0.0)	2	2019/20	12.5	16	7.5
2020/21	(7.7)	13	4.8	42	(22.2)	9	2020/21	5.5	55	8.4
								8.4	Final 5yr average	
								6.1	SD	

(3) Kittiwake

	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		ratio	n=	
1977/78	83.3	102	(50.0)	23			1977/78	71.2	125	
1978/79	53.7	54	(100.0)	7			1978/79	59.0	61	
1979/80	73.7	114	76.7	30	(0.0)	0	1979/80	74.3	144	
1980/81	89.6	1371	92.3	209	84.2	184	1980/81	89.9	1580	73.6
1981/82	76.9	147	79.2	53	90.6	64	1981/82	77.5	200	74.4
1982/83	84.5	969	82.2	202	82.1	262	1982/83	84.1	1171	77.0
1983/84	88.8	1750	80.7	119	82.4	142	1983/84	88.3	1869	82.8
1984/85	68.0	175	78.8	66	(84.6)	13	1984/85	71.0	241	82.2
1985/86	65.5	252	75.0	44	74.2	31	1985/86	66.9	296	77.5
1986/87	73.2	82	(77.8)	9	(20.0)	5	1986/87	73.6	91	76.8
1987/88	75.8	124	69.7	33	54.5	33	1987/88	74.5	157	74.9
1988/89	66.7	102	(57.9)	19	(41.2)	17	1988/89	65.3	121	70.3
1989/90	59.8	132	(68.8)	16	(37.5)	16	1989/90	60.8	148	68.2
1990/91	64.5	124	(71.4)	14	(75.0)	4	1990/91	65.2	138	67.9
1991/92	67.3	55	(85.7)	14	(50.0)	6	1991/92	71.0	69	67.4
1992/93	32.4	182	32.1	28	38.9	36	1992/93	32.4	210	58.9
1993/94	53.5	43	61.3	31	(46.7)	15	1993/94	56.8	74	57.2
1994/95	81.4	43	(100.0)	11	(66.7)	15	1994/95	85.2	54	62.1
1995/96	(50.0)	20	(100.0)	3	(0.0)	2	1995/96	56.5	23	60.4
1996/97	63.6	33	(66.7)	6	(0.0)	0	1996/97	64.1	39	59.0
1997/98	42.1	114	57.7	26	(33.3)	15	1997/98	45.0	140	61.5
1998/99	51.1	131	58.5	65	40.0	35	1998/99	53.6	196	60.9
1999/00	61.9	134	61.0	82	42.5	40	1999/00	61.6	216	56.2
2000/01	46.4	28	37.5	16	(25.0)	4	2000/01	43.2	44	53.5
2001/02	46.3	108	25.7	74	34.0	47	2001/02	37.9	182	48.2
2002/03	85.8	106	34.3	35	(68.8)	16	2002/03	73.0	141	53.9
2003/04	67.6	37	45.2	31	(20.0)	10	2003/04	57.4	68	54.6
2004/05	34.8	69	44.8	29	10.8	37	2004/05	37.8	98	49.9
2005/06	(38.5)	13	(28.6)	7	(0.0)	5	2005/06	35.0	20	48.2
2006/07	(13.6)	22	(36.8)	19	(9.1)	11	2006/07	24.4	41	45.5
2007/08	(0.0)	4	(0.0)	12	(11.8)	17	2007/08	0.0	16	30.9
2008/09	(50.0)	4	(42.9)	14	(0.0)	1	2008/09	44.4	18	28.3
2009/10	(0.0)	7	(0.0)	6	(0.0)	0	2009/10	0.0	13	20.8
2010/11	(20.0)	5	(40.0)	5	(0.0)	0	2010/11	30.0	10	19.8
2011/12	3.3	151	10.2	49	0.0	28	2011/12	5.0	200	15.9
2012/13	(0.0)	20	(0.0)	9	(0.0)	3	2012/13	0.0	29	15.9
2013/14	(0.0)	1	(20.0)	5	(0.0)	0	2013/14	16.7	6	10.3
2014/15	(0.0)	0	(0.0)	0	(0.0)	0	2014/15		0	12.9
2015/16	(0.0)	1	(0.0)	15	(0.0)	4	2015/16	0.0	16	5.4
2016/17	(0.0)	1	(0.0)	1	(0.0)	0	2016/17	0.0	2	4.2
2017/18	(0.0)	9	(16.7)	6	(0.0)	4	2017/18	6.7	15	5.8
2018/19	(0.0)	7	(14.3)	21	(0.0)	3	2018/19	10.7	28	4.3
2019/20	(25.0)	4	(0.0)	2	(0.0)	2	2019/20	16.7	6	6.8
2020/21	(0.0)	5	(0.0)	15	( )		2020/21	0.0	20	5.7
								5.7	5yr average	
								7.0	SD	

(4) Northern Fulmar

	Subregion 8		Subregion 9		subregion 10		National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		ratio	n=	
1977/78	76.0	25	(60.0)	23		0	1977/78	45.8	48	
1978/79	58.8	34	(75.0)	8		0	1978/79	61.9	42	
1979/80	59.3	27	(33.3)	9	( )	0	1979/80	52.8	36	
1980/81	81.6	256	67.2	58	84.2	38	1980/81	79.0	314	59.9
1981/82	61.5	52	(36.8)	19	(65.2)	23	1981/82	54.9	71	58.9
1982/83	72.4	58	(65.0)	20	(66.7)	12	1982/83	70.5	78	63.8
1983/84	81.1	169	(75.0)	16	(66.7)	15	1983/84	80.5	185	67.5
1984/85	(66.7)	24	(66.7)	18	(100.0)	1	1984/85	66.7	42	70.3
1985/86	43.8	80	53.3	30	(37.5)	8	1985/86	46.4	110	63.8
1986/87	(22.2)	9	(50.0)	6	(0.0)	1	1986/87	33.3	15	59.5
1987/88	63.9	166	46.8	77	35.7	28	1987/88	58.4	243	57.1
1988/89	61.0	82	68.4	38	(25.0)	16	1988/89	63.3	120	53.6
1989/90	50.0	34	(66.7)	6	(0.0)	1	1989/90	52.5	40	50.8
1990/91	(36.4)	11	( )	0	( )	0	1990/91	36.4	11	48.8
1991/92	63.6	44	78.8	52	(33.3)	6	1991/92	71.9	96	56.5
1992/93	40.7	27	(12.5)	8	(33.3)	12	1992/93	34.3	35	51.7
1993/94	(33.3)	12	(66.7)	9	(50.0)	2	1993/94	47.6	21	48.5
1994/95	(57.1)	21	(30.8)	13	(63.6)	11	1994/95	47.1	34	47.4
1995/96	(50.0)	12	(25.0)	8	(100.0)	1	1995/96	40.0	20	48.2
1996/97	(38.5)	13	(66.7)	6	( )	0	1996/97	47.4	19	43.3
1997/98	29.0	31	19.4	31	(0.0)	2	1997/98	24.2	62	41.2
1998/99	26.3	399	42.1	247	29.9	97	1998/99	32.4	646	38.2
1999/00	43.5	69	43.9	57	(53.8)	13	1999/00	43.7	126	37.5
2000/01	(12.5)	16	22.2	27	(0.0)	4	2000/01	18.6	43	33.2
2001/02	21.3	244	30.8	78	25.0	28	2001/02	23.6	322	28.5
2002/03	67.9	28	(12.5)	24	(0.0)	4	2002/03	42.3	52	32.1
2003/04	18.4	103	10.6	161	3.6	28	2003/04	13.6	264	28.4
2004/05	14.7	34	15.0	40	(16.7)	18	2004/05	14.9	74	22.6
2005/06	4.2	24	(15.0)	20	(0.0)	4	2005/06	9.1	44	20.7
2006/07	12.0	25	(0.0)	10	(0.0)	10	2006/07	8.6	35	17.7
2007/08	(0.0)	5	(20.0)	20	(7.7)	13	2007/08	16.0	25	12.4
2008/09	(7.4)	27	10.9	55	(0.0)	7	2008/09	9.8	82	11.7
2009/10	(33.3)	3	(6.3)	16	(33.3)	3	2009/10	10.5	19	10.8
2010/11	(0.0)	4	(0.0)	5	( )	0	2010/11	0.0	9	9.0
2011/12	3.8	78	1.9	52	(0.0)	13	2011/12	3.1	130	7.9
2012/13	(0.0)	2	(0.0)	3	( )	0	2012/13	0.0	5	4.7
2013/14	(0.0)	2	( )	0	(0.0)	1	2013/14	0.0	2	2.7
2014/15	(0.0)	0	(0.0)	2	( )	0	2014/15	0.0	2	0.6
2015/16	(0.0)	3	(0.0)	10	( )	0	2015/16	0.0	13	0.6
2016/17	(0.0)	11	(0.0)	13	(0.0)	3	2016/17	0.0	24	0.0
2017/18	(0.0)	9	(0.0)	2	(0.0)	3	2017/18	0.0	11	0.0
2018/19	(0.0)	4	(12.5)	16	(0.0)	0	2018/19	10.0	20	2.0
2019/20	(0.0)	3	(0.0)	4		0	2019/20	0.0	7	1.7
2020/21	(0.0)	20	(0.0)	24	(0.0)	0	2020/21	0.0	44	1.7

1.7	5yr average
4.5	SD

(5) Northern Gannet

	Subregion 8		Subregion 9		subregion 10		National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		ratio	n=	
1977/78	(50.0)	12	(66.7)	23			1977/78	28.6	35	
1978/79	(30.0)	20	(50.0)	4			1978/79	33.3	24	
1979/80	(54.2)	24	(14.3)	7	( )	0	1979/80	45.2	31	
1980/81	45.3	86	26.9	26	(25.0)	8	1980/81	41.1	112	37.0
1981/82	57.4	47	(45.5)	22	(42.9)	14	1981/82	53.6	69	40.4
1982/83	82.2	90	(69.6)	23	(63.6)	11	1982/83	79.6	113	50.6
1983/84	51.5	66	(66.7)	12	(54.5)	11	1983/84	53.8	78	54.7
1984/85	69.2	26	(53.8)	13	(100.0)	2	1984/85	64.1	39	58.5
1985/86	27.4	62	(30.0)	20	(50.0)	10	1985/86	28.0	82	55.9
1986/87	(61.1)	18	(50.0)	6	(0.0)	1	1986/87	58.3	24	56.8
1987/88	17.8	73	4.7	43	(5.3)	19	1987/88	12.9	116	43.5
1988/89	22.0	41	(33.3)	18	(20.0)	15	1988/89	25.4	59	37.8
1989/90	69.1	55	(80.0)	10	(66.7)	3	1989/90	70.8	65	39.1
1990/91	85.7	49	(100.0)	6	(100.0)	1	1990/91	87.3	55	50.9
1991/92	56.8	37	(52.2)	23	(0.0)	6	1991/92	55.0	60	50.3
1992/93	60.0	40	(22.2)	9	(11.1)	9	1992/93	53.1	49	58.3
1993/94	72.4	29	(70.0)	10	(75.0)	4	1993/94	71.8	39	67.6
1994/95	66.7	27	(40.0)	15	(55.6)	9	1994/95	57.1	42	64.9
1995/96	(40.0)	10	(25.0)	8	( )	0	1995/96	33.3	18	54.1
1996/97	(60.0)	20	(71.4)	7	( )	0	1996/97	63.0	27	55.7
1997/98	31.3	32	13.8	29	(0.0)	2	1997/98	23.0	61	49.6
1998/99	9.3	324	12.8	164	10.5	76	1998/99	10.5	488	37.4
1999/00	38.1	63	38.5	52	(33.3)	9	1999/00	38.3	115	33.6
2000/01	(26.3)	19	46.2	39	(20.0)	5	2000/01	39.7	58	34.9
2001/02	4.0	200	8.5	59	(0.0)	21	2001/02	5.0	259	23.3
2002/03	74.3	35	(12.5)	24	(0.0)	4	2002/03	49.2	59	28.5
2003/04	3.4	87	4.6	151	0.0	27	2003/04	4.2	238	27.3
2004/05	19.4	36	24.4	45	(6.3)	16	2004/05	22.2	81	24.1
2005/06	(4.2)	24	(19.0)	21	(50.0)	8	2005/06	11.1	45	18.3
2006/07	21.4	28	(9.1)	11	(16.7)	12	2006/07	17.9	39	20.9
2007/08	(28.6)	7	38.5	26	(14.3)	14	2007/08	36.4	33	18.4
2008/09	3.8)	26	7.5	53	(0.0)	7	2008/09	6.3	79	18.8
2009/10	(33.3)	3	(11.8)	17	(0.0)	2	2009/10	15.0	20	17.4
2010/11	(0.0)	4	(0.0)	5	( )	0	2010/11	0.0	9	15.1
2011/12	2.6	77	1.9	52	(0.0)	13	2011/12	2.3	129	12.0
2012/13	(0.0)	2	(0.0)	3	( )	0	2012/13	0.0	5	4.7
2013/14	(0.0)	2	( )	0	(0.0)	1	2013/14	0.0	2	3.5
2014/15	( )	0	(0.0)	2	( )	0	2014/15	0.0	2	0.5
2015/16	(0.0)	3	(0.0)	10	( )	0	2015/16	0.0	13	0.5
2016/17	(0.0)	11	(0.0)	13	(0.0)	3	2016/17	0.0	24	0.0
2017/18	(10.0)	10	(33.3)	3	(50.0)	6	2017/18	15.4	13	3.1
2018/19	(0.0)	4	(12.5)	16	(0.0)	0	2018/19	10.0	20	5.1
2019/20	(7.1)	14	(0.0)	16	(0.0)	2	2019/20	3.3	30	4.8
2020/21	0.0	28	(6.7)	15	(0.0)	9	2020/21	2.3	43	5.2
								5.2	5yr average	
								6.2	SD	