Beached bird surveys in The Netherlands

summer 2022 & winter 2022/23

C.J. Camphuysen 2023

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Front cover: Great Northern Diver *Gavia immer* De Hors, Texel (photo M.F. Leopold), skin deposited in Rotterdam Natural History Museum.

Summary - This is the annual report on beached bird survey (BBS) combining results obtained in The Netherlands during summer 2022 (May-Oct) and the winter 2022/23. Summer 2022 was a particularly turbulent season, with HPAIV H5N1 virus outbreaks affecting seabirds all over the Northern Hemisphere. Within the Netherlands, coastal colonies of Sandwich Terns *Thalasseus sandvicensis* were severely affected. Elsewhere in Western Europe, Northern Gannets *Morus bassanus* and Great Skuas *Stercorarius skua* were among the most severely affected populations. In this report, summer strandings of (most probably) affected birds within the Netherlands are summarised. No major die-offs of waterbirds occurred in coastal areas, affecting mainly wildfowl, waders, and raptors, as a result of a highly pathogenic avian influenza (HPAI) virus, H5N1, even though further mortality was expected given the dramatic summer of 2022, which turned out to be a peak in an epidemic season that began in autumn 2021 in Europe affecting seabirds on a grand scale for the first time.

Winter 2022/23 was another mild season overall, without really turbulent weather affecting the entire North Sea Area, and this might explain why only one minor seabird wrecks was witnessed (Black-legged Kittiwakes in mid-winter, one of which oiled). The significant declines in (winter) oil rates of pelagic seabirds, such as these reported in recent decades, especially since ~2005, continued, and only very few oiled auks found in winter 2022/23. The sample size for Common Guillemots was considerably smaller than one year before, and in fact insufficiently large for the Dutch contributions of OSPAR subregions 8 and 10 covered in this study that are bordering the North Sea, but sufficient for subregion 9 and for the Dutch North Sea beach area as a whole. The oil-rate (percentage of oiled Common Guillemots of all complete Common Guillemots found dead) arrived at a very low value of only 0.8% (n= 122) for Dutch contributions to the OSPAR areas 8-10 combined; the lowest value ever measured within The Netherlands. 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 3.3 ± 2.7% (mean ± S.D.) for all North Sea beaches combined. The OSPAR target of 10% over periods of at least 5 years for 2030 has been surpassed already.

Vogelstrandingen langs de Nederlandse kust, zomer 2022 en winter 2022/23

Samenvatting - Dit is de jaarlijkse weergave van de resultaten van systematische strandtellingen langs de Nederlandse kust, met een verslag over het winterseizoen 2022/23 met daarnaast bijzondere aandacht voor de daaraan voorafgaande zomer van 2022. 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, maar nog nooit zo laag als in winter 2022/23: slechts 0.8% olieslachtoffers onder Zeekoeten gevonden (n= 122). Het meerjarig gemiddelde is inmiddels op een niveau van 3.3 ± 2.7% beland, waarmee de doelstellingen van OSPAR voor 2030 zelfs overschreden zijn. In de zomer van 2022 vonden massale strandingen plaats van Jan van Genten, Grote Sterns en Zilvermeeuwen als gevolg van een ongekende uitbraak van het vogelgriepvirus H5N1 in Nederland (en elders in West Europa), en een korte samenvatting van de vondsten in vergelijking tot eerdere seizoenen is opgenomen in dit rapport.

Introduction

This is the annual update of seabird strandings reports and results of systematic beached bird surveys for The Netherlands for winter 2022/23. 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). The oil-rates (% oiled) reported here 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.

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*) and four coastal species, including the often-highlighted Common Eider *Somateria mollissima*, Herring Gull *Larus argentatus*, and Great Black-backed Gull *Larus marinus*. Reported densities span the entire ~60 years period for which solid data are available (winter 1959/60 – winter 2022/23), whereas the analysis of oil rates spans a period of the most recent 44 winters (winter 1977/78 to 2022/23). 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.

An extra in this report is the emphasis on seabird strandings in *summer* 2022, now reported in considerable detail, because of several mass mortality incidents and associated strandings caused by major outbreaks of the highly pathogenic avian influenza virus (HPAIV) H5N1. All coastal colonies of Sandwich Terns *Thalasseus sandvicensis* and some sites of Herring Gulls were affected, leading to widespread sanitary issues along the coast, and on top of that came mass strandings of Northern Gannets, a HPAIV related mortality that was in fact widespread throughout the North Atlantic in summer 2022.

Meteorological background for winter 2022/23 [1)]

Over November 2022 to March 2023, the Hellmann number in De Bilt was 22.5, which means that the entire winter period can be classified as mild. Particularly deep depressions and severe storms did not occur at all this season.

November 2022 was mild, quite wet and very sunny. With an average temperature of 8.6°C against a long-term average of 7.0°C, November 2022 ended in sixth place among the mildest November months since 1901. In total, the month had three days of frost (minimum temperature below 0°C) against a normal 4.7°C. On November 19 and 20, the temperature in De Bilt fell below -5°C (moderate frost).

December had a nearly normal temperature, precipitation and sunshine. Twelve frost days were counted in De Bilt, normally there are eleven. In the east of the country it remained locally freezing all day on four days.

January 2023 was mild, very wet and quite gloomy. With an average temperature of 5.8°C against a long-term average of 3.6°C in De Bilt, the entire month was mild, but the month started particularly soft: after the highest December temperature since the start of regular observations in 1901 was measured on December 31, this was again the case on New Year's Eve (17°C). After the middle of the month it became noticeably colder. Some disturbances that passed over or close to the Netherlands and brought some snow locally. The month was also exceptionally wet, with an average of 108 mm of precipitation against a long-term average of 68 mm.

February was again mild, but very dry and sunny. With an average temperature of 5.7°C against normal 3.9°C, February was mild. There were thirteen days of frost in De Bilt (normally 11.6) and no ice days. February was very dry with an average of 20 mm of precipitation compared to the normal 58 mm.

In March it turned very wet again, and this month was soft and gloomy. With an average temperature of 7.0°C against normal 6.5°C, March was quite mild. March had six days of frost in De Bilt, normally there are eight. In the southeast and east of the country it froze for about 10 days and Eelde airport even counted 14 days of frost. Most notable was the wet nature of the month. With an average of 98 mm, against 53 mm normal, March was again very wet indeed.

Finally, April 2023 was on the cool side, but again, wet and with a normal amount of sun. With an average temperature of 8.7°C against normal 9.8°C, April was cool. In the south and east it came to frost eight times, but along the coast the temperature did not fall below zero at all. With 66 mm on average across the country, April was a wet month (normally 40 mm), making it the third wet month of this year, after January and March.

[1)] From: Anonymous 2022-23. Maandoverzicht van het Weer in Nederland, november 2022-april 2023. KNMI, De Bilt https://www.knmi.nl/nederland-nu/klimatologie/gegevens/mow.

Observers and observer effort, summer 2022 and winter 2022/23

In summer 2022 and in winter 2022/23, beached bird surveys (NSO files) and strandings reports (mostly derived from published records in waarneming.nl) were used from such a large number of individuals, that incidental reports were grouped per standard transect, per month. Accidental strandings reports and systematic surveys were received from: A Verdaasdonk, A. Mulder, A. van Steensel, A.J. Bloemendal, A.R Groen, Aad de Koning, Aart van der Spoel, Ab Aaldriks, Ad van den Berge, Adri Kodde, Afra Geerling, Agnès Bimmel- Korstanje, Agnes Noordermeer, Alex Kenter, Alex Kerkum, Alwin van Lubeck, Andre van Keken, Annelies Marijnis, Annemiek van Baren, Arno van Marrewijk, Arno Wouters, Arnoud Heikens, Arnout W.R. de Vries, Astrid Kappers, B.P. den Herder, Bart Bogaerts, Bart Friso, Bart Vastenhouw, Bas de Maat, Bas Koster, Bas van Schooten, Bastiaan van de Kraats, Batman, Ben van Mourik, Bernadette Balten, Bernd Meier, Bert Jan Assink, Bertus de Lange, C Zuhorn, C.M. Ursem, Carel de Vink, Carel van der Zanden, Carolyn Lansu, Cees de Vries, Christian Brinkman, CJ Camphuysen, Coen Cramer, Conny Das, Corstiaan Beeke, D Veenendaal, Daan Dekeukeleire, Daan Knoops, Daan van der Groef, Dagmar Deboeck, Daniël Siepman, David Oosterhuis, Dick Bos, Dick Dooyewaard, Dick Kuipers, Dirk Hoogendoorn, Donny Dolman, Douwe de Boer, Dylan Vendrig, E. Boekhoven, Eckhard Boot, Edwin De Weerd, Egbert Stelpstra, Eline Bakker, Elisa Goudriaan, Ellen Kerkhof, Ellie Veldman, Els Oostenbrink, Emo Klunder, Eric D Delft, Eric Pannier, Eric Stienen, Erik Ernens, Erik Tanis, Erik Verlind, Erwin Goutbeek, Erwin J.O. Kompanje, E-S Dijkstra, Esther Kraaijeveld - de Jong, Evert-Jan Woudsma, F de Meijer, F van Beek, Federico Thiers, Ferdy Hieselaar, Floor Arts, Folkert Draaisma, Frank Haven, Frank Jellema, Frank Schuring, Frank van der Meer, Frank Wendte, Fred ten Horn, Friedrich Pfeifer, Frits Vloemans, Gee van Duin, Geertje Huisman, George Tanis, Gerben Krösschell, Gerhard Bosma, Gerlof du Bois, Gerrit J. Gerritsen, Gertjan van Noord, GO Keijl, Gregor Imbusch, Guus de Vries, H Bouma, H Schekkerman, Hanny van Arkel, Hans Bos, Hans Enklaar, Hans Huitenga, Hans van Buel, Hans Verdaat, Harm Meek, Harold Timans, Hein Nouwens, Henk Huige, Henk van den Brink, Henk van Duijn, Henri Bouwmeester, Henry Soyer, Herman Kolker, Hinko Talsma, Holmer Vonk, I v Oscar Derks, Ivo Meeuwissen, J Groothoff, J ten Horn, J. Rooijakkers, J.H.N. van der Sluis, J.J.W. Buis, JA van Franeker, Jaap Faber, Jaap Vink, Jaco Walhout, Jacob Jan de Vries, Jacques van Goeverden, Jan Bijlsma, Jan Dirk Bol, Jan H. Venema, Jan Jansen, Jan Koen, Jan Kooij (Gemeente Texel), Jan Labse, Jan Lok, Jan Stigter, Jan Tonnis Dik, Jan van Bokkum, Jan van den Berg, Jan van Leeuwen, Jan Willem Dekker, Janny Groeneveld, Jarco Havermans, Jelmer Groen, Jelske Boonstra, Jeroen Bredenbeek, Jeroen Heeres, Jeroen Hoek, Jeroen van der Klaauw, Jeroen van Wijk, Jessica Geertsma, Jitty Hakkert, Joan van der Velden, Job Gerards, Joep Hooymans, Joern Lehmhus, Johan Padding, Johan Stuart, Johan van 't Bosch, Johannes Buitenwerf, Johannes van der Linden, John Raedts, Joop van Eerbeek, Joost Boogaard, Joost Steenweg, Jos van den Berg, JW Dogger, K Arnouts, K.N. Raatjes, Karel Krikke, Katie van der Wende, Kees Mostert, Ken Kraaijeveld, Kim Bobeldijk, Klaas van der Ploeg, Koos Overwater, L de Graaf, L Dijksen, L Emmers, L. van Willegen, Lars Buckx, Laura Kijm, Leo Vorthoren, Leon Kelder, Marco Snijders, MF Leopold, MK Camphuysen, R Costers, R Kleefstra, R Witbaard, S Kuhn, S van den Berg-Blok, Stephan Kühn, Strandbeheer Texel, T de Boer, T van der Es, T van Spanje, TAW Schreurs, and Willem Stel. Total observer effort comprised exactly 700 reports of stranded wildlife which reflected 2505km of coastline surveyed or visited between 1 May 2022 – 30 April 2023 (summer effort in Table 1, winter effort in Table 2).

Table 1. Beached surveys (n counts) and overall coverage (km surveyed) in summer (May-Oct) over the last 63 years. The effort was rarely used for the analysis of trends in oiling, but is available as background information on average strandings densities for any unusual strandings that might occur in any given year.

Summer	Reports	km	Summer	Reports	km	Summer	Reports	km
1960	4	10	1983	91	761	2003	146	691
1961	3	4	1984	85	637	2004	192	915
1962	4	9	1985	54	410	2005	139	669
1963	1	4	1986	51	282	2006	126	586
1964	1	1	1987	52	292	2007	156	670
1966	4	28	1988	43	306	2008	137	610
1967	2	42	1989	50	343	2009	126	604
1968	1	4	1990	49	276	2010	100	449
1969	2	38	1991	74	523	2011	98	435
1972	2	4	1992	44	362	2012	110	359
1973	2	4	1993	35	313	2013	87	343
1974	2	3	1994	39	302	2014	115	400
1975	7	27	1995	53	361	2015	70	257
1976	6	20	1996	36	241	2016	55	163
1977	11	72	1997	58	432	2017	133	414
1978	27	153	1998	73	475	2018	14	54
1979	32	191	1999	59	437	2019	22	119
1980	57	349	2000	129	696	2020	75	231
1981	119	895	2001	138	762	2021	253	1038
1982	107	716	2002	117	589	2022	427	1447
	394	2573		1330	8797		2581	10456

Table 2. Beached surveys (n counts) and overall coverage (km surveyed) in winter (Nov-Apr) over the last 63 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	1980/81	313	2125	2001/02	397	1968.9
1960/61	38	452	1981/82	287	1968	2002/03	370	1869.0
1961/62	17	41	1982/83	388	3126	2003/04	262	1310.4
1962/63	48	145	1983/84	336	2448	2004/05	299	1499.1
1963/64	19	92	1984/85	298	1869	2005/06	241	1250.1
1964/65	7	28	1985/86	287	1833	2006/07	270	1109.0
1965/66	28	300	1986/87	189	1420	2007/08	246	934.4
1966/67	19	164	1987/88	207	1839	2008/09	204	921.2
1967/68	30	322	1988/89	231	1671	2009/10	164	776.2
1968/69	23	541	1989/90	237	1506	2010/11	126	685.4
1969/70	60	832	1990/91	215	1406	2011/12	310	1213.0
1970/71	21	510	1991/92	164	1208	2012/13	124	462.8
1971/72	25	605	1992/93	147	1182	2013/14	162	531.0
1972/73	19	465	1993/94	167	1128	2014/15	151	482.0
1973/74	30	138	1994/95	130	923	2015/16	177	600.2
1974/75	49	393	1995/96	138	956	2016/17	214	697.7
1975/76	35	255	1996/97	121	833	2017/18	205	679.7
1976/77	20	244	1997/98	141	953	2018/19	208	853.7
1977/78	49	408	1998/99	318	1795	2019/20	178	634.0
1978/79	93	579	1999/00	350	1979	2020/21	329	1218.1
1979/80	88	721	2000/01	316	1730	2021/22	449	1541.3
						2022/23	273	1057.4
	725	7277		4980	33898		5359	22294

Table 3. Species found and reported, summer 2022. Peak mortalities (mostly avian influenza related) in **bold**.

Euring	Scientific name	English name	Nederlandse naam	Totals
0	No birds found on count	No birds found dead	Geen vogels gevonden	4x
20	*Gavia stellata*	Red-throated Diver	Roodkeelduiker	3
90	*Podiceps cristatus*	Great Crested Grebe	Fuut	4
220	*Fulmarus glacialis*	Northern Fulmar	Noordse Stormvogel	35
430	*Ardenna grisea*	Sooty Shearwater	Grauwe Pijlstormvogel	1
710	***Morus bassanus***	**Northern Gannet**	**Jan van Gent**	**970**
720	*Phalacrocorax carbo*	Great Cormorant	Aalscholver	48
800	*Phalacrocorax aristotelis*	European Shag	Kuifaalscholver	3
1220	*Ardea cinerea*	Grey Heron	Blauwe Reiger	1
1440	*Platalea leucorodia*	Spoonbill	Lepelaar	14
1549	*Cygnus spec.*	unidentified swan	ongedeterm. zwaan	1
1610	*Anser anser*	Greylag Goose	Grauwe Gans	66
1670	*Branta leucopsis*	Barnacle Goose	Brandgans	15
1680	*Branta bernicla*	Brent Goose	Rotgans	5
1699	*Anser/Branta spec.*	unidentified goose	ongedeterm. gans	7
1700	*Alopochen aegyptiaca*	Egyptian Goose	Nijlgans	10
1730	*Tadorna tadorna*	Common Shelduck	Bergeend	30
1865	*Anas domesticus*	domestic duck	Soepeend	1
2030	*Aythya fuligula*	Tufted Duck	Kuifeend	3
2060	*Somateria mollissima*	Common Eider	Eidereend	94
2130	*Melanitta nigra*	Black Scoter	Zwarte Zeeëend	44
2269	*unidentified duck*	unidentified duck	ongedeterm. eend	2
4500	*Haematopus ostralegus*	Eurasian Oystercatcher	Scholekster	34
4960	*Calidris canutus*	Red Knot	Kanoetstrandloper	1
4970	*Calidris alba*	Sanderling	Drieteenstrandloper	2
5120	*Calidris alpina*	Dunlin	Bonte Strandloper	1
5149	*Calidris spec.*	unidentified sandpiper	ongedeterm. strandloper	1
5340	*Limosa lapponica*	Bar-tailed Godwit	Rosse Grutto	1
5410	*Numenius arquata*	Eurasian Curlew	Wulp	24
5660	*Stercorarius pomarinus*	Pomarine Skua	Middelste Jager	2
5670	*Stercorarius parasiticus*	Arctic Skua	Kleine Jager	2
5690	*Stercorarius skua*	Great Skua	Grote Jager	7
5699	*Stercorarius spec.*	skua	ongedeterm. jager	2
5780	*Hydrocoloeus minutus*	Little Gull	Dwergmeeuw	1
5820	*Chroicocephalus ridibundus*	Black-headed Gull	Kokmeeuw	154
5900	*Larus canus*	Mew Gull	Stormmeeuw	11
5910	*Larus fuscus*	Lesser Black-backed Gull	Kleine Mantelmeeuw	218
5919	***L. fuscus / argentatus***	**Herring / Lesser Black-backed gull**	**Kleine Mantel/Zilvermeeuw**	**1804**
5920	***Larus argentatus***	**Herring Gull**	**Zilvermeeuw**	**1608**
5927	*Larus cachinnans*	Pontic Gull	Pontische Meeuw	9
6000	*Larus marinus*	Great Black-backed Gull	Grote Mantelmeeuw	110
6020	*Rissa tridactyla*	Black-legged Kittiwake	Drieteenmeeuw	8
6049	*Larus spec.*	gull	ongedeterm. meeuw	161
6110	***Thalasseus sandvicensis***	**Sandwich Tern**	**Grote Stern**	**1884**
6150	*Sterna hirundo*	Common Tern	Visdief	41
6160	*Sterna paradisaea*	Arctic Tern	Noordse Stern	1
6240	*Sternula albifrons*	Little Tern	Dwergstern	1
6340	*Uria aalge*	Common Guillemot	Zeekoet	312
6360	*Alca torda*	Razorbill	Alk	62
6540	*Fratercula arctica*	Atlantic Puffin	Papegaaiduiker	3
6655	*Columba 'domestica'*	domestic pigeon	Postduif	1
7680	*Asio flammeus*	Short-eared Owl	Velduil	1
9760	*Alauda arvensis*	Sky Lark	Veldleeuwerik	1
11980	*Turdus pilaris*	Fieldfare	Kramsvogel	1
12010	*Turdus iliacus*	Redwing	Koperwiek	2
15600	*Corvus monedula*	Eurasian Jackdaw	Kauw	4
15670	*Corvus corone*	Crow	Kraai	1
15820	*Sturnus vulgaris*	Common Starling	Spreeuw	1
22270	*Megaptera novaeangliae*	Humpback Whale	Bultrug	1
23510	*Phocoena phocoena*	Harbour Porpoise	Bruinvis	5
24310	*unidentified pinniped*	unidentified seal	ongedeterm. zeehond	4
24330	*Phoca vitulina*	Common Seal	Gewone Zeehond	6

Table 4. Species found and reported, winter (Nov-Apr) 2022/23. No exceptional strandings in this period.

Euring	Scientific name	English name	Nederlandse naam	Totals
0	No birds found on count	No birds found dead	Geen vogels gevonden	5
20	*Gavia stellata*	Red-throated Diver	Roodkeelduiker	13
30	*Gavia arctica*	Black-throated Diver	Parelduiker	1
40	*Gavia immer*	Great Northern Diver	IJsduiker	2
90	*Podiceps cristatus*	Great Crested Grebe	Fuut	5
220	*Fulmarus glacialis*	Northern Fulmar	Noordse Stormvogel	63
550	*Oceanodroma leucorhoa*	Leach's Storm-petrel	Vaal Stormvogeltje	1
710	*Morus bassanus*	Northern Gannet	Jan van Gent	75
720	*Phalacrocorax carbo*	Great Cormorant	Aalscholver	45
800	*Phalacrocorax aristotelis*	European Shag	Kuifaalscholver	2
1220	*Ardea cinerea*	Grey Heron	Blauwe Reiger	1
1570	*Anser fabalis*	Bean Goose	Rietgans	1
1590	*Anser albifrons*	Greater White-fronted Goose	Kolgans	2
1610	*Anser anser*	Greylag Goose	Grauwe Gans	16
1639	*Anser spec.*	unidentified goose	ongedeterm. grijze gans	2
1670	*Branta leucopsis*	Barnacle Goose	Brandgans	7
1680	*Branta bernicla*	Brent Goose	Rotgans	14
1699	*Anser/Branta spec.*	unidentified goose	ongedeterm. gans	1
1730	*Tadorna tadorna*	Common Shelduck	Bergeend	3
1790	*Anas penelope*	Eurasian Wigeon	Smient	1
1840	*Anas crecca*	EurasianTeal	Wintertaling	2
1860	*Anas platyrhynchos*	Mallard	Wilde Eend	1
1890	*Anas acuta*	Northern Pintail	Pijlstaart	1
2030	*Aythya fuligula*	Tufted Duck	Kuifeend	1
2060	*Somateria mollissima*	Common Eider	Eidereend	247
2130	*Melanitta nigra*	Black Scoter	Zwarte Zeeëend	45
2150	*Melanitta fusca*	Velvet Scoter	Grote Zeeëend	1
2180	*Bucephala clangula*	Common Goldeneye	Brilduiker	1
2210	*Mergus serrator*	Red-breasted Merganser	Middelste Zaagbek	8
3865	*Gallus domesticus*	Gallus domesticus	Kip	1
4070	*Rallus aquaticus*	Water Rail	Waterral	1
4500	*Haematopus ostralegus*	Eurasian Oystercatcher	Scholekster	52
4860	*Pluvialis squatarola*	Grey Plover	Zilverplevier	1
4960	*Calidris canutus*	Red Knot	Kanoetstrandloper	1
4970	*Calidris alba*	Sanderling	Drieteenstrandloper	9
5190	*Gallinago gallinago*	Snipe	Watersnip	2
5290	*Scolopax rusticola*	Eurasian Woodcock	Houtsnip	7
5340	*Limosa lapponica*	Bar-tailed Godwit	Rosse Grutto	2
5410	*Numenius arquata*	Eurasian Curlew	Wulp	13
5680	*Stercorarius longicaudus*	Long-tailed Skua	Kleinste Jager	1
5690	*Stercorarius skua*	Great Skua	Grote Jager	2
5780	*Hydrocoloeus minutus*	Little Gull	Dwergmeeuw	1
5820	*Chroicocephalus ridibundus*	Black-headed Gull	Kokmeeuw	73
5900	*Larus canus*	Mew Gull	Stormmeeuw	19
5910	*Larus fuscus*	Lesser Black-backed Gull	Kleine Mantelmeeuw	15
5920	*Larus argentatus*	Herring Gull	Zilvermeeuw	260
6000	*Larus marinus*	Great Black-backed Gull	Grote Mantelmeeuw	79
6020	*Rissa tridactyla*	Black-legged Kittiwake	Drieteenmeeuw	217
6110	*Thalasseus sandvicensis*	Sandwich Tern	Grote Stern	4
6150	*Sterna hirundo*	Common Tern	Visdief	1
6340	*Uria aalge*	Common Guillemot	Zeekoet	184
6360	*Alca torda*	Razorbill	Alk	97
6380	*Cepphus grylle*	Black Guillemot	Zwarte Zeekoet	1
6470	*Alle alle*	Little Auk	Kleine Alk	3
6540	*Fratercula arctica*	Atlantic Puffin	Papegaaiduiker	6
6655	*Columba 'domestica'*	domestic pigeon	Postduif	1
6700	*Columba palumbus*	Common Wood Pigeon	Houtduif	2
11870	*Turdus merula*	Common Blackbird	Merel	1
11980	*Turdus pilaris*	Fieldfare	Kramsvogel	2
12000	*Turdus philomelos*	Song Thrush	Zanglijster	1
12010	*Turdus iliacus*	Redwing	Koperwiek	4
15670	*Corvus corone*	Crow	Kraai	2

Euring	Scientific name	English name	Nederlandse naam	Totals
15820	*Sturnus vulgaris*	Common Starling	Spreeuw	1
23510	*Phocoena phocoena*	Harbour Porpoise	Bruinvis	1
24310	*unidentified pinniped*	unidentified seal	ongedeterm. zeehond	5
24320	*Halichoerus grypus*	Grey Seal	Grijze Zeehond	1
24330	*Phoca vitulina*	Common Seal	Gewone Zeehond	3
26071	*Scyliorhinus canicula*	Small-spotted Catshark	Hondshaai	1
30002	*Oryctolagus cuniculus*	Rabbit	Konijn	1
30003	*Lepus capensis*	Brown Hare	Haas	2
30010	*Rattus rattus*	Rattus rattus	Zwarte Rat	1

Results

Birds found – Two lists of birds found have been provided, one for summer 2022 (observer effort in **Table 1**), during which the effects of a major avian influenza panzootic became prominent in several seabird species along the Dutch coast (indicated in **bold** in **Table 3**), followed by the list of the birds and mammals found in winter 2022/23 (**Table 4**). Only the latter set of data was analysed for the encountered oil contaminations, as part of the long-term monitoring for OSPAR (observer effort in **Table 2**).

Effects of the avian influenza panzootic in summer 2022

Mass strandings of Northern Gannets in the Netherlands, April-October 2022

In April 2022, reports were received of an unprecedented stranding of dead Northern Gannets along the Dutch North Sea coast, especially on the Wadden Sea islands. Some 221 individuals washed ashore within one month, where around 22 dead birds would have been normal, considering an average of 0.06 ± 0.07 stranded gannets per km coastline from systematic beached bird surveys (1980-present; or 10x background levels in April 2022). In addition, 15 birds were found within the Wadden Sea, where 6 would have been normal (0.02 ± 0.09 km-1, or 2.4x background levels). Numbers along the North Sea coast decreased again in May (still 6x background levels) and the incident was therefore not investigated, but it was established that the stranded birds were mostly adults, with a high body mass and that they were (subcutaneous) very fat, with no indications for an unnatural death such as oiling or entanglements. Around the North Sea, the first indications for what would turn out to be a major avian influenza panzootic all over the Northern Hemisphere affecting colonial seabirds, became apparent in May 2022: high mortality of breeding gannets on nests, large numbers of corpses of gannets afloat under several of the major breeding colonies and widespread in the North Sea basin. Within the Netherlands, stranding frequencies increased again in June (17x background levels), soared to a peak of 2.19 gannets km-1 in July (63x background levels), and subsequently declined somewhat in autumn.

Strandings occurred all over the Dutch coastline (**Fig. 1**), with at least 2837 casualties in total, as the result of an extrapolation based on monthly densities between April and October (236, 116, 430, 1131, 465, 247, and 212 respectively), where about 170 dead birds in total

would have been normal given the long-term dataset (1980-2021). The data suggest that adults suffered disproportionally during the current panzootic, with immature birds (2nd to 5th plumage types) thus far relatively being spared. Between Apr-Oct 2022, 89.5% of all gannets found dead were mature birds (n= 344), while only 60.1% were adults in that period over 1980-2021 (n= 759, χ^2_1= 95.1, P< 0.001). In the spring, during the first strandings (Apr-May), the difference was not (88.7% adult over 1980-2021, n= 221, 91.7% in 2022, n= 60, χ^2_1= 0.18, n.s.), but in that season adults normally always outnumbered immatures. Both during the peak in summer (May-June, 63.1% versus 94.7% adult), and in early fall (Aug-Oct, 44.8% versus 85.4% adult), the age distribution was significantly different (χ^2_1= 31.2, P< 0.001 and 7.2, P< 0.01 respectively).

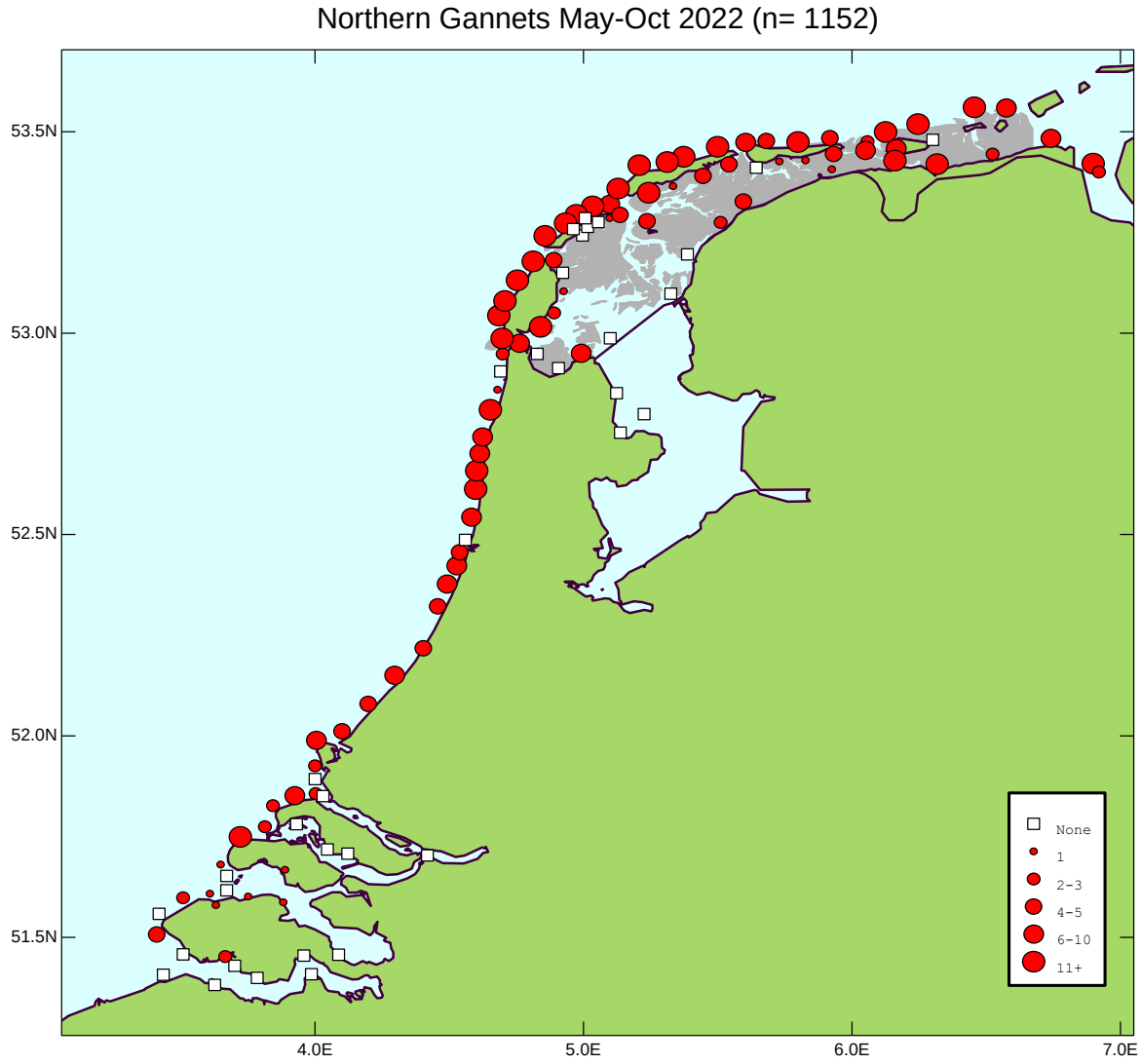

Fig. 1. Strandings of Northern Gannets *Morus* bassanus along the entire Dutch coastline, with 1152 individuals recorded dead and depicted above, but at least 2837 casualties in total must have washed ashore, based on an extrapolation from monthly densities between April and October (extrapolated numbers 236, 116, 430, 1131, 465, 247, and 212 respectively), where about 170 dead birds in total would have been normal given the long-term dataset of seabird strandings in The Netherlands (NZG/NSO database 1980-2021; see Camphuysen *et al.* 2023). Squares indicate transect areas where dead birds were searched for, but where no gannets were recorded.

Against a background of long-term survey data, the significance of the mortality inflicted in Northern Gannets could clearly be appreciated. The results suggest that birds were infected whilst underway towards their breeding grounds (in April), but also that many birds

returned to the south, or at least abandoned the breeding grounds early, in mid-summer. The April-October 2022 event can be seen as an exceptional outlier in the long-term database, in terms of overall densities, age composition and apparent cause of death. Of 19 tested individuals sampled on the Wadden Sea island Vlieland (June-July), 18 individuals (95%) tested positive for avian influenza, of which at least 16 cases involved the H5 subtype. Of these, five could be characterised as HPAI H5N1, and these were genetically closely related to viruses found in gannets sampled in England, Scotland, Wales, and Sweden in 2022. Individual gannets sampled in Wieringen (1x July, 1x August, 1x September), also tested positive for the H5 subtype. The panzootic of highly pathogenic avian influenza virus (HPAIV) H5N1 in summer 2022 posed an enormous challenge to colonial (pelagic) seabird populations, not just in Northern Gannets (Cunningham *et al.* 2022, EFSA 2022, Günther *et al.* 2022). The data on gannets that washed ashore in The Netherlands were published in full in *Limosa* 96: 49-70 (Camphuysen *et al.* 2023).

Mass mortality and strandings of Sandwich Terns in the Netherlands, summer 2022

The 2022 HPAIV (H5N1) epidemic inflicted mass mortalities, across Europe, also in the Sandwich tern (*Thalasseus sandvicensis*). Rijks *et al.* (2022) have summarised the information collected on the breeding grounds and found that mass mortality was seen in 9 of 10 Sandwich Tern breeding colonies present in 2022. In these colonies, with a total of 18,151 breeding pairs, 7,986 adult Sandwich Terns were found dead, and only few chicks fledged. Only one small inland colony (137 pairs) experienced no mass mortality and had a fledgling success (0.47 young/pair) consistent with previous years (0.50 young/pair). From this study, it was concluded that, after Sandwich Terns arrived in the Netherlands for breeding, the H5N1 virus was introduced into their population at least twice. The virus then spread widely within and between breeding colonies, causing outbreaks with high adult and chick mortality in nearly all colonies. Infected birds probably died of systemic HPAI-associated disease, including acute pancreas necrosis and duodenitis. A metapopulation report is currently in press (Knief *et al.* unpublished), in which data on the spread of the virus between colonies throughout northwestern Europe is summarised. Within two months after the first mortalities were reported, over 20,000 adult Sandwich Terns were found dead, equivalent of ~17% of the northwestern European breeding population. Losses were probably even higher, as it was expected that many casualties were not found, or not reported.

From systematic beached bird surveys and additional reports of dead birds along the Dutch coastline, 1897 Sandwich Terns were recorded dead, between April and October 2022. In all, in summer 2022, 1.30 Sandwich Terns were found per km of search effort, against a long-term average of only 0.006 ± 0.01 per km (max 0.05 in 2002) over 1978-2021, over all summers with a reasonable observer effort (Table 1). Densities in 2022 were in other words 216x higher than the long-term average number. The distribution of birds found dead along the coast was quite uneven, with rather high numbers all over the entire Wadden Sea area and in the northern part of the Delta area (Schouwen and Goeree; **Fig. 2**). An uneven distribution of finds could be expected, given the colonial nature of the terns and the fact that the outbreaks occurred within (active) breeding colonies, but the pattern found was still surprising. Major

Sandwich Tern colonies were located in the Western Wadden Sea (Texel and Griend), in Haringvliet (Slijkplaat and Markenje, to the east of Rotterdam), and in the Westerschelde (Hooge Platen). Sandwich Tern strandings were much more frequent than normal all over the Frisian Islands (Texel-Rottumeroog), which could in part reflect the foraging range of birds nesting on Texel and Griend, but could include birds from German colonies, such as the settlement at Juist (Garthe & Flore 2007). Strandings on Goeree and Schouwen must almost certainly be mostly birds breeding in Haringvliet, but the equally heavily affected colony in Westerschelde (plus a nearby site in Zeebrugge in Belgium) is in fact barely reflected in the strandings data. The overall number of terns found along the coast is barely higher than the number found "away from colonies [another 1,600 adult Sandwich Terns] reported dead between late May and end June" (Rijks *et al.* 2022). Of the stranded birds reported here, only a single bird was reported in May, 1601 in June, 185 in July, 89 in August and a few dozens later in autumn and early winter 2022. Needless to say, none of the birds found were oiled.

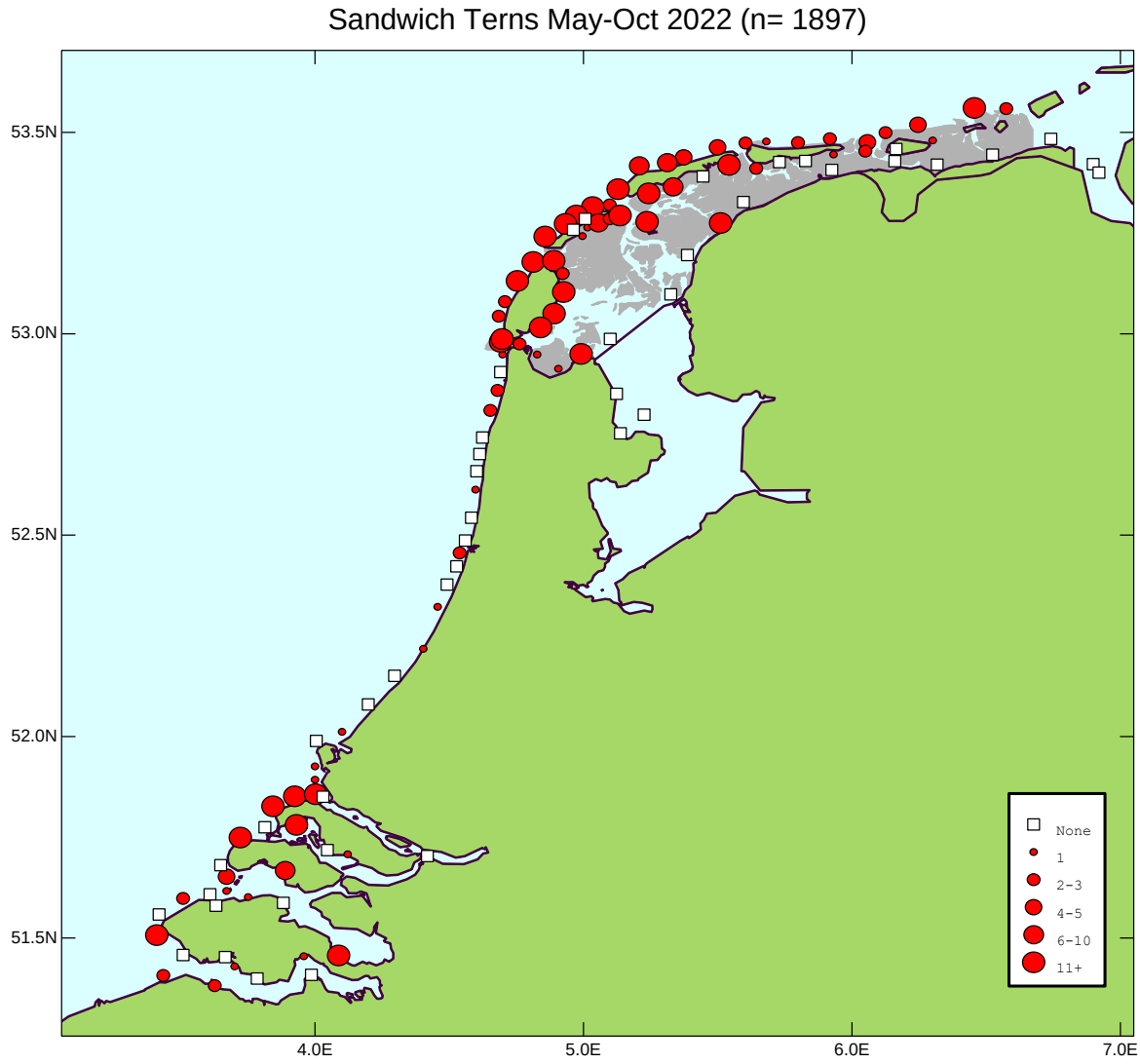

Fig. 2. Strandings of Sandwich Terns *Thalasseus sandvicensis* along the Dutch coastline, with 1897 individuals recorded dead and depicted above, between April and October 2022. Much larger numbers of dead terns were found within he colonies themselves. So, in summer 2022 1.30 Sandwich Terns were found per km of effort, against a long-term average of 0.006 ± 0.01 per km (max 0.05 in 2002) over 1978-2021, summers with a reasonable observer effort (**Table 1**). Densities in 2022 were in other words 216x higher than the long-term average number.

Mass mortality and strandings of Herring Gulls in the Netherlands, summer 2022

In August 2022, after a 'quiet' summer in most studied breeding colonies (with observers generally highly alert on the possibilities of another HPAIV outbreak), yet another mass mortality occurred, but this time highly localised at Texel and Vlieland, with further frequent finds within the 'kop van Noord-Holland' (northern part of the Noord-Holland province; **Fig. 3**). The event still awaits a more detailed analysis, because many of the reported birds were found within some colonies at Vlieland (from where a HPAIV outbreak seemingly originated), and also because relatively few of the stranded birds were tested for avian influenza. Several of those that were tested (plus circumstantial evidence based on postures of birds freshly dead in the beach indicating severe hyperextension and spasticity in head and neck (Opisthotonos; *cf.*

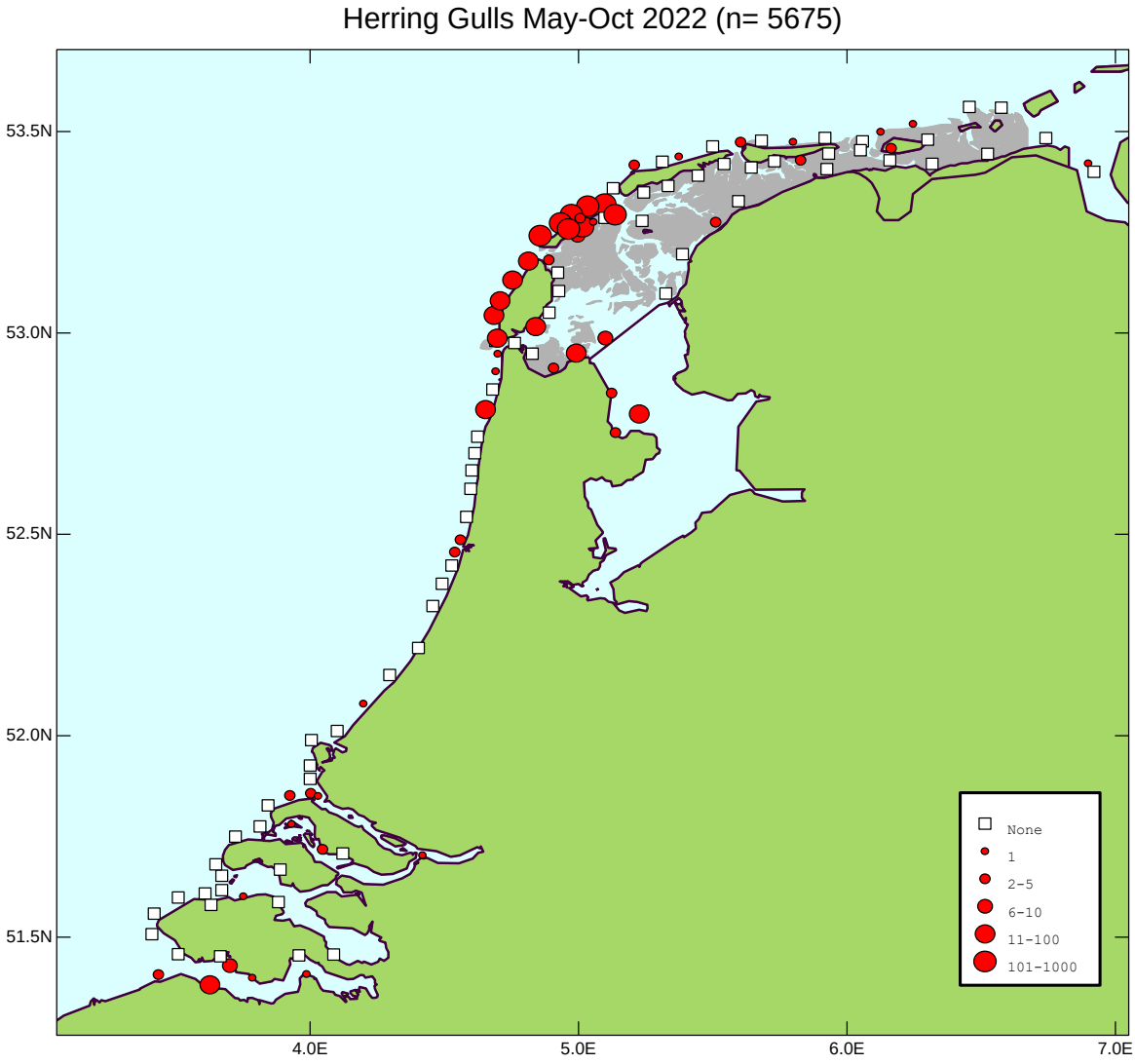

Fig. 3. Strandings of large gulls (Herring Gull *Larus argentatus* and unidentified large gulls combined) along the Dutch coastline, with 5675 individuals recorded dead and depicted above, from systematic searches, accidental finds and beach clean-up operations between April and October 2022 (reconstructed data including a WOB request). Large numbers of dead gulls were found in some colonies at Vlieland, meaning that the peak mortality was highly localised to the westernmost part of the Wadden Sea. So, in summer 2022 2.36 of these large gulls were found per km of effort in all of the Netherlands, against a long-term average of 0.51 ± 0.34 per km (max 1.46 in 1986) over 1978-2021, 44 summers with a reasonable observer effort (**Table 1**). Densities in 2022 were in other words nearly 5x higher than the long-term average number over the entire country. For the islands Texel and Vlieland alone, however, in summer 2022 8.45 large gulls were found per km of effort, against a long-term average of 0.85 ± 1.09 per km (max 5.04 in 1983) over 1978-2021, in 38 summers with a reasonable observer effort. Densities in 2022 were here nearly 10x higher than the long-term average.

Fig. 4. Adult Herring Gull *Larus argentatus*, freshly dead and in the 'typical' posture for HPAIV infected seabirds, 18 August 2022, tested positive for H5N1 (photo C.J. Camphuysen).

Camphuysen *et al.* 2022), as in Fig. **4**) proved to be infected with H5N1. The behaviour of many dying individuals was also highly characteristic, as it included the typical spasms and disorientation of seabirds carrying the virus. That *all* stranded large gulls had died from the virus is doubtful, however, as rather widespread mortality among (fledging) gulls leaving their colonies is in fact quite common. The observed mass mortality was seemingly very prompt (August 2022), and numbered easily into the thousands of dead birds (**Fig. 5**). The large numbers of corpses on crowded holiday beaches were seen as a serious sanitary issue (**Fig. 6**), and not before long, clean-up operations commenced as a result of which large numbers of corpses were removed before they could have been counted, let alone properly identified.

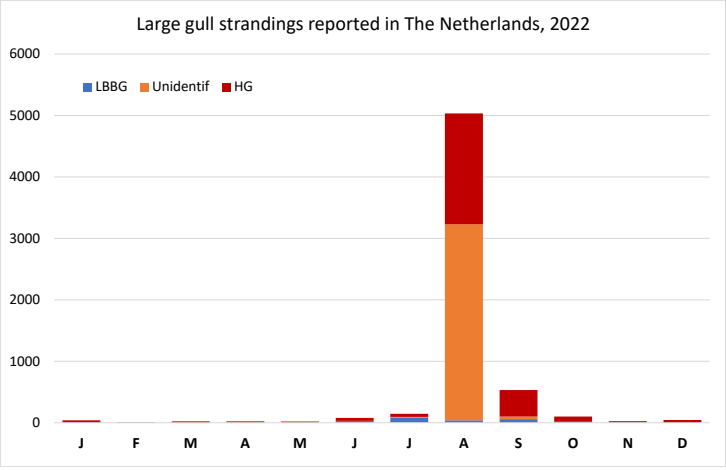

Fig. 5. Strandings of large gulls (Herring Gull, Lesser Black-backed Gulls *Larus fuscus* and unidentified large gulls combined) along the Dutch coastline, Jan-Dec 2022, as absolute numbers reported (reconstructed data including a WOB request).

Fig. 6. Adult Herring Gull *Larus argentatus*, freshly dead and just washed ashore, 18 August 2022, on a tourist-crowded Texel beach causing sanitary issues leading to a clean-up operation by local authorities (photo C.J. Camphuysen).

With only 46% identified to species level over Jun-Dec 2022 (*n*= 5958), it appeared that the majority were Herring Gulls (91%), and the rest Lesser Black-backed Gulls (9%). Of these Herring Gulls, 38.2% were adult birds, 7.8% were immatures, and the remainder (54.0%) were fledglings that had left their colonies (*n*= 552 aged individuals). It later appeared that on some Vlieland colonies, just after SOVON monitoring work had been completed, a major outbreak

of mortality had been observed by 'the general public', information that was picked up much later, by chance, and that was almost entirely missed. This outbreak seemed to have been exactly at the heart of the apparent epizootic that now formed another mass mortality of seabirds within The Netherlands. In some other large colonies, in particular within the large colonies on the south tip at Texel, there had been no evidence for HPAIV related mortality, despite several finds of infected (mostly adult) birds that had died on colony-surrounding beaches. Whether or not all mortality of fledglings found dead was HPAIV related is unsure and it will be hard to find that out in the absence of direct measurements and tests at the time. The mortalities of Sandwich Terns and Gannets reported earlier in this report, were truly exceptional, and while the 2.36 large gulls found per km searched in all of the Netherlands in summer 2022 was very high, it was only 5x higher than the long-term average of 0.51 ± 0.34 per km (max 1.46 in 1986) over 1978-2021 (44 summers with a reasonable observer effort, see Table 1). For the islands Texel and Vlieland alone, however, the 8.45 large gulls were found per km of effort was nearly 10x higher than the long-term average of 0.85 ± 1.09 per km (max 5.04 in 1983) over 1978-2021, in 38 summers with a reasonable observer effort in that region.

The emergence of H5N1 infections in the marine environment signalled a significant change in the dynamics of the virus, with unprecedented mortalities affecting dozens of seabird species in seabird colonies throughout the North Atlantic (Camphuysen *et al.* 2023). High densities of H5N1 susceptible birds (at roosts, foraging grounds or, now, in colonies) are at risk to become infected and to subsequently infect conspecifics. Well-known routes of transmission are through virus excreted in faeces, or, for scavengers and predators, following consumption of infected birds. High pathogenic H5N1 viruses are exceptional, because they can also replicate in and be shed from the respiratory tract of infected birds. If the virus can survive sufficiently long under abiotic conditions, for example in freshwater basins, the frequent virus outbreaks in wetlands affecting swans, geese and various ducks are easily understood. Pelagic seabirds were apparently not at risk, or not thus until 2022, when unexpected outbreaks of highly pathogenic H5N1 avian influenza occurred in the marine environment. Current pressing questions include: how persistent the avian influenza virus is in salt water and how and where come piscivorous, often strictly marine, seabirds get in contact with the virus. It is therefore critical to understand the incidence and mortality risks of HPAIV H5N1 for seabirds, including the scale and timing of inflicted damage.

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Pelagic seabirds washing ashore in winter

The long-term fluctuations in densities shown in this report, as in recent earlier reports, should be treated with some 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 biased towards 'unusual' or otherwise particular species. It is in these unusual species (such as divers, skuas, tube noses 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 2022/23 were low, certainly much lower than in the previous season (**Fig. 7**). No wrecks of guillemots occurred throughout the winter 2022/23, nor in the previous fall in 2022, or the corpses didn't reach our country for some reason. The occurrence of a (small-scale) Kittiwake wreck, with over 170 individuals recorded Jan-Feb 2023, one of which oiled, however, would suggest that had an auk wreck occurred, it would have been recorded. While oil rates are expectedly low during wrecks (for most of the mortality is largely 'food driven', as a result of starvation of the birds involved), the oil rate for guillemots in winter 2022/23 could turn out to be somewhat higher as in recent years, when wrecks were frequent. In winter 2021/22, for example, with only 0.5% oiled (n= 1216), by far the lowest oil rate ever was recorded for the Dutch North Sea coastline (see also Camphuysen 2022 for a long-term overview).

Razorbills were the other commoner auk species in which densities were low (0.09 per km searched, against on average 0.15 ± 0.16 over 1977-2022), but the difference with the previous season was much smaller than in Common Guillemots (**Fig. 7**). With just under 0.06 Northern Fulmars *Fulmarus glacialis* per km searched (**Fig. 8**), the strandings rate was also just below average (0.09 ± 0.09 over the previous 45 seasons). Northern Gannets (**Fig. 8**) were again rather common (0.07 per km against 0.04 ± 0.03 over 1977-2022), which could be an artefact as a result of more 'accidental reports' (still conservatively corrected for expected effort) against fewer systematic surveys. Black-legged Kittiwakes (**Fig. 8**) arrived almost exactly at the long-term average (0.21 against 0.19 ± 0.23 over 1977-22).

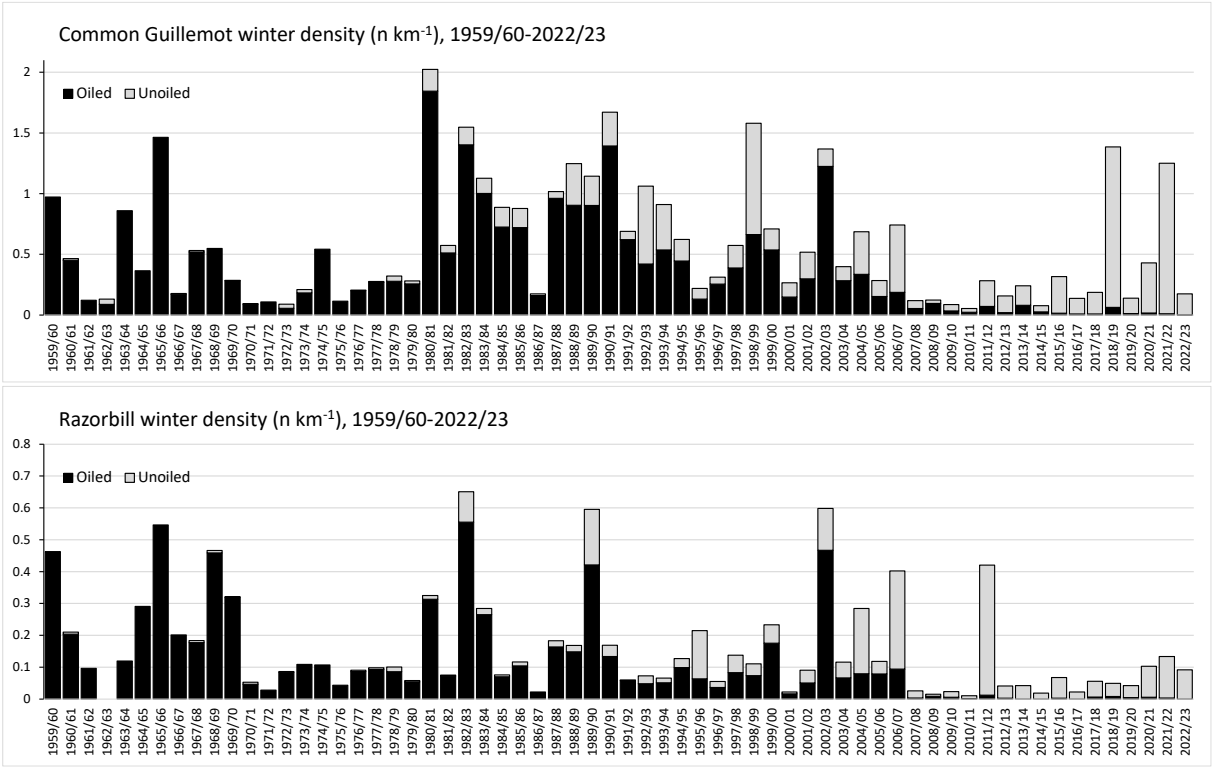

Figure 7. Densities (n km^{-1}) of Common Guillemots and Razorbills washing ashore in winter, 1959/60-2022/23 along the North Sea coast in The Netherlands.

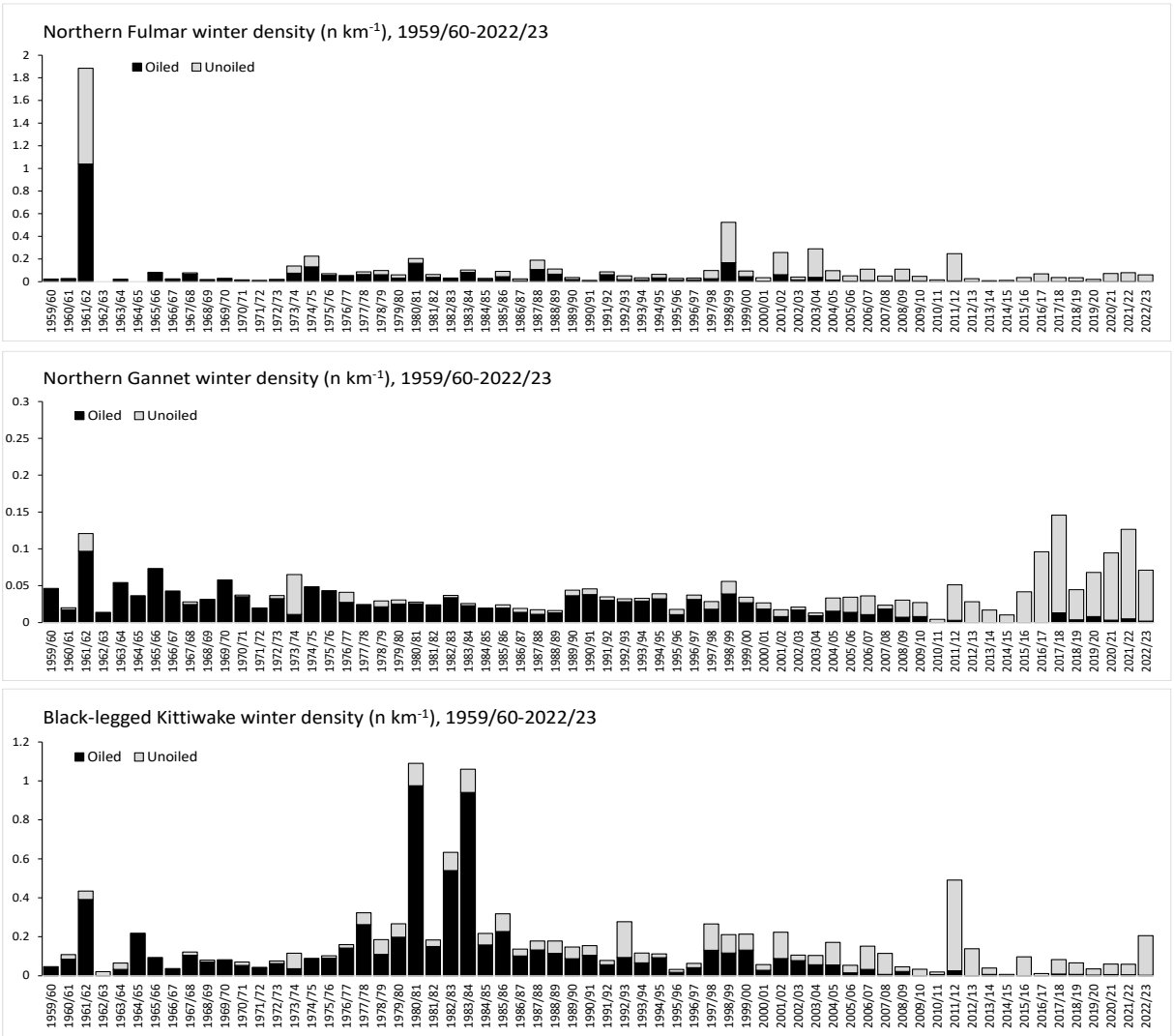

Figure 8. Densities (n km^{-1}) of some more aerial pelagic seabirds washing ashore in winter, 1959/60-2022/23 along the North Sea coast in The Netherlands.

Coastal seabirds washing ashore in winter

Divers Gaviidae were not commonly found, all between Nov 2022 and Feb 2023, but 13 Red-throated Divers *Gavia stellate*, more than in most recent winters were a repeat of the previous winter. One Black-throated Diver *Gavia* arctica and two Great Northern Divers *Gavia* immer completed this season's picture. Ten divers could be checked for oiling, and none of these birds were contaminated. There was a more or less constant trickle of Great Cormorants *Phalacrocorax carbo* on beaches throughout the winter, without any peaks or mass- strandings. One individual was oiled. Records of Common Eiders *Somateria mollissima* peaked Feb-Mar. Total numbers washing ashore (247 individuals were found) were slightly higher than in the previous season, but still low in the longer perspective (**Fig. 9**), with no unusual peaks in strandings rates. Common scoters *Melanitta nigra* washed ashore in very low numbers, and a single Common Scoter was reported as being oiled.

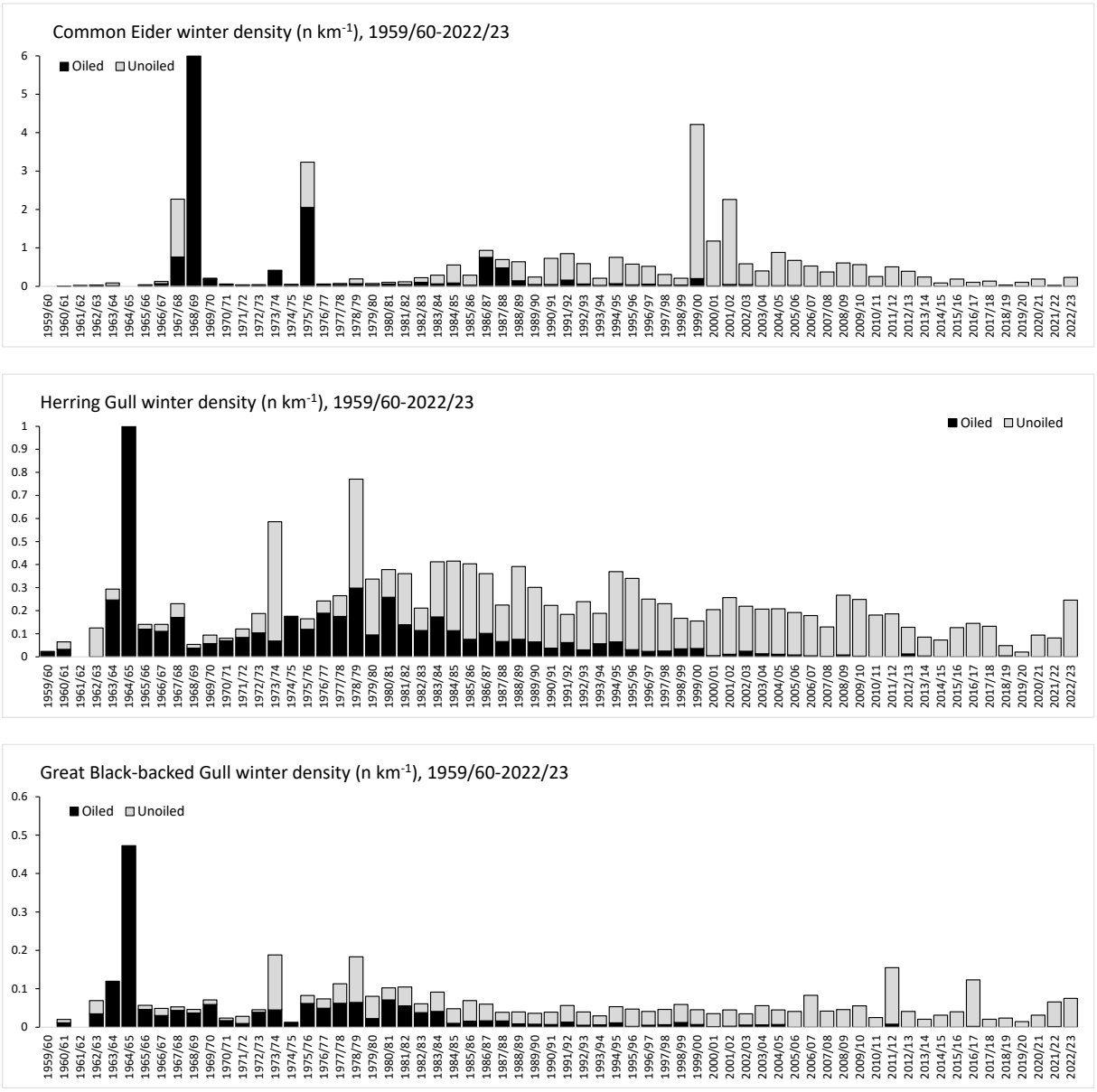

Figure 9. Densities (n km^{-1}) of Common Eiders *Somateria mollissima*, Herring Gulls *Larus argentatus* and Great Black-backed Gulls *Larus marinus* washing ashore in winter in The Netherlands, 1959/60- 2022/23.

Serious oil-related events affecting coastal seabirds 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 (260 found dead) and Greater Black-backed Gulls (79 found dead, both in **Fig. 9**), so that several strandings will have been overlooked and densities are compromised by a lack of reporting. Great Black-backed Gulls and Herring Gulls were notorious HPAIV suspects and several tested birds were positive in summer, but no winter birds were tested. Black-headed Gulls *Larus ridibundus* were affected by a HPAIV outbreak in early 2023, starting with colonies in France and Belgium, 'working its way into' The Netherlands. The Wadden Sea area was reached rather late in the spring (early breeding season), but an individual found beached on Vlieland 11 Feb 2023 tested positive for HPAIV H5N1.

Rarer finds

Uncommon seabirds found, a mix of coastal and more pelagic species, were 1 Black-throated Diver *Gavia arctica* (30 Nov 2022, Ted Sluijter, 16 Nov 2022, damaged corpse, De Punt - Westenschouwen), 2 Great Northern Divers *Gavia immer* (one Rob Sponselee & Lenn van de Zande, very fresh 14 Nov 2022 binnenhaven Vlissingen, a second 4 Dec 2022, De Hors, M.F. Leopold, skin to Rotterdam, see front cover), one Leach's Storm-petrel *Oceanodroma leucorhoa* (11 Nov 2022, Bloemendaal-IJmuiden, Coby Hensen), one Shag *Phalacrocorax aristotelis* (11 Feb 2023, Neeltje Jans, Jaap de Jong), one Long-tailed Skua *Stercorarius longicaudus* (14 Nov 2022, Camperduin, Sander Schagen, **Fig. 10**) and on Black Guillemot *Cepphus grylle* (Jan 2023, first as a dying bird, later found dead, Biels Bal, **Fig. 11**).

Fig. 10. Long-tailed Skua *Stercorarius longicaudus* (14 Nov 2022, Camperduin, Sander Schagen, www.waarneming.nl)

Fig. 11. Black Guillemot *Cepphus grylle* (Jan 2023, as a dying bird, Carl Zuhorn)

Earlier, in summer and autumn 2022, a Sooty Shearwater *Ardenna griseus* (19 September, Terschelling), three European Shags (5 June IJmuiden, 20 October Den Oever, and 24 October Westkapelle), and two Pomarine Skuas *Stercorarius pomarinus* were reported (27 Sep Oudeschild and 28 Sep Goeree Overflakkee, **Fig. 12**).

Fig. 12. Adult dark phase Pomarine Skua *Stercorarius pomarinus*, found 28 Sep 2022 Goeree Overflakkee, dissected at NIOZ (photo C.J. Camphuysen), skin deposited in Rotterdam Natural History Museum (below, photo Erwin Kompanje).

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. 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.

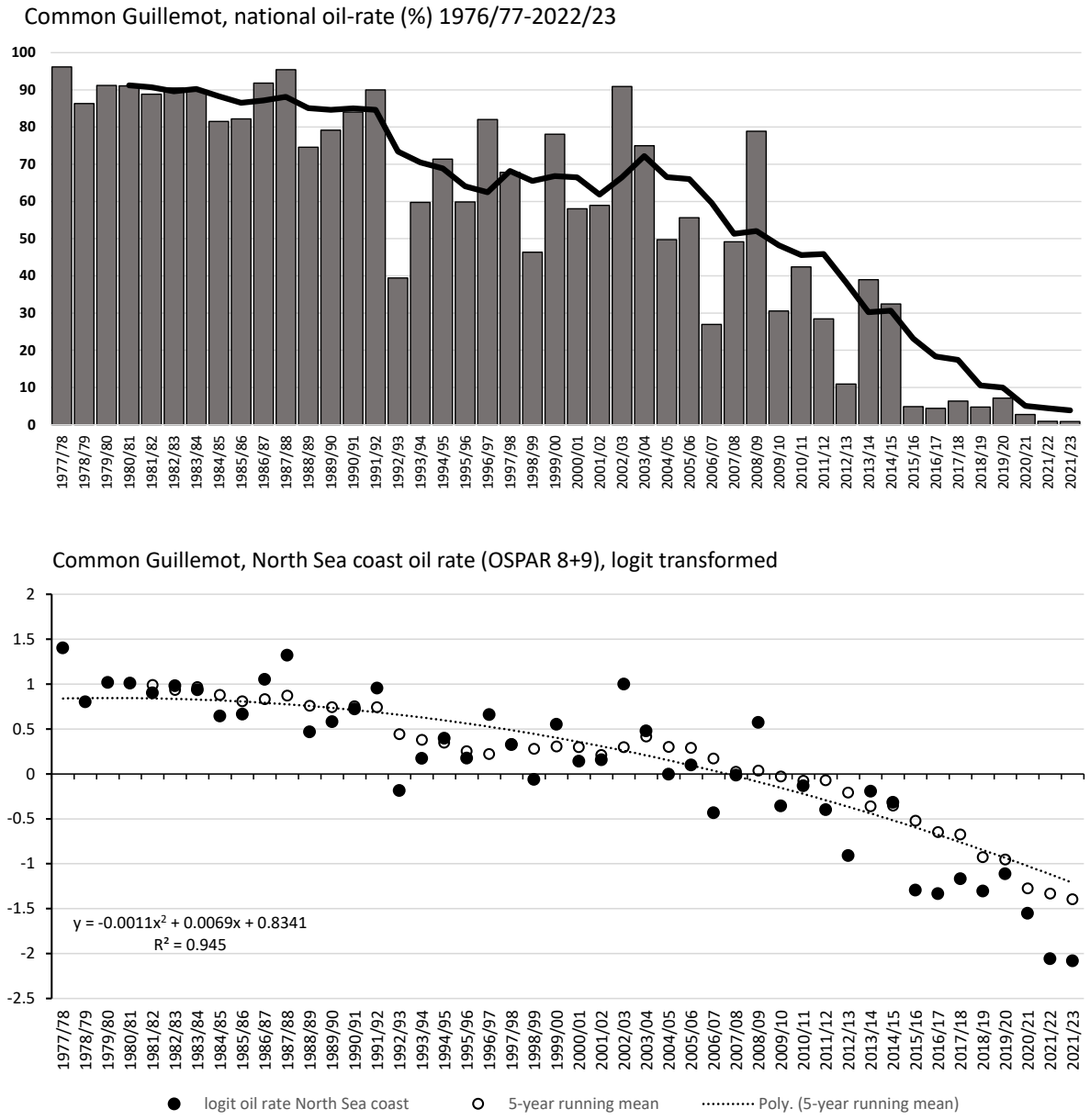

Fig. 13. Proportions oiled and 5-year running mean in oil rates (top panel) and a significant decline in logit-transformed oil rates in Common Guillemots, 1977/78-2022/23.

The significant decline in oil rates in **Common Guillemots** continued, and in winter 2021/22 the lowest oil rate ever was recorded (**Fig. 13, Table 5**). The five-year running mean (3.3 ± 2.7%) is well below what has to be achieved by 2030 according to OSPAR. In a long-term overview, Camphuysen (2022) showed that the decline in oil rates accelerated since winter 2004/05, and an order 2 polynomial trendline provides a better fit with the data than the linear trend used in earlier reports.

Table5. Proportions oiled and 5-year running means (±SD) in pelagic seabirds in 2022/23.

Species	Oiled (%)	n=	Mean		SD
Common Guillemot	0.8	122	3.3	±	2.7
Razorbill	0.0	64	7.2	±	6.8
Northern Fulmar	0.0	36	2.1	±	2.8
Northern Gannet	2.6	39	4.0	±	2.4
Black-legged Kittiwake	1.1	94	6.6	±	5.7

For the **other pelagic seabirds** (**Fig. 14, Table 5**) 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.

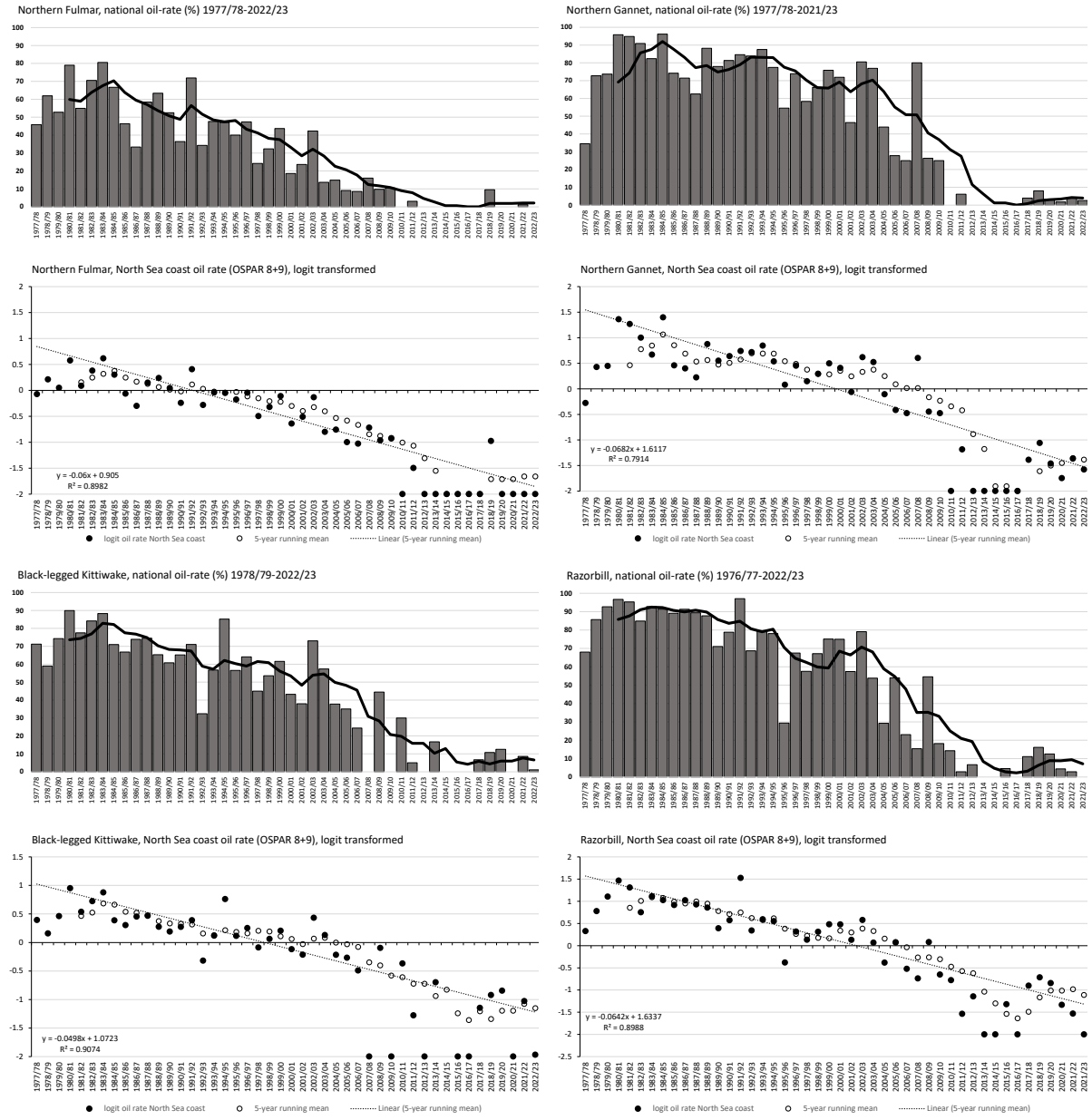

Fig. 14. Proportions oiled and 5-year running mean in oil rates (top panels) and a significant decline in logit-transformed oil rates (lower panels) in the four commoner pelagic species: Northern Fulmar (top left), Northern Gannet (top right), Black-legged Kittiwake (bottom left), and Razorbill (bottom right), 1977/78-2022/23.

For the more **coastal species**, an oil rate 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.

Avian influenza related mortality, winter 2022/23

Within the Netherlands, an ad-hoc working group is monitoring Avian mortality related bird mortality for some years now (AI-impact 21/22 group, chaired by Thijs Kuiken, Erasmus University, Rotterdam). Major die-offs of waterbirds occurred in coastal areas in summer 2022, affecting Sandwich Terns and Herring Gulls (this report), but also wildfowl, waders, and raptors, as a result of a highly pathogenic avian influenza (HPAI) virus, H5N1. Casualties were eventually found in seabird colonies throughout much of the Northern Hemisphere, on a grand and unprecedented scale in the Old World as well as in the New World. Most severely hit in the breeding areas were Northern Gannet, Great Skua *Stercorarius skua*, and Common Guillemot, among many other species that were infected but in which mortality rates remained thus far quite low. Details of the effects of the avian influenza outbreak on seabirds in the Netherlands are published elsewhere. For the winter 2022/23, beachcombers were prepared to sample and test seabird in case of unusual strandings, to at least rule out (or confirm) the role that H5N1 might play in these strandings events. Luckily, serious mass strandings did not occur this winter season, and the Black-legged Kittiwakes found and tested turned out being negative. The beached bird survey programme will continue to play a serious role in the monitoring of the effects of avian influenza in The Netherlands.

Discussion

In winter 2022/23, overall densities of seabirds were on the low side, or normal given the long term strandings rates. Also, the oil rates were low again and the lowest on record for the key sentinel species, the Common Guillemot, signalling a further improvement in marine ecosystems for as far as chronic oil pollution is concerned. The current figure is well below 10%, and it consolidates the sharp drop in oil-rates that occurred after winter 2005/06 (Camphuysen 2022). The OSPAR target of 10% over periods of at least 5 years for 2030 has been exceeded. 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 south-eastern 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). Northern Fulmars have been fairly frequent again in recent years, so that the study group had sufficient carcasses for inspection. This season formed no exception, with 63 documented strandings of this species, many of which were fit for internal inspections.

The beached bird survey programme will continue to play a serious role in the monitoring of the effects of avian influenza in The Netherlands. Another aspect, is the importance for this kind of data to document (major), perhaps more natural, seabird wrecks, because back-ground data can be made available to put found numbers into a longer-term

perspective. The mass strandings of Northern Gannets, Sandwich Terns and Herring Gulls that have occurred in the summer of 2022 could be considered in their long-term context, as a result of which it was possible to describe exactly how exceptional these strandings have been. Autumn 2022 and the winter that followed were otherwise rather calm periods for the beach-combers, for the numbers of seabirds washing ashore were (luckily) low.

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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 – Zeekoet – *Uria aalge*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	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	78.4	812	90.2	378	81.1	159	1985/86	82.2	1190	86.5
1986/87	89.8	108	96.1	51	(92.0)	25	1986/87	91.8	159	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	(16.7)	18	3.1	127	3.8	26	2015/16	4.8	145	23.1
2016/17	2.5	40	7.1	28	(28.6)	7	2016/17	4.4	68	18.3
2017/18	0.0	25	10.5	38	(0.0)	20	2017/18	6.3	63	17.4
2018/19	9.8	51	4.1	437	(0.0)	15	2018/19	4.7	488	10.5
2019/20	7.7	39	6.5	31	(14.3)	14	2019/20	7.1	70	10.0
2020/21	1.3	77	3.1	254	(19.2)	26	2020/21	2.7	331	5.0
2021/22	1.0	573	0.7	702	0.4	279	2021/22	0.9	1275	4.4
2021/23	5.6 (18)		0.0	104	(0.0)	8	2021/23	0.8	122	3.9

(2) Razorbill – Alk – *Alca torda*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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	

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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	87.6	129	93.5	46	(100.0)	4	1985/86	89.1	175	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)	9	(0.0)	7	(0.0)	2	2013/14	0.0	16	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	17.2	29	(0.0)	1	2018/19	16.1	31	6.4
2019/20	(7.7)	13	(33.3)	3	(0.0)	2	2019/20	12.5	16	8.9
2020/21	(7.7)	13	3.6	55	(12.5)	8	2020/21	4.4	68	8.8
2021/22	3.8	26	2.3	44	(0.0)	12	2021/22	2.9	70	9.4
2021/23	0.0 (	17)	0.0	47	(0.0)	3	2021/23	0.0	64	7.2

(3) Kittiwake – Drieteenmeeuw – *Rissa tridactyla*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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	65.4	254	75.0	44	74.2	31	1985/86	66.8	298	77.5
1986/87	73.5	83	(77.8)	9	(20.0)	5	1986/87	73.9	92	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	68.3
1990/91	64.5	124	(71.4)	14	(75.0)	4	1990/91	65.2	138	68.0
1991/92	67.3	55	(85.7)	14	(50.0)	6	1991/92	71.0	69	67.4

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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)	16	(0.0)	4	2015/16	0.0	17	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	(16.7)	6	(0.0)	2	(0.0)	2	2019/20	12.5	8	6.0
2020/21	(0.0)	5	(0.0)	15	(0.0)	0	2020/21	0.0	20	6.0
2021/22	(0.0)	7	(10.7)	28	(0.0)	0	2021/22	8.6	35	7.7
2022/23	0.0	32	1.6	62	(0.0)	9	2022/23	1.1	94	6.6

(4) Northern Fulmar – Noordse Stormvogel – *Fulmarus glacialis*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
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	(11.8)	17	(0.0)	0	2018/19	9.5	21	1.9
2019/20	(0.0)	3	(0.0)	4		0	2019/20	0.0	7	1.9
2020/21	(0.0)	20	0.0	32	(0.0)	7	2020/21	0.0	52	1.9
2021/22	2.5	40	0.0	45	(0.0)	2	2021/22	1.2	85	2.1
2022/23	(0.0)	11	0.0	25	(0.0)	5	2022/23	0.0	36	2.1

(5) Northern Gannet – Jan-van-Gent – *Morus bassanus*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
1977/78	(100.0)	6	(100.0)	23			1977/78	34.5	29	
1978/79	(66.7)	9	(100.0)	2			1978/79	72.7	11	
1979/80	(92.9)	14	(20.0)	5	( )	0	1979/80	73.7	19	
1980/81	95.1	41	100.0	7	(50.0)	4	1980/81	95.8	48	69.2
1981/82	96.4	28	(90.9)	11	(100.0)	6	1981/82	94.9	39	74.3
1982/83	91.4	81	(88.9)	18	(77.8)	9	1982/83	90.9	99	85.6
1983/84	81.0	42	(88.9)	9	(100.0)	6	1983/84	82.4	51	87.5
1984/85	100.0	18	(87.5)	8	(100.0)	2	1984/85	96.2	26	92.0
1985/86	70.8	24	(85.7)	7	(83.3)	6	1985/86	74.2	31	87.7
1986/87	(70.6)	17	(75.0)	4	( )	0	1986/87	71.4	21	83.0
1987/88	86.7	15	22.2	9	(100.0)	1	1987/88	62.5	24	77.3
1988/89	81.8	11	(100.0)	6	(60.0)	5	1988/89	88.2	17	78.5
1989/90	74.5	51	(100.0)	8	(66.7)	3	1989/90	78.0	59	74.9
1990/91	80.8	52	(85.7)	7	(100.0)	1	1990/91	81.4	59	76.3
1991/92	84.0	25	(85.7)	14	(0.0)	6	1991/92	84.6	39	78.9
1992/93	88.9	27	(50.0)	4	(33.3)	3	1992/93	83.9	31	83.2
1993/94	87.5	24	(87.5)	8	(100.0)	3	1993/94	87.5	32	83.1
1994/95	78.3	23	(75.0)	8	(100.0)	5	1994/95	77.4	31	83.0
1995/96	(80.0)	5	(33.3)	6	( )	0	1995/96	54.5	11	77.6
1996/97	(80.0)	15	(62.5)	8	( )	0	1996/97	73.9	23	75.4
1997/98	76.9	13	36.4	11	( )	0	1997/98	58.3	24	70.3
1998/99	66.7	45	65.6	32	66.7	12	1998/99	66.2	77	66.1
1999/00	66.7	36	90.9	22	(60.0)	5	1999/00	75.9	58	65.8
2000/01	(71.4)	7	72.0	25	(33.3)	3	2000/01	71.9	32	69.2
2001/02	50.0	16	41.7	12	( )	0	2001/02	46.4	28	63.7
2002/03	86.7	30	(50.0)	6	(0.0)	1	2002/03	80.6	36	68.2
2003/04	60.0	5	87.5	8	0.0	1	2003/04	76.9	13	70.3
2004/05	33.3	21	55.0	20	(25.0)	4	2004/05	43.9	41	63.9
2005/06	(33.3)	3	(26.7)	15	(66.7)	6	2005/06	27.8	18	55.1
2006/07	30.0	20	(12.5)	8	(40.0)	5	2006/07	25.0	28	50.8
2007/08	(66.7)	3	83.3	12	(66.7)	3	2007/08	80.0	15	50.7
2008/09	12.5	8	36.4	11	(0.0)	2	2008/09	26.3	19	40.6
2009/10	(50.0)	2	(20.0)	10	(0.0)	1	2009/10	25.0	12	36.8
2010/11	(0.0)	2	( )	0	( )	0	2010/11	0.0	2	31.3
2011/12	5.4	37	8.3	12	(0.0)	7	2011/12	6.1	49	27.5
2012/13	(0.0)	4	(0.0)	5	( )	1	2012/13	0.0	9	11.5
2013/14	(0.0)	3	( )	3	(0.0)	2	2013/14	0.0	6	6.2

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)			
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean	
2014/15	( )	2	(0.0)	3	( )	0	2014/15	0.0	5	1.2	
2015/16	(0.0)	1	(0.0)	18	( )	1	2015/16	0.0	19	1.2	
2016/17	(0.0)	14	(0.0)	12	(0.0)	9	2016/17	0.0	26	0.0	
2017/18	2.6	38	(7.7)	13	(37.5)	8	2017/18	3.9	51	0.8	
2018/19	(0.0)	9	(12.5)	16	( )	0	2018/19	8.0	25	2.4	
2019/20	(7.1)	14	(0.0)	16	(0.0)	2	2019/20	3.3	30	3.1	
2020/21	0.0	28	3.4	29	(0.0)	9	2020/21	1.8	57	3.4	
2021/22	7.9	38	1.7	59	(0.0)	3	2021/22	4.1	97	4.2	
2022/23	(0.0)	12	3.7	27	(0.0)	8	2022/23	2.6	39	4.0	

(6) Common Eider – Eidereend – Somateria mollissima

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)			
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean	
1977/78	(71.4)	14	(75.0)	23			1977/78	35.1	37		
1978/79	(53.3)	15	27.6	29			1978/79	36.4	44		
1979/80	(71.4)	7	54.8	31	(25.0)	4	1979/80	57.9	38		
1980/81	(76.2)	21	69.6	56	39.3	61	1980/81	71.4	77	50.2	
1981/82	(36.4)	22	44.0	50	37.0	119	1981/82	41.7	72	48.5	
1982/83	47.1	34	58.0	169	41.3	392	1982/83	56.2	203	52.7	
1983/84	57.7	52	17.2	122	17.7	379	1983/84	29.3	174	51.3	
1984/85	22.9	96	15.7	287	14.3	509	1984/85	17.5	383	43.2	
1985/86	(50.0)	8	15.9	107	5.7	211	1985/86	18.3	115	32.6	
1986/87	62.9	35	78.6	355	84.6	279	1986/87	77.2	390	39.7	
1987/88	99.5	555	52.8	322	17.3	237	1987/88	82.3	877	44.9	
1988/89	40.0	50	45.8	216	10.9	523	1988/89	44.7	266	48.0	
1989/90	(87.5)	8	16.2	68	17.7	209	1989/90	23.7	76	49.2	
1990/91	11.0	429	2.0	204	2.0	200	1990/91	8.1	633	47.2	
1991/92	36.8	261	7.6	340	(13.5)	6	1991/92	20.3	601	35.8	
1992/93	34.1	123	8.5	153	2.3	343	1992/93	19.9	276	23.3	
1993/94	28.6	28	3.4	58	12.0	108	1993/94	11.6	86	16.7	
1994/95	29.3	41	6.1	66	8.1	533	1994/95	15.0	107	15.0	
1995/96	4.6	108	9.0	178	(4.1)	121	1995/96	7.3	286	14.8	
1996/97	9.7	31	25.9	81	(4.4)	206	1996/97	21.4	112	15.1	
1997/98	18.5	27	3.8	78	(9.5)	105	1997/98	7.6	105	12.6	
1998/99	(6.3)	16	29.1	55	11.1	171	1998/99	23.9	71	15.1	
1999/00	20.2	455	4.7	1631	3.4	4982	1999/00	8.1	2086	13.7	
2000/01	6.6	91	1.9	377	0.2	965	2000/01	2.8	468	12.8	
2001/02	1.5	323	3.9	613	1.6	2723	2001/02	3.1	936	9.1	
2002/03	73.7	57	4.3	232	1.1	474	2002/03	18.0	289	11.2	
2003/04	(20.0)	10	4.2	71	1.4	209	2003/04	6.2	81	7.6	
2004/05	(0.0)	14	2.9	170	1.7	483	2004/05	2.7	184	6.6	
2005/06	(16.7)	12	4.0	101	1.5	267	2005/06	5.3	113	7.1	
2006/07	(0.0)	4	0.0	38	1.5	130	2006/07	0.0	42	6.4	
2007/08	( )	0	4.2	24	0.0	59	2007/08	4.2	24	3.7	
2008/09	(0.0)	1	1.5	67	0.0	82	2008/09	1.5	68	2.7	
2009/10	( )	0	0.0	51	2.8	71	2009/10	0.0	51	2.2	
2010/11	(0.0)	3	(0.0)	16	( )	0	2010/11	0.0	19	1.1	
2011/12	(0.0)	6	0.9	112	0.0	61	2011/12	0.8	118	1.3	
2012/13	( )	0	(0.0)	5	(0.0)	5	2012/13	0.0	5	0.5	
2013/14	( )	0	(0.0)	9	(0.0)	6	2013/14	0.0	9	0.2	
2014/15	( )	0	(0.0)	5	( )	0	2014/15	0.0	5	0.2	
2015/16	( )	0	(0.0)	8	(0.0)	14	2015/16	0.0	8	0.2	
2016/17	( )	0	(0.0)	11	(0.0)	8	2016/17	0.0	11	0.0	
2017/18	( )	0	(0.0)	3	(0.0)	42	2017/18	0.0	3	0.0	
2018/19	(0.0)	2	(0.0)	1	(0.0)	14	2018/19	0.0	3	0.0	
2019/20	(0.0)	17	(0.0)	10	0.0	32	2019/20	0.0	27	0.0	
2020/21	( )	8	0.0	39	0.0	25	2020/21	0.0	47	0.0	
2021/22	( )	0	(0.0)	23	(0.0)	5	2021/22	0.0	23	0.0	
2022/23	( )	2	0.0	144	(0.0)	17	2022/23	0.0	146	0.0	

(7) Herring Gull – Zilvermeeuw – *Larus argentatus*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
1977/78	68.8	64	(71.4)	23	0.0	3	1977/78	56.3	87	
1978/79	38.9	211	(36.8)	19			1978/79	38.7	230	
1979/80	32.0	122	18.4	38	(0.0)	4	1979/80	28.8	160	
1980/81	73.7	350	63.6	88	25.0	40	1980/81	71.7	438	48.9
1981/82	52.1	257	27.4	84	13.2	121	1981/82	46.0	341	48.3
1982/83	61.2	237	61.7	60	20.1	134	1982/83	61.3	297	49.3
1983/84	46.4	412	47.4	38	12.3	162	1983/84	46.4	450	50.8
1984/85	31.7	227	26.8	82	17.4	144	1984/85	30.4	309	51.2
1985/86	22.2	189	14.7	95	10.9	119	1985/86	19.7	284	40.8
1986/87	36.5	115	21.0	81	(11.7)	77	1986/87	30.1	196	37.6
1987/88	47.2	106	37.0	46	5.2	116	1987/88	44.1	152	34.2
1988/89	24.7	174	19.6	56	5.1	137	1988/89	23.5	230	29.6
1989/90	21.4	215	(26.1)	23	8.2	49	1989/90	21.8	238	27.8
1990/91	14.2	169	(60.0)	5	0.0	9	1990/91	15.5	174	27.0
1991/92	25.7	105	(50.0)	20	(0.0)	6	1991/92	29.6	125	26.9
1992/93	10.5	105	10.0	30	9.7	72	1992/93	10.4	135	20.2
1993/94	30.4	92	(46.2)	13	0.0	24	1993/94	32.4	105	21.9
1994/95	31.4	70	8.0	50	6.8	73	1994/95	21.7	120	21.9
1995/96	9.6	83	11.1	36	(0.0)	54	1995/96	10.1	119	20.8
1996/97	6.3	64	12.9	31	(0.0)	29	1996/97	8.4	95	16.6
1997/98	8.6	81	(17.4)	23	(5.0)	20	1997/98	10.6	104	16.6
1998/99	17.6	102	28.0	25	12.5	40	1998/99	19.7	127	14.1
1999/00	17.9	84	25.7	35	9.1	44	1999/00	20.2	119	13.8
2000/01	5.0	40	2.2	46	0.0	99	2000/01	3.5	86	12.5
2001/02	2.7	74	9.4	32	3.6	166	2001/02	4.7	106	11.7
2002/03	41.2	51	6.7	45	0.7	135	2002/03	25.0	96	14.6
2003/04	(16.7)	24	14.3	28	0.0	74	2003/04	15.4	52	13.8
2004/05	10.8	37	0.0	25	2.2	93	2004/05	6.5	62	11.0
2005/06	(7.1)	14	(5.3)	19	3.4	117	2005/06	6.1	33	11.5
2006/07	(0.0)	10	(5.9)	17	0.0	63	2006/07	3.7	27	11.3
2007/08	(0.0)	6	(0.0)	8	(0.0)	47	2007/08	0.0	14	6.3
2008/09	(0.0)	13	3.8	26	(0.0)	61	2008/09	2.6	39	3.8
2009/10	(0.0)	7	2.3	44	(0.0)	40	2009/10	2.0	51	2.9
2010/11	(0.0)	11	0.0	18	( )	0	2010/11	0.0	29	1.6
2011/12	0.0	26	0.0	30	0.0	37	2011/12	0.0	56	0.9
2012/13	(28.6)	7	(0.0)	7	(0.0)	8	2012/13	14.3	14	3.8
2013/14	(0.0)	3	(0.0)	14	(12.5)	8	2013/14	0.0	17	3.2
2014/15	(0.0)	5	(0.0)	6	( )	0	2014/15	0.0	11	2.9
2015/16	(0.0)	2	(0.0)	21	0.0	25	2015/16	0.0	23	2.9
2016/17	( )	0	0.0	34	(0.0)	12	2016/17	0.0	34	2.9
2017/18	(0.0)	2	0.0	43	(0.0)	9	2017/18	0.0	45	0.0
2018/19	(0.0)	1	(11.1)	18	(0.0)	3	2018/19	10.5	19	2.1
2019/20	(0.0)	1	(0.0)	3		0	2019/20	0.0	4	2.1
2020/21	(0.0)	1	0.0	38	(0.0)	7	2020/21	0.0	39	2.1
2021/22	(0.0)	4	0.0	70	(0.0)	8	2021/22	0.0	74	2.1
2022/23	(0.0)	18	0.0	84	(0.0)	8	2022/23	0.0	102	2.1

(8) Great Black-backed Gull – Grote Mantelmeeuw – *Larus marinus*

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
1977/78	59.3	27	(0.0)	23	(0.0)	2	1977/78	32.0	50	
1978/79	38.1	63	(18.2)	11			1978/79	35.1	74	
1979/80	31.6	38	(12.5)	8	(0.0)	1	1979/80	28.3	46	
1980/81	73.7	95	(54.2)	24	(50.0)	6	1980/81	69.7	119	41.3
1981/82	66.3	95	26.5	34	35.7	28	1981/82	55.8	129	44.2
1982/83	66.2	77	(73.7)	19	39.6	48	1982/83	67.7	96	51.3
1983/84	62.3	77	(53.3)	15	11.3	53	1983/84	60.9	92	56.5
1984/85	19.4	36	(13.3)	15	(12.5)	8	1984/85	17.6	51	54.4
1985/86	34.4	32	(6.3)	16	12.1	33	1985/86	25.0	48	45.4

OSPAR	Subregion 8		Subregion 9		subregion 10			National (8+9)		
	ratio	n=	ratio	n=	ratio	n=		Ratio	n=	mean
1986/87	14.8	27	(60.0)	15	(8.3)	12	1986/87	31.0	42	40.4
1987/88	42.9	7	(61.1)	18	(15.0)	20	1987/88	56.0	25	38.1
1988/89	38.5	13	(25.0)	8	(4.8)	21	1988/89	33.3	21	32.6
1989/90	18.2	22	(28.6)	7	(25.0)	4	1989/90	20.7	29	33.2
1990/91	17.9	28	(25.0)	4	(0.0)	2	1990/91	18.8	32	31.9
1991/92	22.5	40	(33.3)	3	(0.0)	6	1991/92	23.3	43	30.4
1992/93	30.8	13	(0.0)	3	(0.0)	17	1992/93	25.0	16	24.2
1993/94	25.0	8	(33.3)	6	(0.0)	6	1993/94	28.6	14	23.3
1994/95	15.4	13	(25.0)	12	(12.5)	8	1994/95	20.0	25	23.1
1995/96	7.1	14	(0.0)	7	(0.0)	5	1995/96	4.8	21	20.3
1996/97	33.3	6	(14.3)	7	(0.0)	11	1996/97	23.1	13	20.3
1997/98	18.2	11	(28.6)	7	(0.0)	10	1997/98	22.2	18	19.7
1998/99	29.6	27	(29.4)	17	0.0	28	1998/99	29.5	44	19.9
1999/00	7.7	13	(18.2)	11	11.8	34	1999/00	12.5	24	18.4
2000/01		0	(11.1)	18	(0.0)	23	2000/01	11.1	18	19.7
2001/02	8.3	12	(11.1)	9	0.0	30	2001/02	9.5	21	17.0
2002/03	50.0	8	(6.7)	15	(9.5)	21	2002/03	21.7	23	16.9
2003/04	25.0	8	(14.3)	14	(0.0)	24	2003/04	18.2	22	14.6
2004/05	23.1	13	(30.0)	10	(0.0)	15	2004/05	26.1	23	17.3
2005/06	0.0	7	(0.0)	10	(0.0)	18	2005/06	0.0	17	15.1
2006/07	0.0	4	(0.0)	15	(0.0)	24	2006/07	0.0	19	13.2
2007/08	( )	0	(0.0)	3	(0.0)	15	2007/08	0.0	3	8.9
2008/09	(0.0)	6	(0.0)	11	(0.0)	9	2008/09	0.0	17	5.2
2009/10	(0.0)	5	(0.0)	14	(0.0)	7	2009/10	0.0	19	0.0
2010/11	(0.0)	2	(0.0)	5	( )	0	2010/11	0.0	7	0.0
2011/12	8.3	24	(5.3)	19	(0.0)	18	2011/12	7.0	43	1.4
2012/13	0.0	3	(0.0)	5	(0.0)	4	2012/13	0.0	8	1.4
2013/14	(0.0)	3	(0.0)	2	(0.0)	3	2013/14	0.0	5	1.4
2014/15	(0.0)	3	(0.0)	4	( )	0	2014/15	0.0	7	1.4
2015/16	(0.0)	2	(0.0)	13	(0.0)	2	2015/16	0.0	15	1.4
2016/17	(0.0)	0	0.0	40	(0.0)	10	2016/17	0.0	40	0.0
2017/18	(0.0)	2	(0.0)	3	(0.0)	0	2017/18	0.0	5	0.0
2018/19	(0.0)	7	(0.0)	8	(0.0)	1	2018/19	0.0	15	0.0
2019/20	(0.0)	2		0	(0.0)	4	2019/20	0.0	2	0.0
2020/21	(0.0)	7	(0.0)	16	(0.0)	1	2020/21	0.0	23	0.0
2021/22	(0.0)	17	2.2	45	(0.0)	4	2021/22	1.6	62	0.3
2022/23	(0.0)	9	0.0	39	(0.0)	9	2022/23	0.0	48	0.3