

# Monitoring and assessment of the proportion of oiled Common Guillemots from beached bird surveys in The Netherlands: update winter 2014/15

C.J. Camphuysen

**Front cover:**

Selection of photos of stranded Common Guillemots from [www.waarneming.nl](http://www.waarneming.nl) for the period 1 Nov 2014-30 April 2015. None of the guillemots depicted are oiled.

Large photo stranded Common Guillemot courtesy Jan Andries van Franeker

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# **Monitoring and assessment of the proportion of oiled Common Guillemots from beached bird surveys in The Netherlands: annual update winter 2014/15**

## **Summary**

This is the annual update for OSPAR of the beached bird survey (BBS) results in The Netherlands (winter 2014/15). The Dutch BBS provides data for OSPAR area's 8, 9 and 10, but data from Belgian and German colleagues will have to be merged to arrive at the final values for these areas. For the Dutch North Sea region, significant declines in oil rates were reported over a long study period (1977/78-2013/14) as well as (clearly accelerating) over the last 10-15 years. In winter 2014/15, densities of pelagic seabirds washing ashore were again very low. Some oil incidents (mystery spills, no source known, deduced from stranded seabirds) were recorded in Zeeland, affecting mostly Common Guillemots, but numbers stranded remained low.

The (Dutch) national oil rate of Common Guillemots in winter 2014/15 amounted to 32.4% (n=37), with the five-year running mean over 2010/11-2014/15 (mean  $\pm$  SD) at  $30.2 \pm 11.6\%$ . For five other selected offshore species, not a single oiled carcass was reported, but the sample size was too small for a meaningful assessment of the annual oil rate. The results obtained over the last decade suggest a continuation of low oil rates in Common Guillemots in Dutch waters. Following the significant trends in the most recent data set (1999/00-present), a projection for 2020 would arrive at *c.* 19% (logit -0.64).



# **Monitoring en vaststelling van het percentage met olie besmeurde Zeekoeten door middel van systematische strandtellingen in Nederland; jaarlijkse rapportage, winter 2014/15**

## **Samenvatting**

Dit is de jaarlijkse weergave voor OSPAR van de resultaten van systematische strandtellingen langs de Nederlandse kust, met een verslag over het seizoen 2014/15. Middels deze tellingen verzorgt Nederland haar bijdragen voor de OSPAR deelgebieden 8, 9, en 10. Om een compleet beeld te krijgen voor deze deelgebieden zullen Belgische en Duitse gegevens moeten worden toegevoegd en gecombineerd. In deze rapportage worden alleen de Nederlandse gegevens besproken. Voor de Nederlandse Noordzeekust kon de lange termijn afname in oliebevuilingspercentages (1977/78-2013/14) bij de Zeekoeten worden bevestigd. Over de laatste jaren versnelt deze afname.

In de winter van 2014/15 spoelden opnieuw erg weinig vogels aan. Het (Nederlandse) nationale oliebevuilingspercentage van de Zeekoet in de winter van 2014/15, gemeten langs het strand, bedroeg 32.4% (n= 37), hetgeen vrijwel gelijk is aan het vijfjaarlijks lopend gemiddelde over 20010/11-2014/15 (gemiddeld  $\pm$  SD 30.2  $\pm$  11.6%). Het aantal aangespoelde Zeekoeten was lager dan ooit en ook hier is sprake van een lange-termijn trend. Bij geen van de andere soorten, inclusief de andere geselecteerde zeevogelsoorten werden, deze winter met olie besmeurde individuen aangetroffen. Voor de meeste soorten was de steekproef (door het geringe aantal strandingen) te klein om een betekenisvol percentage te berekenen, maar de indruk van een geringe mate van chronische olievervuiling werd hiermee krachtig bevestigd.

De oliebevuilingspercentages lijken de afgelopen Jaren (vooral de afgelopen 10 jaren) steeds sneller af te nemen. Op basis van de lineaire regressie berekend over de logit-oliebevuilingspercentages in deze eeuw (1999/00-2014/15) waarover een significante dalende trend werd gevonden, zou het bevuilingspercentage in 2020 uitkomen op  $\pm$ 19% (logit -0.64).

## Introduction

The effectiveness of measures against (chronic) oil pollution, and of any temporal and spatial trends existing and developing in past and current levels of chronic oil pollution can be effectively monitored through beached bird surveys: counts of stranded seabirds on North Sea coasts, coupled with the assessment of oil rates (proportion of birds oiled; Furness & Camphuysen 1997, Camphuysen & Heubeck 2001). Species-specific oil rates reflect the risk for various species of marine birds to become oiled at sea, with high oil rates being more characteristic for seabirds that are particularly common in areas with frequent oil spills and that have a behaviour that puts them at risk (a swimming and diving life-style); lower oil rates were found in more aerial seabirds, especially those wintering away from the busiest shipping lanes (Furness & Camphuysen 1997, Camphuysen 2010). Common Guillemots, abundant and widespread wing-propelled pursuit seabirds in NW European waters, are particularly useful in this context. By monitoring the occurrence of oil on carcasses of guillemots washing ashore around Europe, spatial and temporal trends in chronic oil pollution can be derived over large geographical scales and over long time-series.

The information need for the monitoring and assessment of oil fouling of seabirds, in particular the Common Guillemot, was first established in the OSPAR organization in the form of an OSPAR Ecological Quality Objective (EcoQO). The Marine Strategy Framework Directive demands in the Commission Decision of 2010, Chapter 8.2, Effects of contaminants, an indicator for oil pollution (EU 2010). In the legal Dutch Kader Richtlijn Marien document, page 78 Vervuilende stoffen (Anon, 2012), the Oiled Guillemot 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 present document is the annual update for The Netherlands for winter 2014/15. All data collected since winter 1997/78 are incorporated in this report. Oil-rates (% oiled) of Common Guillemots are provided for the Dutch North Sea coast as a whole (monitoring an area of 299 km in length), and for the Dutch contributions to OSPAR areas 8 (238 km), 9 (61 km), and 10 (299 km; see Methods). Raw data are provided in Appendices and an analysis of recent trends is provided in the Results section of this report. While the emphasis of this study is on Common Guillemots, similar data are collected for all stranded birds and details are provided on five other species in this report: two further offshore seabirds (the Black-legged Kittiwake *Rissa tridactyla* and the Razorbill *Alca torda*) and three inshore or more coastal species (Herring Gull *Larus argentatus*, Common Eider *Somateria mollissima*, and Common Scoter *Melanitta nigra*). All six species are illustrated below:

### Selected offshore seabirds



Common Guillemot  
*Uria aalge*

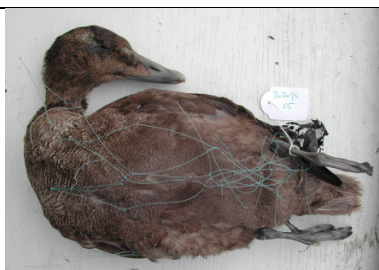


Razorbill  
*Alca torda*



Black-legged Kittiwake  
*Rissa tridactyla*

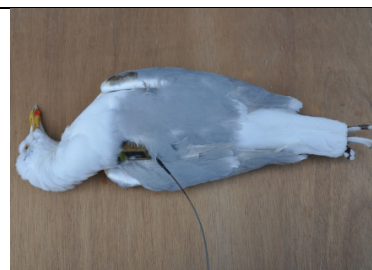
### Selected nearshore or coastal seabirds



Common Eider  
*Somateria mollissima*



Common Scoter  
*Melanitta nigra*



Herring Gull  
*Larus argentatus*

## Methods

With the “Oiled Guillemot EcoQO”, the significance of chronic oil pollution in particular sea areas is assessed by means of beached bird surveys, in which stranded dead or dying seabirds (notably Common Guillemots) are checked for the presence or absence of mineral oil in their feathers (Camphuysen & Heubeck 2001). Surveys are conducted in winter (Nov-Apr), when the effects of chronic oil pollution are most pronounced and when (illegal) discharges at sea under cover of darkness (*i.e.* at night) are frequent (Vollaard 2013). Stranded seabirds are identified, aged if possible, and the carcass is examined for the presence of oil in the feathers. Other evident causes of death are recorded simultaneously and in case of mass strandings, a special investigation is organised in order to try and explain the event. The “Oiled Guillemot EcoQO” uses ratios (the proportion of birds oiled from the total number of birds found) rather than absolute numbers of birds washing ashore.

In order to evaluate trends in oil rates, as described in earlier proposals (Camphuysen 2002, 2004, OSPAR 2004, Camphuysen 2005ab, OSPAR 2005), all incomplete carcasses were excluded from the analysis of beached bird survey results (the presence or absence of oil in the feathers cannot reliably be studied in incomplete remains of birds). The remainder (nTotal) was split in fractions of unoiled (nUnoiled) and oiled (nOiled) individuals. Only substances that were visually

classified as mineral oil were considered here. An acceptable oil rate ( $n_{\text{Oiled}}/n_{\text{Total}}*100$ ) for Common Guillemots is based on at least 25 complete carcasses of stranded seabirds per annum per area (i.e. quality code 01, see Appendices) and is otherwise considered ‘unreliable’ (quality code 00). Annual winter values (% oiled) are provided in bar graphs, with a running (arithmetic) mean calculated over five-year periods (i.e. the mean of five annual values preceding and including a particular value), superimposed with a line graph to illustrate the most recent trends. Lower quality assessments (00, percentages based on less than 25 complete carcasses) are indicated with a lighter shading. To facilitate a trend analysis by means of linear regression, the oil-rates were logit-transformed in order to obtain normalised data distributions, following recommendations in Camphuysen & Van der Meer 1996 ( $=\text{LOG}((x/100)/(1-(x/100)))$ ); see also Camphuysen 1995, 1997). For this part of the analysis, lower quality data (quality code 00) were excluded.

The Dutch beached bird surveys contribute to three OSPAR areas, but additional data are required from neighboring countries in each case:

OSPAR 8 → Eastern Southern Bight mainland coast Belgian/French border to Texel (B, NL)

OSPAR 9 → Southern German Bight North Sea coast Frisian Islands Texel to Elbe (NL, FRG)

OSPAR 10 → Western Wadden Sea mainland and Wadden Sea coast Frisian Islands Texel to Elbe (NL, FRG)

The NZG/NSO beached bird survey monitoring of these areas consists of 93 discrete sections of coast over 598 km (OSPAR area 8, 38 sections, 238km; area 9, 11 sections, 61km; and area 10, 44 sections, 299 km). Half that area consists of coastline bordering the North Sea, the other half borders the western Wadden Sea (i.e. more sheltered waters with particularly intense controls of the occurrence of marine pollution). A “national value” of oil rates is provided by lumping all censuses conducted along the North Sea coast (i.e. a combination of the Dutch contributions to OSPAR areas 8 and 9).

## Observer effort

Since winter 1977/1978, beached bird surveys have been organised by the Dutch Seabird group. Effort peaked in the 1980s, as a result of the enormous numbers of oiled seabirds washing ashore and an army of environmentally concerned volunteers searching beaches. Over the last 10 years, (arithmetic) mean ( $\pm$  SD) observer effort amounted to  $897 \pm 309$  km per winter. In recent years, effort is compromised as a result of extremely low numbers of birds washing ashore (**Appendix 1**). In this season, no less than 37 counts (26%,  $n= 145$ ) were received during which not a single corpse of a bird was found. It is difficult to activate volunteers for beached bird surveys if the rewards (finds) are low. Therefore, data were added from [www.waarneming.nl](http://www.waarneming.nl), to compensate for the low observer effort, in order to obtain a larger data set for analysis, and to achieve a wider coverage over the entire Dutch coast. The people reporting their finds in [waarneming.nl](http://www.waarneming.nl) were all acknowledged and the presence of oil was judged from published photographic material. For

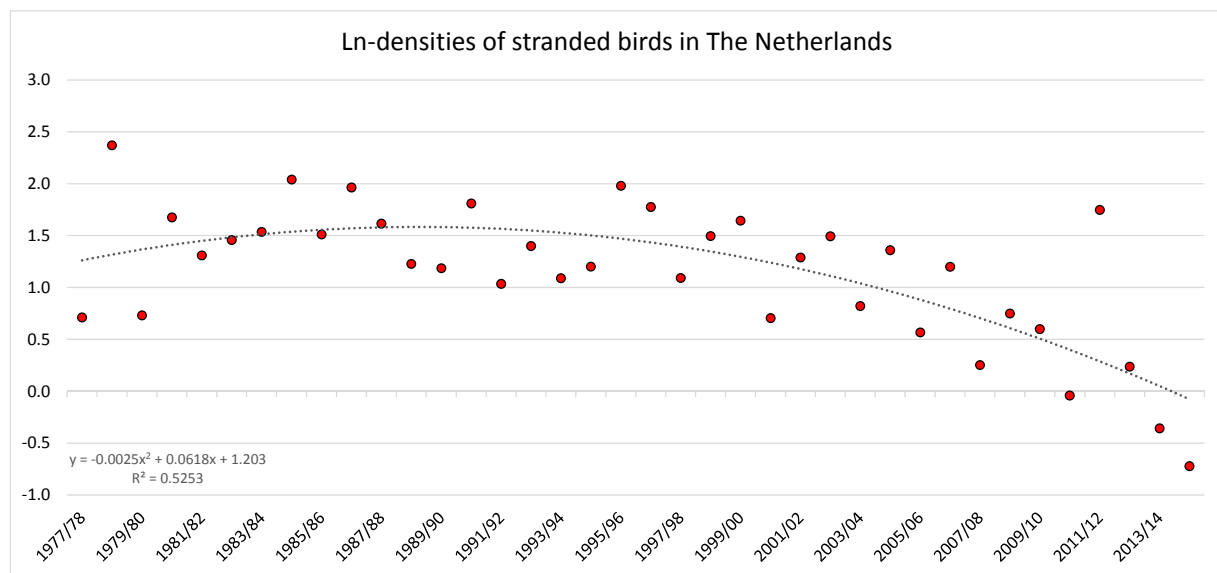


Common Guillemots, however, the obtained data from the systematic surveys over the Dutch North Sea shoreline as a whole were in fact sufficient to calculate reliable oil rates, but the waarneming.nl material certainly enhanced both area coverage and the sample size.

I am very grateful to the following observers that have provided information on stranded seabirds in 2014/15: Arnold Gronert, André de Baerdemaeker, Annelies Vriens, Bram Kroese, Chris Rosmalen, Kees Camphuysen, Carl Zuhorn, David Janssens, Dick Veenendaal, Dirk Kuiken, Dennis de Heer, Dennis Maas, Erik Holscher, Evelien Dekker, Floor Arts, Frank London, Gerrit Gerritsen, Hans Bouma, Hans-Werner Neumann, Harmke de Hoogh, Hugo Wieleman, J. Slurp, Job ten Horn, J. van der Zwaag, Jan Andries van Franeker, Jacob de Vries, Jacques Groen, Joeri Lamers, Joost de Jong, Leon Kelder, Mardik Leopold, v/h Natuurorganisatie De Windbreker, Nelleke Groen, Nick Agterberg, Niels Godijn, Patrick Agterberg, Paul van Eik, Ruud Costers, Rinus Dillerop, Sander Lillipaly, Sanne van den Berg-Blok, Susanne van Donk, Sven Prins, Teun de Boer, Theo Kiewiet, Vincent Stork, Willem-Pier Vellinga, Wim van Boekel en [www.waarneming.nl](http://www.waarneming.nl)

## Results

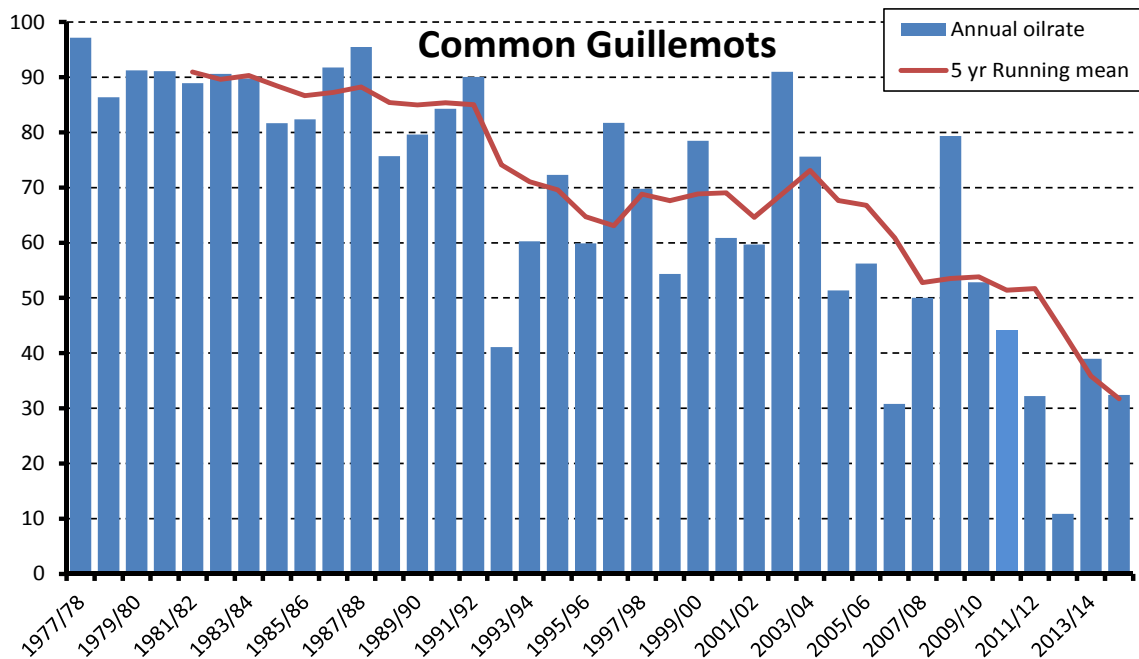
**Birds found dead** – Overall densities in winter 2014/15 were the lowest on record over the past 4 decades (**Fig. 1**). The severe storms that occurred washed away material rather than that new corpses washed ashore and the extremely mild winter (KNMI files) made even rather weak waterbirds and seabirds survive.



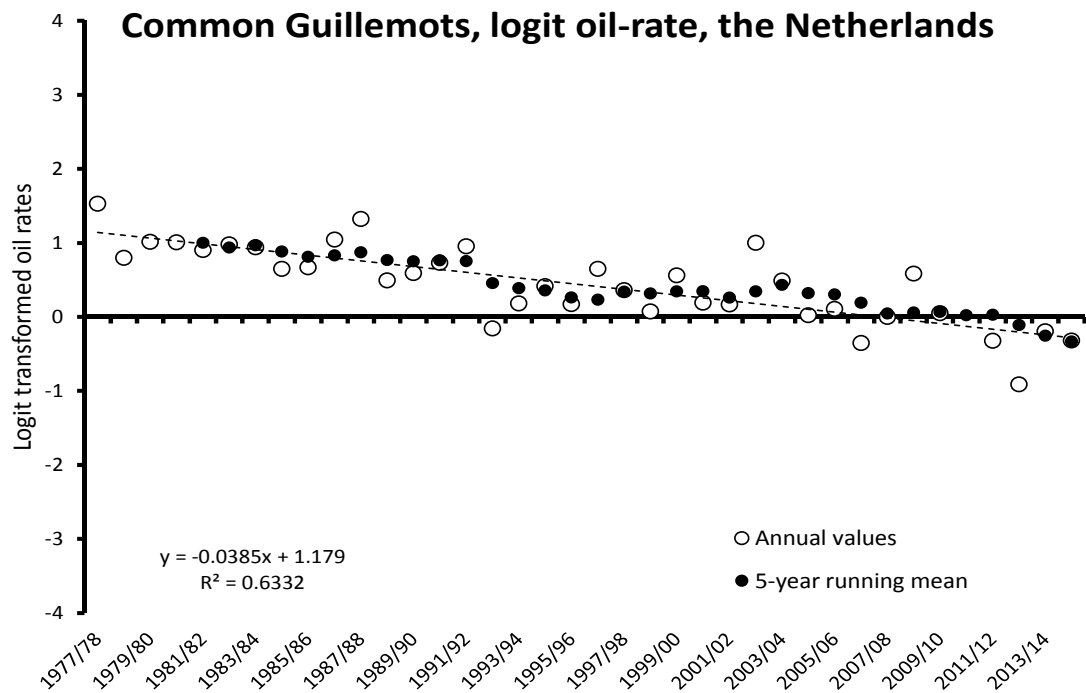
**Fig. 1.** Long-term trends in densities of sea- and waterbirds (*n* per km of beach surveyed on a ln scale; all species combined on all surveyed North Sea shorelines) washing ashore in The Netherlands ranged from a maximum of 10.7 birds km<sup>-1</sup> (2.4 on the ln-scale) in the severe of winter 1978/79 to a minimum of 0.48 birds km<sup>-1</sup> (-0.7) in winter 2014/15 → an all-time low number in deposition rates.

In all 328 carcasses representing 47 species of birds and four species of marine mammals were recorded during these most recent censuses (**Appendix 2**). In the top-10, most of the species featuring in the present report are represented:

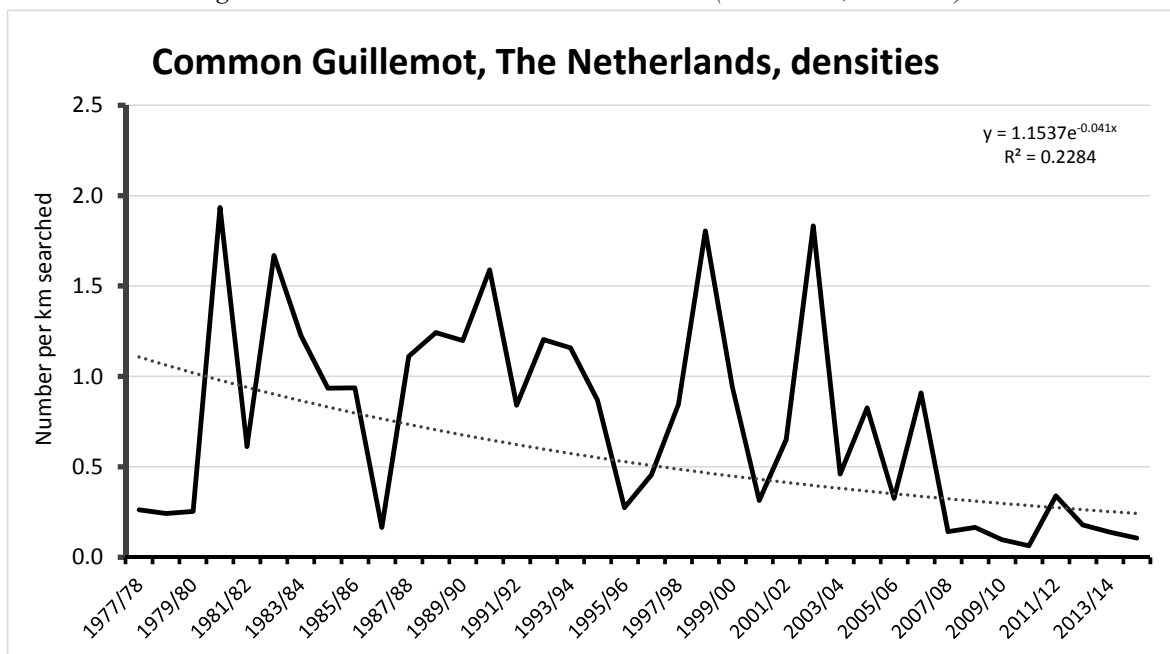
Top 10 most numerous species	Scientific name	Dutch name	Total
2060 Eidereend	<i>Somateria mollissima</i>	Common Eider	41
6340 Zeekoet	<i>Uria aalge</i>	Common Guillemot	37
5920 Zilvermeeuw	<i>Larus argentatus</i>	Herring Gull	35
1730 Bergeend	<i>Tadorna tadorna</i>	Common Shelduck	23
5820 Kokmeeuw	<i>Chroicocephalus ridibundus</i>	Black-headed Gull	22
6000 Grote Mantelmeeuw	<i>Larus marinus</i>	Great Black-backed Gull	15
4500 Scholekster	<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	13
5900 Stormmeeuw	<i>Larus canus</i>	Mew Gull	11
2130 Zwarte Zeeëend	<i>Melanitta nigra</i>	Black Scoter	10
6360 Alk	<i>Alca torda</i>	Razorbill	9



**Fig. 2.** Annual oil rates in Common Guillemots ( $n > 25$  complete carcasses) in The Netherlands (OSPAR areas 8, 9 and 10) along the North Sea beach and 5yr running arithmetic mean oil rates since 1977/78. See Fig. 3 for the overall trend in oil rates. **Note:** to conduct a trend analysis, these values were logit-transformed in Fig. 3.

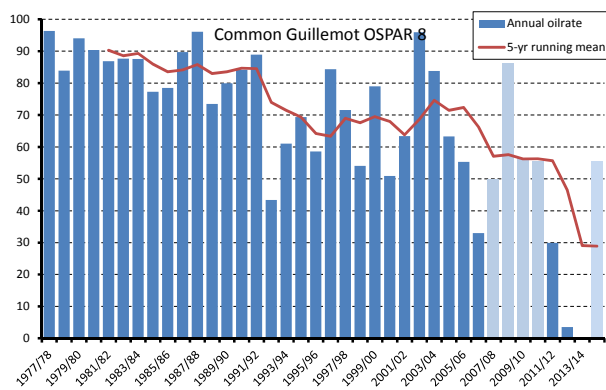


**Fig. 3.** Logit-transformed annual oil rates in Common Guillemots ( $n > 25$  complete carcasses) in The Netherlands (OSPAR areas 8, 9 and 10) along the North Sea beach and 5-year running (arithmetic) mean oil rates since the late 1977/78. A linear regression was calculated over the annual values (dashed line;  $P < 0.001$ ).

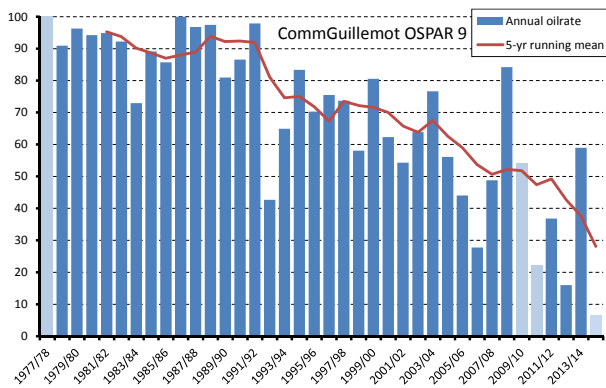


**Fig. 4.** Overall densities ( $n \text{ km}^{-1}$ ) in Common Guillemots in The Netherlands (OSPAR areas 8, 9 and 10) along the North Sea beach since winter 1977/78. An exponential trend line was calculated over the annual values (dashed line), suggesting a long-term decline, but with highly variable numbers.

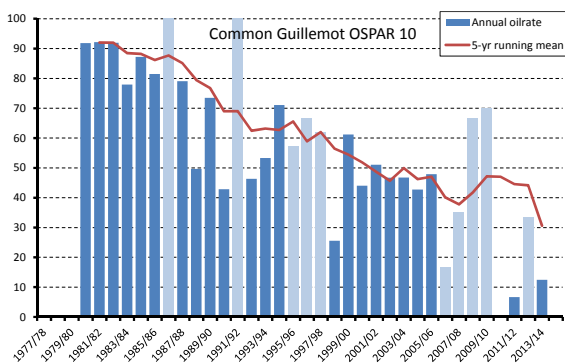
**Oil rates in Common Guillemots** - The annual oil rate in Common Guillemots along the North Sea coast declined steadily, and significantly since the late 1970s (**Fig. 2-3**). Along the North Sea coast of The Netherlands as a whole, in line with numerous earlier reports, a significant decline in oil rates can be demonstrated (**Fig. 3**). In winter 2014/15 the national oil rate arrived at 32.4% (n= 37). The exceptionally low value over 2012/13 (10.9%; n= 55) can be seen as an outlier. The five-year running (arithmetic) mean has arrived at  $31.7 \pm 12.7\%$  (**Appendix 2**). Declining oil rates were found in all three OSPAR regions covered by Dutch surveys (**Appendix 2**), but the sample size within each of these regions (that are in fact all contributions to international datasets to be analysed with combination with Belgian and German data) is too small to warrant a separate trend analysis. The densities of Common Guillemots found along the Dutch North Sea shore are plotted in **Fig. 4**, and these data show highly variable numbers between seasons (the results of wrecks, weather and oil spills), but also a long-term decline leading to very low densities in recent years. The low level of strandings was unforeseen in the 1980s and 1990s when the Oiled Guillemot Eco-QO was developed, but this is an issue affecting the robustness of recent data (as a result of a reduced sample size) in The Netherlands, just as it is in neighbouring countries.



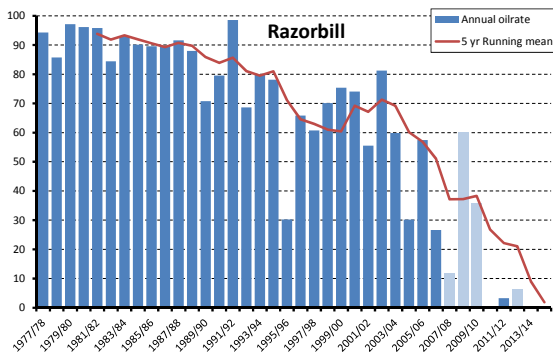
**Fig. 4.** Annual oil rates in Common Guillemots ( $n > 25$  complete carcasses) in OSPAR area 8 (**Eastern Southern Bight mainland coast Dutch contribution only**) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessments over 2007/08-2010/11 and 2014/15 (but not 2012/13-13/14!) is low due to low sample size (few corpses). No oiled birds in 2013/14, relatively many in 2014/15.



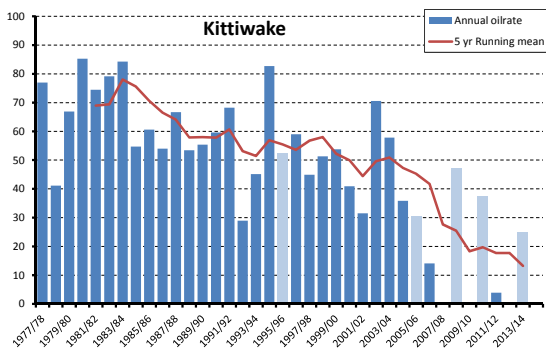
**Fig. 5.** Annual oil rates in Common Guillemots ( $n > 25$  complete carcasses) in OSPAR area 9 (Southern German Bight Dutch contribution only) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessment over 2009/10-2010/11 and 2014/15 is low due to low sample size (few corpses).



**Fig. 6.** Annual oil rates in Common Guillemots ( $n > 25$  complete carcasses) in OSPAR area 10 (Western Wadden Sea Dutch contribution only) and 5-year running (arithmetic) mean oil rates since the late 1970s. The quality of the assessments over many years (but not 2013/14) is low due to low sample size. Common Guillemots are an oceanic species.

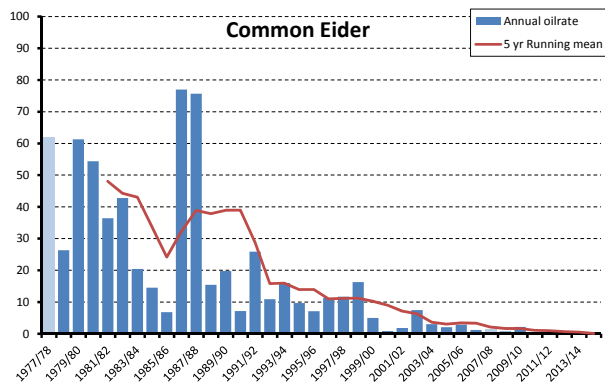


**Fig. 7.** Annual oil rates in Razorbills ( $n > 25$  complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 7 for the quality of values. Sample size in 2013/14-2014/15 (none oiled) were too low for an accurate estimate of oil rates. The five-year mean is therefore unrealistically low.

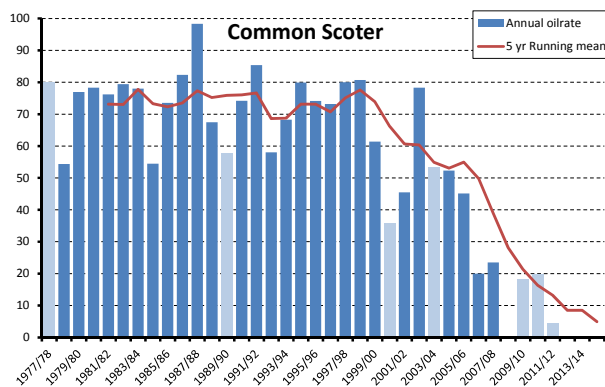


**Fig. 8.** Annual oil rates in Black-legged Kittiwakes ( $n > 25$  complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 8 for the quality of values. No reliable data for 2014/15 were collected (too few intact corpses were found).

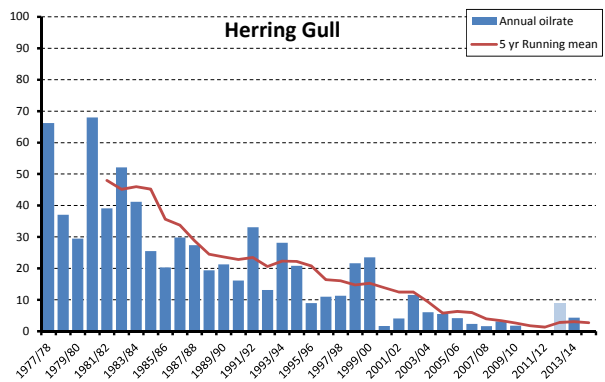




**Fig. 9.** Annual oil rates in Common Eiders ( $n > 25$  complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 9 for the quality of values.



**Fig. 10.** Annual oil rates in Common Scoters ( $n > 25$  complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 10 for the quality of values.



**Fig. 11.** Annual oil rates in Herring Gulls ( $n > 25$  complete carcasses) in The Netherlands and 5-year running (arithmetic) mean oil rates since the late 1970s. See Appendix 11 for the quality of values.

**Oil rates in other offshore seabirds** - The other offshore seabirds are characterised by similar trends (Figs 7-8), but the numbers washing ashore are smaller, also in the recent absence of food-related or storm-driven mass-mortalities and associated wrecks. The most recent wrecks occurred in winter 2011/12, resulting in reliable but also spectacularly low oil rates. It is this kind of mortality events that oil rates are artificially lowered and should be treated with caution.

**Oil rates in nearshore seabirds** - The long-term trends of the coastal species Common Eiders (Fig. 9) and Herring Gulls (Fig. 11) are even steeper declines. Oiled carcasses are currently rare,

even along the North Sea coast, indicating a more pronounced decline in oil rates than in offshore seabirds. Remarkably, the oil rates of the more gregarious Common Scoters (**Fig. 10**) did not decline, until rather recently. The decline coincided with a marked decline in overall numbers washing ashore, and although seawatchers have indicated that Common Scoters today are scarce in comparison with the 1970s-90s (Camphuysen & Van Dijk 1983, Platteeuw *et al.* 1994, [www.trektellen.nl](http://www.trektellen.nl)), high concentrations of birds have occurred that did not produce higher numbers of (oiled or unoiled) carcasses.

**Recent trends and long-term projection** - The long-term trends are evident declines in oil rates in all species. For Common Guillemots, the recent trend based on logit transformed oil rates over the most recent winters (1999/00 - 2014/15), for the Dutch North Sea coast as a whole, was significant ( $P < 0.02$ ;  $a = 0.56$ ,  $b = -0.06$ ,  $r^2 = 0.46$ ,  $rms = 0.12$ ,  $se\ b = 0.02$ ,  $t = -3.31$ ,  $n = 15$ ), leading to a projection of  $\sim$  logit -0.64, or 19% oiled birds for 2020, which is in accordance with the most recent targets

## Discussion and conclusion

Beached bird surveys are an essential part of both the Oiled-Guillemot EcoQO as well as for the plastic particle monitoring conducted by using Northern Fulmar carcasses around the North Sea (Van Franeker & SNS Fulmar Study Group 2013 and numerous other reports). In winter 2014/15, very few seabirds washed ashore, frustrating both projects, but the oil rates were again low signalling a major improvement in marine ecosystems for as far as chronic oil pollution is concerned (Fig. 1). The 5-year running (arithmetic) mean oil rate in Common Guillemots arrived at  $22.6 \pm 11.2\%$  (Fig. 2). The latest results (last decade) suggest an acceleration of the decline in oil rates. Following the most recent data, (1999/00-present), a projection for 2020 would arrive at a national oil rate for Common Guillemots of c. 19% (logit -0.64). Apart from some oiled Common Guillemots, no other oiled carcasses were reported in 2014/15.

Seabird densities in winter 2011/12 were so high that volunteers were easy to stimulate and readily set out (in numbers!) to search for dead birds. In 2012/13, 2013/14 and again in 2014/15, numbers of seabirds were so low, that many of them refrained from searching systematically. More opportunistic reports from [www.waarneming.nl](http://www.waarneming.nl), after screening for double counts and identification errors, were successfully used to enhance the sample size of stranded Common Guillemots. Fox predation, beach-clean-up operations by NGOs and the more and more frequent 'sand suppletions' are issues that hinder regular beached bird surveys in various ways. Foxes scavenge and remove corpses, so that intact material (fit for inspection for oil) rapidly turn into scavenged remains (no longer fit for the assessment of oiling). This problem is well known in

many countries, but relatively new for The Netherlands. The data are affected in a sense that fewer corpses are available for inspection, but the oil-rate (i.e. the value of interest) is not expected to be influenced by the removal and more rapid decay of carcasses. Sand suppletions make substantial sectors of coastline (at least temporarily) inaccessible and beach-washed carcasses may be covered under sand. Both factors hinder assessments of total numbers washing ashore (corpse counts), but are not expected to negatively affect the oil rate, the value desired by OSPAR for the oiled-seabird (Guillemot) ECOQo.

The Dutch data collected for OSPAR regions 8 and 9 must be seen as contributions to the data set. An international co-ordinator, 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. There is no doubt that similar trends will be revealed as presented in the current document for the Dutch area as a whole.

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## Appendix 1 Observer effort

*Kilometers surveyed in beached bird surveys in The Netherlands, winter 1977/78-2014/15. The data for the North Sea include surveys along the North Sea coast (combining Dutch contributions to OSPAR areas 8-9; see Methods). Total effort is the sum for all three contributions (OSPAR areas 8-10).*

	OSPAR 8	OSPAR 9	OSPAR 10	Totals
1977/78	356.0	40.5	7.0	403.5
1978/79	473.2	54.5	3.0	530.7
1979/80	594.7	49.6	3.0	647.3
1980/81	1492.9	154.1	302.0	1949.0
1981/82	1176.6	145.5	527.5	1849.6
1982/83	1846.0	205.0	748.8	2799.8
1983/84	1341.5	264.5	565.6	2171.6
1984/85	1133.3	133.5	424.0	1690.8
1985/86	1023.0	95.5	470.0	1588.5
1986/87	708.0	66.5	444.0	1218.5
1987/88	835.2	112.0	509.4	1456.6
1988/89	951.4	78.0	432.7	1462.1
1989/90	1062.8	122.5	290.5	1475.8
1990/91	1190.8	52.5	123.0	1366.3
1991/92	806.7	76.5	265.5	1148.7
1992/93	678.3	55.0	375.5	1108.8
1993/94	522.5	65.5	482.0	1070.0
1994/95	335.3	57.9	481.3	874.5
1995/96	482.2	86.0	328.0	896.2
1996/97	381.8	54.0	352.5	788.3
1997/98	377.8	95.7	408.0	881.5
1998/99	772.0	264.2	698.5	1734.6
1999/00	646.7	342.1	904.7	1893.5
2000/01	450.3	453.8	690.2	1594.3
2001/02	496.9	489.7	935.5	1922.0
2002/03	805.3	372.3	599.6	1777.2
2003/04	370.0	308.9	516.1	1195.0
2004/05	284.8	314.8	772.0	1371.6
2005/06	253.4	275.5	582.6	1111.5
2006/07	300.7	268.4	515.1	1084.1
2007/08	231.9	166.0	493.9	891.8
2008/09	238.9	232.0	361.2	832.1
2009/10	225.1	136.5	229.8	591.4
2010/11	276.9	119.8	141.0	537.7
2011/12	301.6	237.4	413.7	952.7
2012/13	218.8	68.7	153.3	440.8
2013/14	254.7	141.4	130.2	526.3
2014/15	237.8	101.0	119.4	458.2



## Appendix 2 Species found, winter 2014/15

Euring	Nederlandse naam	Scientific name	English name	n
0	Geen vogels gevonden	No birds found dead	No birds found dead	37
20	Roodkeelduiker	<i>Gavia stellata</i>	Red-throated Diver	7
30	Parelduiker	<i>Gavia arctica</i>	Black-throated Diver	1
90	Fuut	<i>Podiceps cristatus</i>	Great Crested Grebe	1
220	Noordse Stormvogel	<i>Fulmarus glacialis</i>	Northern Fulmar	5
550	Vaal Stormvogeltje	<i>Oceanodroma leucorhoa</i>	Leach's Storm-petrel	1
710	Jan van Gent	<i>Sula bassana</i>	Northern Gannet	5
720	Aalscholver	<i>Phalacrocorax carbo</i>	Great Cormorant	5
1220	Blauwe Reiger	<i>Ardea cinerea</i>	Grey Heron	1
1610	Grauwe Gans	<i>Anser anser</i>	Greylag Goose	3
1670	Brandgans	<i>Branta leucopsis</i>	Barnacle Goose	2
1680	Rotgans	<i>Branta bernicla</i>	Brent Goose	4
1730	Bergeend	<i>Tadorna tadorna</i>	Common Shelduck	23
1820	Krakeend	<i>Anas strepera</i>	Gadwall	2
1840	Wintertaling	<i>Anas crecca</i>	Eurasian Teal	1
1860	Wilde Eend	<i>Anas platyrhynchos</i>	Mallard	6
1890	Pijlstaart	<i>Anas acuta</i>	Northern Pintail	1
2060	Eidereend	<i>Somateria mollissima</i>	Common Eider	41
2130	Zwarte Zeeëend	<i>Melanitta nigra</i>	Black Scoter	10
4500	Scholekster	<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	13
4860	Zilverplevier	<i>Pluvialis squatarola</i>	Grey Plover	1
4930	Kievit	<i>Vanellus vanellus</i>	Northern Lapwing	1
4960	Kanoetstrandloper	<i>Calidris canutus</i>	Red Knot	2
5120	Bonte Strandloper	<i>Calidris alpina</i>	Dunlin	3
5290	Houtsnip	<i>Scolopax rusticola</i>	Eurasian Woodcock	2
5340	Rosse Grutto	<i>Limosa lapponica</i>	Bar-tailed Godwit	1
5410	Wulp	<i>Numenius arquata</i>	Eurasian Curlew	4
5610	Steenloper	<i>Arenaria interpres</i>	Ruddy Turnstone	1
5660	Middelste Jager	<i>Stercorarius pomarinus</i>	Pomarine Skua	2
5670	Kleine Jager	<i>Stercorarius parasiticus</i>	Arctic Skua	1
5690	Grote Jager	<i>Stercorarius skua</i>	Great Skua	3
5780	Dwergmeeuw	<i>Hydrocoloeus minutus</i>	Little Gull	1
5820	Kokmeeuw	<i>Chroicocephalus ridibundus</i>	Black-headed Gull	22
5900	Stormmeeuw	<i>Larus canus</i>	Mew Gull	11
5910	Kleine Mantelmeeuw	<i>Larus fuscus</i>	Lesser Black-backed Gull	6
5920	Zilvermeeuw	<i>Larus argentatus</i>	Herring Gull	35
6000	Grote Mantelmeeuw	<i>Larus marinus</i>	Great Black-backed Gull	15
6020	Drieteenmeeuw	<i>Rissa tridactyla</i>	Black-legged Kittiwake	3
6340	Zeekoet	<i>Uria aalge</i>	Common Guillemot	37
6345	Alk / Zeekoet	<i>Alca torda / Uria aalge</i>	Common Guillemot/Razorbill	1
6360	Alk	<i>Alca torda</i>	Razorbill	9

<b>Euring</b>	<b>Nederlandse naam</b>	<b>Scientific name</b>	<b>English name</b>	<b>n</b>
6470	Kleine Alk	<i>Alle alle</i>	<i>Little Auk</i>	2
6540	Papegaaiduiker	<i>Fratercula arctica</i>	<i>Atlantic Puffin</i>	2
6655	Postduif	<i>Columba 'domestica'</i>	<i>domestic pigeon</i>	2
6700	Houtduif	<i>Columba palumbus</i>	<i>Common Wood Pigeon</i>	1
11870	Merel	<i>Turdus merula</i>	<i>Common Blackbird</i>	1
11980	Kramsvogel	<i>Turdus pilaris</i>	<i>Fieldfare</i>	7
12010	Koperwiek	<i>Turdus iliacus</i>	<i>Redwing</i>	3
15820	Spreeuw	<i>Sturnus vulgaris</i>	<i>Common Starling</i>	2
23070	Griend	<i>Globicephala melaena</i>	<i>Long-finned Pilot Whale</i>	1
23510	Bruinvis	<i>Phocoena phocoena</i>	<i>Harbour Porpoise</i>	7
24320	Grijze Zeehond	<i>Halichoerus grypus</i>	<i>Grey Seal</i>	1
24330	Gewone Zeehond	<i>Phoca vitulina</i>	<i>Common Seal</i>	6

### Appendix 3 Common Guillemot *Uria aalge*

Oil rates of Common Guillemots in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

In all tables: Qual (Quality code) 01 = sufficiently large samples ( $\geq 25$ ), 00= (too) small samples

National Common Guillemots			Annual			Annual			
Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	102	105	1977/78	97.1	01		1977/78	1.53	
1978/79	120	139	1978/79	86.3	01		1978/79	0.80	
1979/80	168	185	1979/80	90.8	01		1979/80	0.99	
1980/81	3426	3759	1980/81	91.1	01		1980/81	1.01	
1981/82	890	997	1981/82	89.3	01	90.9	1981/82	0.92	1.00
1982/83	3994	4403	1982/83	90.7	01	89.7	1982/83	0.99	0.94
1983/84	2199	2472	1983/84	89.0	01	90.2	1983/84	0.91	0.96
1984/85	1138	1390	1984/85	81.9	01	88.4	1984/85	0.65	0.88
1985/86	1116	1357	1985/86	82.2	01	86.6	1985/86	0.67	0.81
1986/87	160	175	1986/87	91.4	01	87.0	1986/87	1.03	0.83
1987/88	1477	1562	1987/88	94.6	01	87.8	1987/88	1.24	0.86
1988/89	1231	1672	1988/89	73.6	01	84.7	1988/89	0.45	0.74
1989/90	1221	1540	1989/90	79.3	01	84.2	1989/90	0.58	0.73
1990/91	1733	2073	1990/91	83.6	01	84.5	1990/91	0.71	0.74
1991/92	720	799	1991/92	90.1	01	84.2	1991/92	0.96	0.73
1992/93	462	1107	1992/93	41.7	01	73.7	1992/93	-0.14	0.45
1993/94	508	855	1993/94	59.4	01	70.8	1993/94	0.17	0.39
1994/95	336	466	1994/95	72.1	01	69.4	1994/95	0.41	0.36
1995/96	107	179	1995/96	59.8	01	64.6	1995/96	0.17	0.26
1996/97	183	225	1996/97	81.3	01	62.9	1996/97	0.64	0.23
1997/98	334	481	1997/98	69.4	01	68.4	1997/98	0.36	0.34
1998/99	1183	2399	1998/99	49.3	01	66.4	1998/99	-0.01	0.30
1999/00	886	1163	1999/00	76.2	01	67.2	1999/00	0.50	0.31
2000/01	221	377	2000/01	58.6	01	67.0	2000/01	0.15	0.31
2001/02	472	811	2001/02	58.2	01	62.4	2001/02	0.14	0.22
2002/03	2151	2402	2002/03	89.6	01	66.4	2002/03	0.93	0.30
2003/04	305	427	2003/04	71.4	01	70.8	2003/04	0.40	0.38
2004/05	351	701	2004/05	50.1	01	65.6	2004/05	0.00	0.28
2005/06	156	288	2005/06	54.2	01	64.7	2005/06	0.07	0.26
2006/07	179	618	2006/07	29.0	01	58.8	2006/07	-0.39	0.16
2007/08	38	82	2007/08	46.3	01	50.2	2007/08	-0.06	0.00
2008/09	79	101	2008/09	78.2	01	51.6	2008/09	0.56	0.03
2009/10	35	63	2009/10	55.6	01	52.6	2009/10	0.10	0.05
2010/11	15	34	2010/11	44.1	00	50.6	2010/11		0.01
2011/12	69	238	2011/12	29.0	01	50.6	2011/12	-0.39	0.01
2012/13	7	58	2012/13	12.1	01	43.8	2012/13	-0.86	-0.11
2013/14	25	75	2013/14	33.3	01	34.8	2013/14	-0.30	-0.27
2014/15	12	37	2014/15	32.4	01	30.2	2014/15	-0.32	-0.36

<b>OSPAR 8 COMMON GUILLEMOTS</b>									
Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	79	82	1977/78	96.3	01		1977/78	1.42	
1978/79	78	93	1978/79	83.9	01		1978/79	0.72	
1979/80	111	118	1979/80	94.1	01		1979/80	1.20	
1980/81	2782	3078	1980/81	90.4	01		1980/81	0.97	
1981/82	589	678	1981/82	86.9	01	90.3	1981/82	0.82	0.97
1982/83	2205	2515	1982/83	87.7	01	88.6	1982/83	0.85	0.89
1983/84	1444	1649	1983/84	87.6	01	89.3	1983/84	0.85	0.92
1984/85	667	863	1984/85	77.3	01	86.0	1984/85	0.53	0.79
1985/86	634	808	1985/86	78.5	01	83.6	1985/86	0.56	0.71
1986/87	96	107	1986/87	89.7	01	84.1	1986/87	0.94	0.72
1987/88	1138	1184	1987/88	96.1	01	85.8	1987/88	1.39	0.78
1988/89	918	1249	1988/89	73.5	01	83.0	1988/89	0.44	0.69
1989/90	1036	1296	1989/90	79.9	01	83.5	1989/90	0.60	0.71
1990/91	1593	1892	1990/91	84.2	01	84.7	1990/91	0.73	0.74
1991/92	466	524	1991/92	88.9	01	84.5	1991/92	0.90	0.74
1992/93	356	821	1992/93	43.4	01	74.0	1992/93	-0.12	0.45
1993/94	343	562	1993/94	61.0	01	71.5	1993/94	0.19	0.40
1994/95	172	248	1994/95	69.4	01	69.4	1994/95	0.35	0.36
1995/96	65	111	1995/96	58.6	01	64.2	1995/96	0.15	0.25
1996/97	124	147	1996/97	84.4	01	63.3	1996/97	0.73	0.24
1997/98	219	306	1997/98	71.6	01	69.0	1997/98	0.40	0.35
1998/99	704	1302	1998/99	54.1	01	67.6	1998/99	0.07	0.32
1999/00	546	691	1999/00	79.0	01	69.5	1999/00	0.58	0.36
2000/01	58	114	2000/01	50.9	01	68.0	2000/01	0.02	0.33
2001/02	220	347	2001/02	63.4	01	63.8	2001/02	0.24	0.25
2002/03	1930	2011	2002/03	96.0	01	68.7	2002/03	1.38	0.34
2003/04	119	142	2003/04	83.8	01	74.6	2003/04	0.71	0.47
2004/05	176	278	2004/05	63.3	01	71.5	2004/05	0.24	0.40
2005/06	47	85	2005/06	55.3	01	72.4	2005/06	0.09	0.42
2006/07	126	382	2006/07	33.0	01	66.3	2006/07	-0.31	0.29
2007/08	9	18	2007/08	50.0	00	57.1	2007/08		
2008/09	19	22	2008/09	86.4	00	57.6	2008/09		
2009/10	13	23	2009/10	56.5	00	56.2	2009/10		
2010/11	5	9	2010/11	55.6	00	56.3	2010/11		
2011/12	32	107	2011/12	29.9	01	55.7	2011/12	-0.37	0.10
2012/13	1	28	2012/13	3.6	01	46.4	2012/13	-1.43	-0.06
2013/14		16	2013/14	0.0	00	29.1	2013/14		
2014/15	10	18	2014/15	55.6	00	28.9	2014/15		

OSPAR 9 COMMON GUILLEMOTS									
Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	23	23	1977/78	100.0	00		1977/78		
1978/79	40	44	1978/79	90.9	01		1978/79	1.00	
1979/80	26	27	1979/80	96.3	01		1979/80	1.41	
1980/81	212	225	1980/81	94.2	01		1980/81	1.21	
1981/82	111	117	1981/82	94.9	01	95.3	1981/82	1.27	1.30
1982/83	332	360	1982/83	92.2	01	93.7	1982/83	1.07	1.17
1983/84	70	96	1983/84	72.9	01	90.1	1983/84	0.43	0.96
1984/85	310	348	1984/85	89.1	01	88.7	1984/85	0.91	0.89
1985/86	114	133	1985/86	85.7	01	87.0	1985/86	0.78	0.82
1986/87	21	21	1986/87	100.0	01	88.0	1986/87	n.d.	0.86
1987/88	151	156	1987/88	96.8	01	88.9	1987/88	1.48	0.90
1988/89	114	117	1988/89	97.4	01	93.8	1988/89	1.58	1.18
1989/90	102	126	1989/90	81.0	01	92.2	1989/90	0.63	1.07
1990/91	122	141	1990/91	86.5	01	92.3	1990/91	0.81	1.08
1991/92	231	236	1991/92	97.9	01	91.9	1991/92	1.66	1.06
1992/93	29	68	1992/93	42.6	01	81.1	1992/93	-0.13	0.63
1993/94	74	114	1993/94	64.9	01	74.6	1993/94	0.27	0.47
1994/95	65	78	1994/95	83.3	01	75.1	1994/95	0.70	0.48
1995/96	26	37	1995/96	70.3	01	71.8	1995/96	0.37	0.41
1996/97	37	49	1996/97	75.5	01	67.3	1996/97	0.49	0.31
1997/98	84	114	1997/98	73.7	01	73.5	1997/98	0.45	0.44
1998/99	299	515	1998/99	58.1	01	72.2	1998/99	0.14	0.41
1999/00	223	277	1999/00	80.5	01	71.6	1999/00	0.62	0.40
2000/01	96	154	2000/01	62.3	01	70.0	2000/01	0.22	0.37
2001/02	165	304	2001/02	54.3	01	65.8	2001/02	0.07	0.28
2002/03	136	213	2002/03	63.8	01	63.8	2002/03	0.25	0.25
2003/04	128	167	2003/04	76.6	01	67.5	2003/04	0.52	0.32
2004/05	87	155	2004/05	56.1	01	62.6	2004/05	0.11	0.22
2005/06	37	84	2005/06	44.0	01	59.0	2005/06	-0.10	0.16
2006/07	38	137	2006/07	27.7	01	53.7	2006/07	-0.42	0.06
2007/08	20	41	2007/08	48.8	01	50.7	2007/08	-0.02	0.01
2008/09	48	57	2008/09	84.2	01	52.2	2008/09	0.73	0.04
2009/10	13	24	2009/10	54.2	00	51.8	2009/10		
2010/11	2	9	2010/11	22.2	00	47.4	2010/11		
2011/12	32	87	2011/12	36.8	01	49.2	2011/12	-0.24	-0.01
2012/13	4	25	2012/13	16.0	01	42.7	2012/13	-0.72	-0.13
2013/14	23	39	2013/14	59.0	01	37.6	2013/14	0.16	-0.22
2014/15	1	15	2014/15	6.7	00	28.1	2014/15		



OSPAR 10 COMMON GUILLEMOTS									
Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78			1977/78						
1978/79			1978/79						
1979/80			1979/80						
1980/81	214	233	1980/81	91.8	01		1980/81	1.05	
1981/82	106	115	1981/82	92.2	01	92.0	1981/82	1.07	1.06
1982/83	399	434	1982/83	91.9	01	92.0	1982/83	1.06	1.06
1983/84	127	163	1983/84	77.9	01	88.5	1983/84	0.55	0.88
1984/85	41	47	1984/85	87.2	01	88.2	1984/85	0.83	0.87
1985/86	132	162	1985/86	81.5	01	86.1	1985/86	0.64	0.79
1986/87	15	17	1986/87	100.0	00	87.7	1986/87		
1987/88	68	86	1987/88	79.1	01	85.1	1987/88	0.58	0.76
1988/89	66	133	1988/89	49.6	01	79.5	1988/89	-0.01	0.59
1989/90	61	83	1989/90	73.5	01	76.7	1989/90	0.44	0.52
1990/91	15	35	1990/91	42.9	01	69.0	1990/91	-0.12	0.35
1991/92	6	6	1991/92	100.0	00	69.0	1991/92		
1992/93	63	136	1992/93	46.3	01	62.5	1992/93	-0.06	0.22
1993/94	57	107	1993/94	53.3	01	63.2	1993/94	0.06	0.23
1994/95	59	83	1994/95	71.1	01	62.7	1994/95	0.39	0.23
1995/96	4	7	1995/96	57.1	00	65.6	1995/96		
1996/97	4	6	1996/97	66.7	00	58.9	1996/97		
1997/98	13	21	1997/98	61.9	00	62.0	1997/98		
1998/99	107	419	1998/99	25.5	01	56.5	1998/99	-0.46	0.11
1999/00	93	152	1999/00	61.2	01	54.5	1999/00	0.20	0.08
2000/01	22	50	2000/01	44.0	01	51.9	2000/01	-0.10	0.03
2001/02	71	139	2001/02	51.1	01	48.7	2001/02	0.02	-0.02
2002/03	36	77	2002/03	46.8	01	45.7	2002/03	-0.06	-0.07
2003/04	29	62	2003/04	46.8	01	50.0	2003/04	-0.06	0.00
2004/05	44	103	2004/05	42.7	01	46.3	2004/05	-0.13	-0.07
2005/06	34	71	2005/06	47.9	01	47.0	2005/06	-0.04	-0.05
2006/07	13	79	2006/07	16.5	01	40.1	2006/07	-0.71	-0.17
2007/08	7	20	2007/08	35.0	00	37.8	2007/08		
2008/09	6	9	2008/09	66.7	00	41.7	2008/09		
2009/10	7	10	2009/10	70.0	00	47.2	2009/10		
2010/11		0	2010/11		00	47.0	2010/11		
2011/12	2	30	2011/12	6.7	01	44.6	2011/12	-1.15	-0.09
2012/13	1	3	2012/13	33.3	00	44.2	2012/13		
2013/14	2	16	2013/14	12.5	00	30.6	2013/14		
2014/15		0	2014/15		00		2014/15		

## Appendix 7 Razorbill *Alca torda*

Oil rates of Razorbills in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast.

Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	33	35	1977/78	94.3	01		1977/78	1.22	
1978/79	36	42	1978/79	85.7	01		1978/79	0.78	
1979/80	34	35	1979/80	97.1	01		1979/80	1.53	
1980/81	551	573	1980/81	96.2	01		1980/81	1.40	
1981/82	114	119	1981/82	95.8	01	93.8	1981/82	1.36	1.18
1982/83	1370	1623	1982/83	84.4	01	91.8	1982/83	0.73	1.05
1983/84	572	615	1983/84	93.0	01	93.3	1983/84	1.12	1.14
1984/85	91	101	1984/85	90.1	01	91.9	1984/85	0.96	1.05
1985/86	137	153	1985/86	89.5	01	90.6	1985/86	0.93	0.98
1986/87	17	19	1986/87	89.5	01	89.3	1986/87	0.93	0.92
1987/88	228	249	1987/88	91.6	01	90.7	1987/88	1.04	0.99
1988/89	168	191	1988/89	88.0	01	89.7	1988/89	0.86	0.94
1989/90	555	784	1989/90	70.8	01	85.9	1989/90	0.38	0.78
1990/91	167	210	1990/91	79.5	01	83.9	1990/91	0.59	0.72
1991/92	68	69	1991/92	98.6	01	85.7	1991/92	1.83	0.78
1992/93	46	67	1992/93	68.7	01	81.1	1992/93	0.34	0.63
1993/94	52	65	1993/94	80.0	01	79.5	1993/94	0.60	0.59
1994/95	75	96	1994/95	78.1	01	81.0	1994/95	0.55	0.63
1995/96	49	162	1995/96	30.2	01	71.1	1995/96	-0.36	0.39
1996/97	27	41	1996/97	65.9	01	64.6	1996/97	0.29	0.26
1997/98	68	112	1997/98	60.7	01	63.0	1997/98	0.19	0.23
1998/99	110	157	1998/99	70.1	01	61.0	1998/99	0.37	0.19
1999/00	281	373	1999/00	75.3	01	60.4	1999/00	0.48	0.18
2000/01	20	27	2000/01	74.1	01	69.2	2000/01	0.46	0.35
2001/02	75	135	2001/02	55.6	01	67.1	2001/02	0.10	0.31
2002/03	799	984	2002/03	81.2	01	71.2	2002/03	0.64	0.39
2003/04	67	112	2003/04	59.8	01	69.2	2003/04	0.17	0.35
2004/05	68	225	2004/05	30.2	01	60.2	2004/05	-0.36	0.18
2005/06	50	87	2005/06	57.5	01	56.9	2005/06	0.13	0.12
2006/07	58	218	2006/07	26.6	01	51.1	2006/07	-0.44	0.02
2007/08	2	17	2007/08	11.8	01	37.2	2007/08		-0.23
2008/09	6	10	2008/09	60.0	01	37.2	2008/09		
2009/10	5	14	2009/10	35.7	01	38.3	2009/10		
2010/11		5	2010/11	0.0	00	26.8	2010/11		
2011/12	12	364	2011/12	3.3	01	22.2	2011/12	-1.47	
2012/13	1	16	2012/13	6.3	01	21.1	2012/13		
2013/14		19	2013/14	0.0	01	9.1	2013/14		
2014/15		6	2014/15	0.0	00	1.9	2014/15		

## Appendix 8 Black-legged Kittiwakes *Rissa tridactyla*

Oil rates of Black-legged Kittiwakes in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast.

Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	87	113	1977/78	77.0	01		1977/78	0.52	
1978/79	35	85	1978/79	41.2	01		1978/79	-0.15	
1979/80	95	142	1979/80	66.9	01		1979/80	0.31	
1980/81	1317	1545	1980/81	85.2	01		1980/81	0.76	
1981/82	140	188	1981/82	74.5	01	69.0	1981/82	0.46	0.35
1982/83	884	1117	1982/83	79.1	01	69.4	1982/83	0.58	0.36
1983/84	1603	1902	1983/84	84.3	01	78.0	1983/84	0.73	0.55
1984/85	151	276	1984/85	54.7	01	75.6	1984/85	0.08	0.49
1985/86	171	282	1985/86	60.6	01	70.6	1985/86	0.19	0.38
1986/87	61	113	1986/87	54.0	01	66.6	1986/87	0.07	0.30
1987/88	102	153	1987/88	66.7	01	64.1	1987/88	0.30	0.25
1988/89	70	131	1988/89	53.4	01	57.9	1988/89	0.06	0.14
1989/90	87	157	1989/90	55.4	01	58.0	1989/90	0.09	0.14
1990/91	90	151	1990/91	59.6	01	57.8	1990/91	0.17	0.14
1991/92	43	63	1991/92	68.3	01	60.7	1991/92	0.33	0.19
1992/93	66	228	1992/93	28.9	01	53.1	1992/93	-0.39	0.05
1993/94	28	62	1993/94	45.2	01	51.5	1993/94	-0.08	0.03
1994/95	43	52	1994/95	82.7	01	56.9	1994/95	0.68	0.12
1995/96	12	23	1995/96	52.2	01	55.4	1995/96		0.09
1996/97	23	39	1996/97	59.0	01	53.6	1996/97	0.16	0.06
1997/98	62	138	1997/98	44.9	01	56.8	1997/98	-0.09	0.12
1998/99	97	189	1998/99	51.3	01	58.0	1998/99	0.02	0.14
1999/00	129	240	1999/00	53.8	01	52.2	1999/00	0.07	0.04
2000/01	18	44	2000/01	40.9	01	50.0	2000/01	-0.16	0.00
2001/02	68	216	2001/02	31.5	01	44.5	2001/02	-0.34	-0.10
2002/03	96	136	2002/03	70.6	01	49.6	2002/03	0.38	-0.01
2003/04	37	64	2003/04	57.8	01	50.9	2003/04	0.14	0.02
2004/05	33	92	2004/05	35.9	01	47.3	2004/05	-0.25	-0.05
2005/06	7	23	2005/06	30.4	00	45.2	2005/06	-0.36	-0.08
2006/07	10	71	2006/07	14.1	01	41.8	2006/07	-0.79	-0.14
2007/08		11	2007/08	0.0	00	27.6	2007/08		-0.42
2008/09	8	17	2008/09	47.1	00	25.5	2008/09		
2009/10		14	2009/10	0.0	00	18.3	2009/10		
2010/11	3	8	2010/11	37.5	00	19.7	2010/11		
2011/12	10	257	2011/12	3.9	01	17.7	2011/12	-1.39	
2012/13		26	2012/13	0.0	01	17.7	2012/13		
2013/14	1	4	2013/14	25.0	01	13.3	2013/14	-0.48	
2014/15			2014/15		00		2014/15		

## Appendix 9 Common Eiders *Somateria mollissima*

Oil rates of Common Eiders in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast.

Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	13	21	1977/78	61.9	00		1977/78		
1978/79	10	38	1978/79	26.3	01		1978/79	-0.45	
1979/80	19	31	1979/80	61.3	01		1979/80	0.20	
1980/81	56	103	1980/81	54.4	01		1980/81	0.08	
1981/82	63	173	1981/82	36.4	01	48.1	1981/82	-0.24	-0.03
1982/83	196	458	1982/83	42.8	01	44.2	1982/83	-0.13	-0.10
1983/84	98	479	1983/84	20.5	01	43.1	1983/84	-0.59	-0.12
1984/85	110	756	1984/85	14.6	01	33.7	1984/85	-0.77	-0.29
1985/86	16	236	1985/86	6.8	01	24.2	1985/86	-1.14	-0.50
1986/87	281	365	1986/87	77.0	01	32.3	1986/87	0.52	-0.32
1987/88	658	870	1987/88	75.6	01	38.9	1987/88	0.49	-0.20
1988/89	91	590	1988/89	15.4	01	37.9	1988/89	-0.74	-0.21
1989/90	52	263	1989/90	19.8	01	38.9	1989/90	-0.61	-0.20
1990/91	54	757	1990/91	7.1	01	39.0	1990/91	-1.11	-0.19
1991/92	138	533	1991/92	25.9	01	28.8	1991/92	-0.46	-0.39
1992/93	56	513	1992/93	10.9	01	15.8	1992/93	-0.91	-0.73
1993/94	25	156	1993/94	16.0	01	15.9	1993/94	-0.72	-0.72
1994/95	57	588	1994/95	9.7	01	13.9	1994/95	-0.97	-0.79
1995/96	24	337	1995/96	7.1	01	13.9	1995/96	-1.12	-0.79
1996/97	33	293	1996/97	11.3	01	11.0	1996/97	-0.90	-0.91
1997/98	19	162	1997/98	11.7	01	11.2	1997/98	-0.88	-0.90
1998/99	37	227	1998/99	16.3	01	11.2	1998/99	-0.71	-0.90
1999/00	340	6860	1999/00	5.0	01	10.3	1999/00	-1.28	-0.94
2000/01	12	1344	2000/01	0.9	01	9.0	2000/01	-2.05	-1.00
2001/02	65	3557	2001/02	1.8	01	7.1	2001/02	-1.73	-1.11
2002/03	54	722	2002/03	7.5	01	6.3	2002/03	-1.09	-1.17
2003/04	8	262	2003/04	3.1	01	3.6	2003/04	-1.50	-1.42
2004/05	12	584	2004/05	2.1	01	3.1	2004/05	-1.68	-1.50
2005/06	10	342	2005/06	2.9	01	3.5	2005/06	-1.52	-1.44
2006/07	2	165	2006/07	1.2	01	3.3	2006/07	-1.91	-1.46
2007/08	1	74	2007/08	1.4	00	2.1	2007/08		-1.66
2008/09	1	130	2008/09	0.8	01	1.7	2008/09	-2.11	-1.77
2009/10	2	92	2009/10	2.2	01	1.7	2009/10	-1.65	-1.77
2010/11		28	2010/11	0.0	00	1.1	2010/11		
2011/12	1	169	2011/12	0.6	01	1.0	2011/12	-2.23	
2012/13		10	2012/13	0.0	00	0.7	2012/13		
2013/14		15	2013/14	0.0	00	0.6	2013/14		
2014/15		17	2014/15	0.0	00	0.1	2014/15		

## Appendix 10 Common Scoters *Melanitta nigra*

Oil rates of Common Scoters in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast.

Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	8	10	1977/78	80.0	00		1977/78	0.60	
1978/79	144	265	1978/79	54.3	01		1978/79	0.08	
1979/80	30	39	1979/80	76.9	01		1979/80	0.52	
1980/81	65	83	1980/81	78.3	01		1980/81	0.56	
1981/82	160	210	1981/82	76.2	01	73.2	1981/82	0.51	0.44
1982/83	154	194	1982/83	79.4	01	73.0	1982/83	0.59	0.43
1983/84	110	141	1983/84	78.0	01	77.8	1983/84	0.55	0.54
1984/85	98	180	1984/85	54.4	01	73.3	1984/85	0.08	0.44
1985/86	175	238	1985/86	73.5	01	72.3	1985/86	0.44	0.42
1986/87	121	147	1986/87	82.3	01	73.5	1986/87	0.67	0.44
1987/88	1571	1598	1987/88	98.3	01	77.3	1987/88	1.76	0.53
1988/89	56	83	1988/89	67.5	01	75.2	1988/89	0.32	0.48
1989/90	11	19	1989/90	57.9	00	75.9	1989/90	0.14	0.50
1990/91	112	151	1990/91	74.2	01	76.0	1990/91	0.46	0.50
1991/92	70	82	1991/92	85.4	01	76.6	1991/92	0.77	0.52
1992/93	83	143	1992/93	58.0	01	68.6	1992/93	0.14	0.34
1993/94	71	104	1993/94	68.3	01	68.7	1993/94	0.33	0.34
1994/95	155	194	1994/95	79.9	01	73.1	1994/95	0.60	0.44
1995/96	103	139	1995/96	74.1	01	73.1	1995/96	0.46	0.43
1996/97	71	97	1996/97	73.2	01	70.7	1996/97	0.44	0.38
1997/98	24	30	1997/98	80.0	01	75.1	1997/98	0.60	0.48
1998/99	197	244	1998/99	80.7	01	77.6	1998/99	0.62	0.54
1999/00	70	114	1999/00	61.4	01	73.9	1999/00	0.20	0.45
2000/01	10	28	2000/01	35.7	00	66.2	2000/01	-0.26	0.29
2001/02	81	178	2001/02	45.5	01	60.7	2001/02	-0.08	0.19
2002/03	101	129	2002/03	78.3	01	60.3	2002/03	0.56	0.18
2003/04	15	28	2003/04	53.6	00	54.9	2003/04	0.06	0.09
2004/05	23	44	2004/05	52.3	01	53.1	2004/05	0.04	0.05
2005/06	14	31	2005/06	45.2	00	55.0	2005/06	-0.08	0.09
2006/07	2	10	2006/07	20.0	00	49.9	2006/07		
2007/08	4	17	2007/08	23.5	00	38.9	2007/08		
2008/09		4	2008/09	0.0	00	28.2	2008/09		
2009/10	2	11	2009/10	18.2	00	21.4	2009/10		
2010/11	1	5	2010/11	20.0	00	16.3	2010/11		
2011/12	1	22	2011/12	4.5	00	13.3	2011/12		
2012/13		6	2012/13	0.0	00	8.5	2012/13		
2013/14		9	2013/14	0.0	00	8.5	2013/14		
2014/15		5	2014/15	0.0		4.9	2014/15		

## Appendix 11 Herring Gull *Larus argentatus*

Oil rates of Herring Gulls in The Netherlands, winter 1977/78-2013/14. The National survey combines all surveys along the North Sea coast (Dutch contributions to OSPAR 8 and 9).

Winter	nOiled	nTotal		Oilrate %	Qual	5-yr mean		Logit oil	5-yr mean
1977/78	49	74	1977/78	66.2	01		1977/78	0.29	
1978/79	83	224	1978/79	37.1	01		1978/79	-0.23	
1979/80	43	146	1979/80	29.5	01		1979/80	-0.38	
1980/81	291	428	1980/81	68.0	01		1980/81	0.33	
1981/82	165	422	1981/82	39.1	01	48.0	1981/82	-0.19	-0.04
1982/83	232	445	1982/83	52.1	01	45.1	1982/83	0.04	-0.08
1983/84	265	644	1983/84	41.1	01	46.0	1983/84	-0.16	-0.07
1984/85	107	420	1984/85	25.5	01	45.2	1984/85	-0.47	-0.08
1985/86	67	330	1985/86	20.3	01	35.6	1985/86	-0.59	-0.26
1986/87	65	218	1986/87	29.8	01	33.8	1986/87	-0.37	-0.29
1987/88	68	248	1987/88	27.4	01	28.8	1987/88	-0.42	-0.39
1988/89	63	325	1988/89	19.4	01	24.5	1988/89	-0.62	-0.49
1989/90	62	291	1989/90	21.3	01	23.6	1989/90	-0.57	-0.51
1990/91	30	186	1990/91	16.1	01	22.8	1990/91	-0.72	-0.53
1991/92	41	124	1991/92	33.1	01	23.5	1991/92	-0.31	-0.51
1992/93	24	183	1992/93	13.1	01	20.6	1992/93	-0.82	-0.59
1993/94	36	128	1993/94	28.1	01	22.3	1993/94	-0.41	-0.54
1994/95	31	149	1994/95	20.8	01	22.2	1994/95	-0.58	-0.54
1995/96	14	156	1995/96	9.0	01	20.8	1995/96	-1.01	-0.58
1996/97	12	109	1996/97	11.0	01	16.4	1996/97	-0.91	-0.71
1997/98	13	115	1997/98	11.3	01	16.0	1997/98	-0.89	-0.72
1998/99	37	171	1998/99	21.6	01	14.7	1998/99	-0.56	-0.76
1999/00	40	170	1999/00	23.5	01	15.3	1999/00	-0.51	-0.74
2000/01	3	180	2000/01	1.7	01	13.8	2000/01	-1.77	-0.79
2001/02	11	268	2001/02	4.1	01	12.4	2001/02	-1.37	-0.85
2002/03	25	217	2002/03	11.5	01	12.5	2002/03	-0.89	-0.85
2003/04	7	115	2003/04	6.1	01	9.4	2003/04	-1.19	-0.98
2004/05	8	145	2004/05	5.5	01	5.8	2004/05	-1.23	-1.21
2005/06	6	143	2005/06	4.2	01	6.3	2005/06	-1.36	-1.17
2006/07	2	84	2006/07	2.4	01	5.9	2006/07	-1.61	-1.20
2007/08	1	61	2007/08	1.6	01	4.0	2007/08		-1.38
2008/09	3	95	2008/09	3.2	01	3.4	2008/09	-1.49	-1.46
2009/10	1	57	2009/10	1.8	01	2.6	2009/10		-1.57
2010/11		59	2010/11	0.0	00	1.8	2010/11		-1.74
2011/12		83	2011/12	0.0	01	1.3	2011/12	n.d.	-1.88
2012/13	2	22	2012/13	9.1	01	2.8	2012/13		-1.54
2013/14	1	23	2013/14	4.3	01	3.0	2013/14	-1.34	-1.50
2014/15		25	2014/15	0.0	01	2.7	2014/15	n.d.	



Het NIOZ Koninklijk Nederlands Instituut voor Onderzoek der Zee is een instituut van de Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), met vestigingen op Texel en in Yerseke.

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NIOZ Rapport 2015-4

Front cover:

Selection of photos of stranded Common Guillemots from [www.waarneming.nl](http://www.waarneming.nl) for the period 1 Nov 2014-30 April 2015. None of the guillemots depicted are oiled.

Large photo stranded Common Guillemot courtesy Jan Andries van Franeker

De missie van het NIOZ is het verkrijgen en verspreiden van wetenschappelijke kennis van zeeën en oceanen voor een beter begrip en een duurzaam beheer van onze planeet, het beheren van de nationale faciliteiten voor zeeonderzoek en het ondersteunen van marien onderzoek en onderwijs in Nederland en in Europa.

