

WADDEN SEA ECOSYSTEM No. 25

Quality Status Report 2009
Thematic Report No. 5.3

Oil Pollution and Seabirds

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2009
Common Wadden Sea Secretariat
Trilateral Monitoring and Assessment Group

Colophon

Publisher

Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany;
Trilateral Monitoring and Assessment Group (TMAG).

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Language support

Seabury Salmon

Lay-out and technical editing

Common Wadden Sea Secretariat

Graphic support

Gerold Lüerßen

Published

2009

ISSN 0946-896X

This publication should be cited as:

Kees (C.J.) Camphuysen, M. S. Dieckhoff, D. M. Fleet & K. Laursen, 2009. Oil Pollution and Seabirds. Thematic Report No. 5.3. In: Marencic, H. & Vlas, J. de (Eds), 2009. Quality Status Report 2009. Wadden-Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.

5.3 Oil Pollution in Seabirds

5.3.1 Introduction

Oiled seabirds washing ashore, dead or alive, have had a signalling function since the very early days of oil pollution at sea. The number of dead oiled seabirds on the coastline is not in itself a reliable parameter for monitoring changes in oil pollution at sea. The percentage of birds that is oil contaminated among the birds found washed ashore (called the 'oil rate'), however, has proven to be a useful monitoring tool (Camphuysen, 1999, Camphuysen and Heubeck, 2001). Differences in oil rates between sea areas have clearly indicated that chronic oil pollution was more intense around shipping lanes than elsewhere (Camphuysen, 2005, Camphuysen *et al.* 2005, Camphuysen, 2007). In recent years, beached bird survey techniques have been further refined and species-specific oil-rates were introduced as the main instrument to measure trends in chronic oil pollution at sea (Camphuysen and Franeker, 1992, Camphuysen & Heubeck, 2001).

5.3.1.1 Ecological importance

Chronic oil pollution is a constant threat to seabirds and other marine life. Oiled seabirds are the most visible and obvious casualties resulting from oil spills, but the sensitivity to oil of other marine organisms and coastal habitats is enormous (Baker, 1983; Bergman, 1985; Kingston, 1992). This is particularly true for soft-sediment environments, such as the Wadden Sea, and attempts to minimize oil pollution in this area were initiated long ago. However, the most important sources of chronic oil pollution in terms of casualties among seabirds are typically situated offshore, such as shipping and offshore oil and gas exploration (Dahlman *et al.*, 1994). In the 1980s and 1990s, tens of thousands of seabirds are known to wash ashore oiled each winter in the southern North Sea alone (Camphuysen, 1989), but as yet it has been difficult to demonstrate effects in terms of major population declines. There are various explanations for this, one of which is the lack of adequate data (age composition of casualties and information on breeding origin; Heubeck *et al.*, 2003), but of greater significance is probably the overall success of seabirds due to, for example, shifts in prey availability due to the overfishing of predatory fish (Camphuysen and Garthe, 2000). Oil rates have declined considerably in recent years (2004 QSR), and the estimates of total numbers washing ashore should be lower than estimated previously.

5.3.1.2 Conclusions of the 2004 QSR

The results of beached bird surveys in the Wadden Sea area and its approaches indicated that oil rates have declined significantly over the last decades. The decline is most prominent in the Wadden Sea itself, whereas oil rates of birds found along North Sea shores (including the North Sea side of the Wadden Sea islands) are consistently higher than those in the Wadden Sea. Pelagic seabirds, notably common guillemots, still have relatively high oil rates and the recent designation of North West European waters as a Special Area under MARPOL Annex I (enforced in 1999) has not yet led to a drastic further decline in oil contamination levels on beached birds. Data from the German North Sea coast suggests further declines after 1999, but recent observations in The Netherlands (winter 2002/03, and winter 2003/04) suggest a reversed trend, with very high oil rates in pelagic seabirds and repeated strandings of oil slicks on beaches (NZG/NSO unpubl. material). This reversal can only partly be attributed to some unfortunate recent oil incidents, such as the sinking of the Tricolor and the Assie Eurolink in December 2002. For most inshore species, as exemplified by shelduck and herring gull, recent oil rates are generally much lower than historic levels within the Wadden Sea. It was considered too early, to assess effects of the designation of the PSSA Wadden Sea in 2002. Longer data sets are necessary to find correlations to the measures taken on the different levels to reduce oil pollution in the area concerned.

5.3.2 Policy

5.3.2.1 Trilateral policies

Shipping activities are a continuous source of contamination of the marine environment with oil, garbage and hazardous substances (de Jong *et al.*, 1999). Information on temporal changes and spatial differences in the oil pollution of the marine environment is being provided by Beached Bird Surveys carried out according to standardized methods and on a long-term basis. Trilateral policies for the reduction of pollution from ships were agreed at the Ministerial Conferences in Stade 1997 (Trilateral policy and management, §2.1.3-5) and in Esbjerg 2001 (Esbjerg Declaration: shore reception facilities §54-56, impacts of shipping §57-62, PSSA Wadden Sea §63-66). The aim of all these measures was the elimination of operational oil pollution, combating illegal discharges and minimizing accidental pollution by oil from shipping.

5.3.2.2 'Special Area' concept

Under MARPOL Annex I, the North Sea was listed as a Special Area in September 1997 with the adoption of the 1997 amendment that came into force on 1 February 1999 (North West European waters were designated a 'Special Area' under MARPOL Annex I). This region includes the North Sea and its approaches (including the international Wadden Sea), the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the West of Ireland. In 'Special Areas', discharge into the sea of oil or oily mixtures from any oil tanker and ship over 400 t is prohibited. The expectations from this step were considerable, because the amounts of oil that are allowed to be spilled at sea in 'Special Areas' are so small that oiled seabirds should not occur, except in occasional oil incidents. Obviously, the declaration of a 'Special Area' status was just the first step. Intensified or at least continuous control through aerial surveillance and harbor inspections is required to prosecute offenders and to bring illegal discharges down to acceptable levels.

5.3.2.3 PSSA Wadden Sea

In 2002, following a joint application of Denmark, Germany and The Netherlands, the Wadden Sea was designated as a Particularly Sensitive Sea

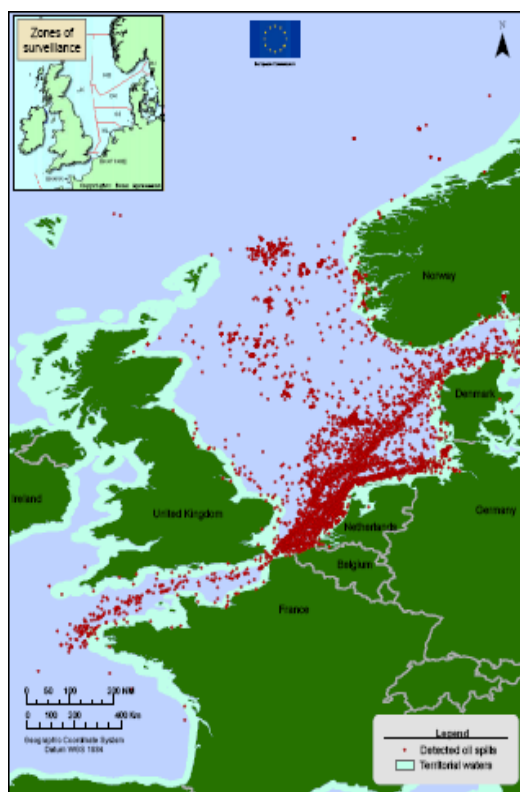
Area (PSSA) by the International Maritime Organization (IMO) (Reineking, 2002). A PSSA is an area that needs special protection because of its significance for recognized ecological or socio-economic or scientific reasons. In addition, the area should be at risk from international shipping activities. The designated PSSA Wadden Sea is the marine area of the Wadden Sea Conservation Area, comprising the Wadden Sea national parks in Germany and the Wadden Sea nature protection areas in Denmark and The Netherlands. The major shipping routes have been excluded from the PSSA. The PSSA Wadden Sea designation will send strong signals to the international shipping community and increase awareness of the particular sensitivity of the area to impacts from shipping, such as oil.

5.3.3 Sources of pollution

The sources of chronic oil pollution are diverse, and estimates of total quantities dumped or released in the marine environment vary widely (GESAMP 1993, Camphuysen, 2007). Chronic oil pollution should refer to mineral oil only, but in fact, numerous lipophilic substances are involved, including mineral oil. Few studies were capable of discriminating between types. While incidents with non-mineral oils are known to occur (Camphuysen *et al.* 1999), and while adverse effects are well known (Bommel e 1991), we have insufficient knowledge about the scale and eventual trends in the levels of non-mineral oil pollutants in the marine environment within Europe (Timm & Dahlmann 1991). With regard to mineral oil pollution, studies in the 1980s and 1990s showed that ordinary ships' fuel oils (notable heavy fuel oils, HFOs), deliberately discharged with bilge waters, are the main source of oil pollution (Dahlmann 1985, Dahlmann 1987, Dahlmann *et al.* 1994). Over 700 samples of plumage of oiled beached birds and from oiled beaches in Germany were analysed during 1998–2001 and again, over 90% of the samples contained (heavy) fuel oil residues and probably included bilge water discharges from large vessels (Reineking & Fleet 2001).

At the 4th Meeting of EGEMP and OCEANIDES (Ispra, 25–26 October 2005), the EC Joint Research Centre (JRC) presented its approach towards a European atlas and database of oil spills in the waters around Europe. This initiative was reinforced in the OCEANIDES project and a detailed presentation was given during the final workshop in 2005. During the first year of the project over 6000 oil spills were recorded, 2100 of which were detected in the Baltic (1998–2002, aircraft), 1868 in the

Figure 1:
From 1998 to 2004, as represented in this map, a total of 4900 oil spills were detected in the North Sea by the aerial surveillance of the members of the Bonn Agreement (Belgium, Denmark, France, Germany, Netherlands, Norway, Sweden, United Kingdom). http://serac.jrc.it/midiv/maps/northsea/aerial/oilspill_bonn_1998_2004.pdf



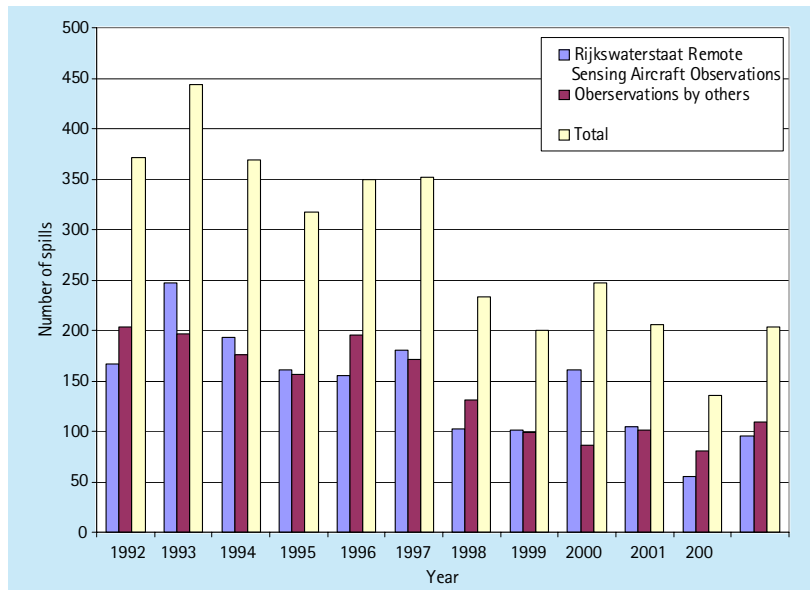


Figure 2: Reported oil spills on the Dutch Continental Shelf 1992 - 2003. (Data from Directoraat-Generaal Rijkswaterstaat, Directie Noordzee; data before 1992 is not reliable).

North Sea (1998-2001, aircraft), and 1638 in the Mediterranean in 1999 alone (satellite). By the end of the project, the data contained information on 17,650 oil spills all over Europe. Summary maps can be downloaded as PDF files at <http://serac.jrc.it/midiv/maps/> and composites are reproduced below for the Mediterranean, the Baltic, the North Sea, and the Black Sea (e.g. Figure 1).

The results show a clear clustering of recorded slicks around the major shipping lanes in the southern and in the south-eastern North Sea. The clustering of oil slicks around the busiest areas

in terms of marine shipping is clearly reflected in oil rates found on beached corpses, both in the past and in recent years, suggesting that the main source of pollution (discharges from ships) remained the same over time. It should be stressed, however, that there is little concrete information about the sources of oil pollution and other lipophilic substances in recent years.

Recent numbers of slick detections for Dutch and German waters are summarised in Figures 2 and 3.

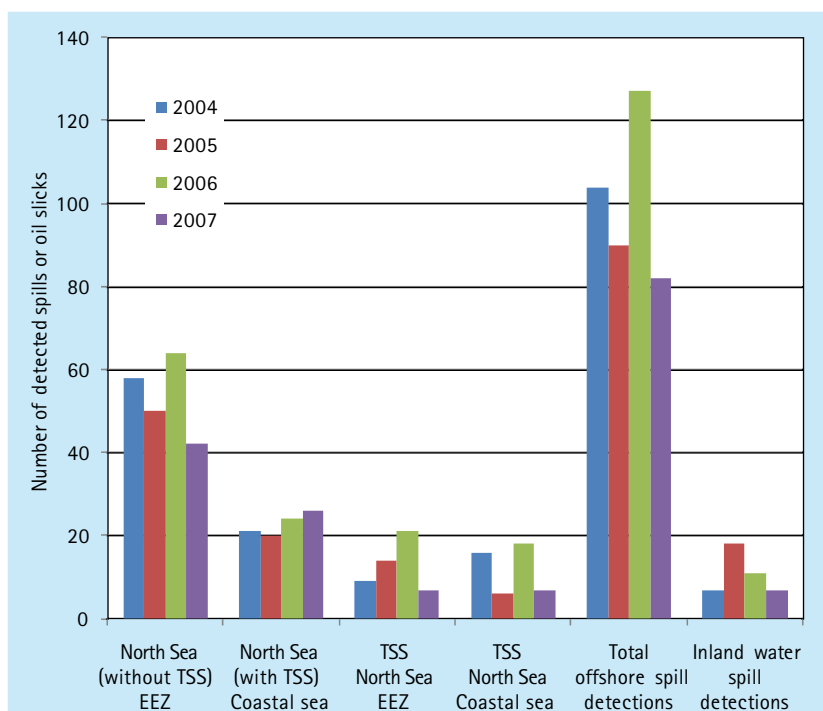


Figure 3: Reported oil spills in German waters, 2004-2007 (EEZ = Exclusive Economic Zone, TSS = Traffic Separation Scheme) (Data from the Bundesamt für Seeschifffahrt und Hydrographie).

Oil incidents on the German North Sea coast in the period 2004 to 2009

In the period since the last Quality Status Report was published, one oil spill, involving fuel oil from a cargo ship, polluted the coast of Niedersachsen and two mystery oil spills polluted the Schleswig-Holstein west coast.

In the afternoon of the 6th November 2008 the cargo ship "Duncan Island" lost nine containers near Texel during a storm. One of them tore a hole in the hull in the region of the fuel tanks, so that the ship lost about 90 m² of heavy fuel oil. The leaking ship continued its journey eastwards along the coast of Niedersachsen to Cuxhaven, where it finally moored in the harbour there. Due to the storm only small amounts of oil were found on the coasts of the East Frisian Islands. However, in the following days lots of oiled birds were observed on the island's beaches and in the Wadden Sea. Overall 1645 oiled birds were recorded, a lot still alive. Only 80 birds could be sent to a rehabilitation centre, none of which survived. The majority of the oil victims were Common Scoter (26 %), Common Eider (19 %) and Guillemot (11 %). These birds were oiled at sea. However, a large proportion of the birds were oiled on the beaches e.g. Sanderling (13.7 %) and Herring Gull (9 %). This accident resulted in the high oiling rate of birds recorded in Niedersachsen in the Winter 2007/08.

Both mystery spills in Schleswig-Holstein were of heavy fuel oil produced from Russian crude oil (information from the BSH-Hamburg). In February 2004 approximately 2000 oiled birds were found dead or dying on the Schleswig-Holstein Wadden Sea coast. 83 % of the oiled birds were Common Scoter, 7 % Common Eider and 3 % Guillemot. The first birds were found on the 5th February and most birds were recovered between the 11th und 19th of February. Nearly all birds were recovered in Northern Friesland, mostly on the islands, Hallig Islands and sandbanks of that region. In February 2008 a second oil spill hit the west coast of Schleswig-Holstein. Although only a small amount of oil was found on the beaches, approximately 1500 oiled birds were recovered. The majority of oil victims were again Common Scoter (97 %). Two percent were Guillemots and 1% Common Eider. The first birds were found on the 3rd February and most birds were recovered between the 5th und 9th of that month. As in 2004 nearly all the birds were found in the Northern Friesian region mainly on the islands of Amrum (61%) and Föhr (27%).

Northern Friesland is a hot spot for oil spills in the Wadden Sea (see figure 4.4.1 Wadden Sea

QSR 2004). At regular intervals oil pollution kills huge numbers of mainly Common Scoter in that region. The Common Scoter winter population there numbers about 80,000 individuals. It is a well known fact that the number of birds found dead or dying on the coast represents only a small proportion of the birds actually hit by the oil spill. It can be assumed that a relatively high percentage of the Common Scoter wintering off the North Friesian coast have fallen victim to oil pollution in recent years. To what extent this is affecting the population of this sea duck species is unknown.

5.3.4 Oiled Seabirds

Systematic beached bird surveys, organized to assess the fraction of oiled seabirds washed ashore among the total number of dead birds found on beaches (oil rate), have been intense for decades, particularly in Denmark, Germany and The Netherlands (Joensen, 1972 a,b; Joensen and Hansen, 1977; Reineking and Vauk, 1982; Averbeck *et al.*, 1993; Camphuysen, 1989, 1997; Reineking, 1997; Fleet and Reineking, 2000, 2001; Durinck and Skov, 2001; Fleet *et al.*, 2003). Earlier results indicated slow but consistent declines in oil rates over the past decades (Camphuysen, 1997, 1998; Durinck and Skov 2001; Fleet and Reineking, 2001). Since the 1999 QSR, oil rates of the most common seabird found on North Sea beaches, the common guillemot *Uria aalge*, an indicator for marine oil pollution, have been proposed as one of the Ecological Quality Objectives (EcoQOs) (Camphuysen, 2005) by the Biodiversity Committee (BDC) of the OSPAR Commission. The EcoQO, as agreed by the 5th North Sea Conference, was defined as: the proportion of oiled common guillemots should be 10% or less of the total found dead or dying individuals of this species, in all areas of the North Sea. Common guillemots were chosen on the basis of their wide distribution in winter and their sheer abundance: sufficiently large samples could be obtained each winter in all North Sea countries to calculate a reliable oil rate figure. The methodology of both the surveys and the subsequent analysis of data has been described previously (Camphuysen and Dahlmann, 1995; Camphuysen and Meer, 1996; Camphuysen and Heubeck, 2001, Camphuysen 2005).

In Dutch North Sea waters, the mean oil rate (\pm SD) of common guillemots has been over the most recent 5 winters (2003/04 - 2007/08) 51.3 \pm 17.4% (North Sea coast of Delta area, mainland and Wadden Sea islands included). Within the Wadden Sea the oil rate amounted to 36.5 \pm

13.8% over the same seasons (a non-significant difference, $t_8 = 1.5$, $P = 0.086$ (one-tailed test). When calculating mean oil rates over the North Sea coast of the Wadden Sea islands only (as in Table 4.6.1), the mean of $47.9 \pm 17.6\%$ is even less different from the within-Wadden Sea situation.

In German North Sea waters, the mean oil rate (\pm SD) of common guillemots has been over the most recent 5 winters (2003/04 - 2007/08) $35.9 \pm 24.2\%$. Within the Wadden Sea the oil rate amounted to $30.2 \pm 17.0\%$ over the same seasons (sample size 2005/06 and 2007/08 >10 but less than 25).

In Danish waters surveys of beached birds following the method recommended by OSPAR were initiated in winter 2004/05 and are performed at four beaches situated along the North Sea coast (Skallingen, Fanø and Rømø) and at the mainland coast (off Ribe). For common guillemots the average percentage of oil rates during the seasons 2004/05 - 2007/08 was 28.1 % and no difference were found between the numbers of guillemots washed ashore along the North Sea coasts and the mainland coast, when corrected for differences in covered coast lengths. For shelduck and herring gull no birds with oil were found during the four winter seasons and for common eider oil rate was 1.0 %.

5.3.5 Trends in oil rates in the Wadden Sea area

In the following analysis, the Danish-German-Dutch North Sea coast has been subdivided into ten sub-regions based on the planning of surveys in each of the participating countries (Table 1). Within the sub-regions a distinction was made between (1) coast exposed to the Wadden Sea (mainland coast as well as island coast facing the mainland) and (2) coast exposed to the North Sea (on islands). The second column (DK) comprises data for the Danish Wadden and North Sea, the last column (NL mainland) includes data for the Dutch mainland coast of the North Sea south of the Wadden Sea.

For common guillemots, one conclusion can be drawn straight away: the EcoQO of 10% oiled has not yet been reached, although an overall decline in oil rates since the mid-1980s is obvious (Table 1; Figure 4). The results give a modest indication of a sharper decline since 1999, and in fact, with the exception of Germany's North Sea exposed coasts, oil rates seem to have stabilized over the most recent years at levels just below 50%. On the Schleswig-Holstein (SH) North Sea exposed coast in Germany, the average oil rate since 1999

is 34%. This is significantly lower than the average for the winters 1992/93 to 1997/98 (62%). On the North Sea exposed coast in Niedersachsen (Nds), this difference was less apparent. Nevertheless, the lowest three oil rates recorded in the period 1992/93-2002/03 in this region were measured in the last three years, with the lowest value on record - 29% - in 2002/03. Camphuysen (2003) observed a reverse trend in oil rates in pelagic seabirds in 2002/03 (Table 1), but concluded that this might have been caused by an unfortunate coincidence of oil incidents (including the 'Tricolor' in the Channel and the 'Assie Eurolink' that sank north of Terschelling). It should be noted, however, that high oil rates in common guillemots occurred again in winter 2003/04 (70%; NZG/NSO unpubl. data; not included in the present analysis), indicating that chronic oil pollution levels are still high.

Oil rates fluctuate from year to year, and where oil incidents or significant local spills may raise oil rates, natural mortality events have a tendency to lower the values found. These fluctuations introduce some noise in the signal received, but we chose not to arbitrarily remove values from the time series, but rather to work with the variability in the material as it was found. It is very interesting to note that several of the more drastic variations between seasons are synchronous in all or at least most sub-regions studied (Table 1; Figure 4).

Common guillemots may not be considered a typical example of the Wadden Sea avifauna; other abundant seabirds deserve attention. For most inshore species, as exemplified by shelduck and herring gull, recent oil rates are generally much lower than historic levels within the Wadden Sea. In the Danish part of the Wadden Sea, a recent increase in the oil rates of gulls and other inshore species has been recorded (Durinck and Skov, 2001). Common eider *Somateria mollissima*, shelduck *Tadorna tadorna*, and herring gull *Larus argentatus* were selected as numerous representatives of the Wadden Sea bird population. Because individual winter seasons did not always provide sufficient samples, the data was grouped in time intervals and overall oil-rates were calculated (Table 2). Two trends are apparent: (1) higher oil rates in the 1970-1980s than in recent years, and (2) for each species, higher oil rates along North Sea shores than within the Wadden Sea itself. The first trend is in agreement with overall declines in oil pollution reported in Western Europe, the second is in line with earlier conclusions that the North Sea (and the shipping lanes in it) is much more oil-contaminated than the Wadden Sea area.

Table 1. Oil rates in Common Guillemots (% oiled of total number found) in the sub-regions in and around the Wadden Sea in winter 1984/85-2002/03. Blank cells indicate insufficient data (sample 25 individuals or more), or no sampling effort.

DK = Danish west coast including Wadden Sea; German Bight; FRG Nds ws = Wadden Sea exposed coasts in Niedersachsen; FRG Nds ns = North Sea side of the islands in Niedersachsen; FRG SH ws = Wadden Sea exposed coasts in Schleswig-Holstein; FRG SH ns = North Sea side of the islands Schleswig-Holstein; NL ws = Dutch coasts Wadden Sea exposed; NL islands = North Sea side of the Dutch Wadden Sea islands; NL mainl = Dutch North Sea coast southwards of Den Helder. ns = North Sea exposed (coast of the islands facing the North Sea). ws = Wadden Sea exposed (mainland coast as well as island coast facing the mainland)

	DK	FRG	FRG	FRG	FRG	NL	NL	NL
Winter		Nds	Nds	SH	SH		Islands	mainl
		ws	ns	ws	ns	ws	ns	ns
1988/89	78.4					52.7	86.7	58.0
1989/90	66.2						67.8	66.7
1990/91	74.8						62.5	84.1
1991/92	85.2						96.7	96.5
1992/93	31.1		50.5		43.4	22.2	18.4	28.1
1993/94	54.2		48.2	65.5	78.7	36.1		50.3
1994/95	71.3		75.0		72.5			47.2
1995/96			53.7					
1996/97			62.1		80.0			83.3
1997/98	55.6		60.2		34.5			62.5
1998/99	43.8	3.9	25.0	29.3	24.6	3.3	27.1	25.6
1999/00	59.6		54.2	11.5	33.3		22.2	65.3
2000/01			40.5	18.5				
2001/02	46.6		37.7	31.3	33.3			60.0
2002/03	56.0		35.3		37.1			98.2
2003/04			47.4	35.1	10.3	43.1	70.2	83.9
2004/05	50.0		41.1	14.8	2.4	43.3	39.7	60.0
2005/06						47.9	57.0	55.6
2006/07	3.8		17.9	23.0	7.4	13.3	23.6	29.1
2007/08			80.3			35.0	48.8	47.4

Figure 4: Logit-transformed oil rates in common guillemots in the areas around the Wadden Sea (cf. Table 1) and overall declining linear trends in the Netherlands (black lines), and in Germany (red lines). Logit values of 0.0 refer to oil rates to 50%; 100% and 0% are infinitely large positive and negative values respectively.

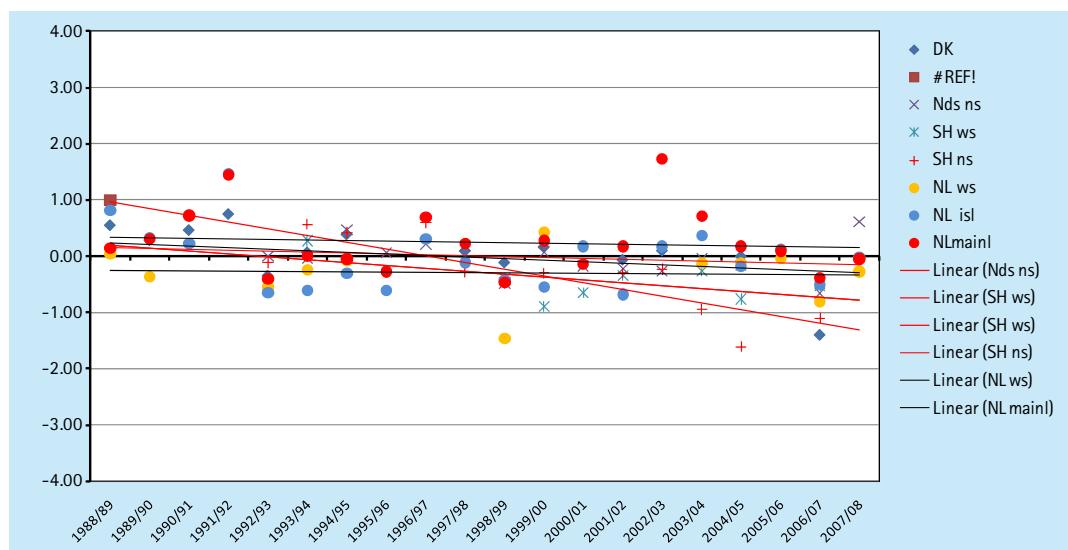


Table 2:
Grouped oil rates in shelduck, common eider and herring gull (% oiled of total number found) in the sub-regions in and around the Wadden Sea within five-year periods since winter 1977/78. Blank cells indicate insufficient data (sample <25 individuals). See table 1 for sub-regions. ns = North Sea exposed (coast of the island facing the North Sea), ws = Wadden Sea exposed (mainland coast as well as island coast facing the mainland)

	DK	FRG	FRG	FRG	FRG	NL	NL	NL
		Nds	Nds	SH	SH			
Shelduck		ws	ns	ws	ns	ws	islands	mainl.
1977-81						7.1	39.7	26.7
1981-86						7.6	15.1	32.8
1986-91						3.2	22.0	5.7
1991-96			2.3		7.7	1.1	7.9	3.6
1996-01			1.0	11.6	9.4	3.6	2.4	0
2001-06	5.9	4.0	1.5	1.0	0.0	0.5	0	
2007-08			3.7	0.0	7.7	0		
Common Eider								
1977-81						37.9	58.3	68.4
1981-86						22.0	26.2	35.7
1986-91						20.3	47.6	60.7
1991-96			11.1	17.8	30.0	8.0	6.8	29.9
1996-01		1.9	2.2	14.4	7.3	3.2	5.5	16.5
2001-06	12.6	0.0	1.4	4.6	4.9	1.5	3.7	12.5
2007-08		61.1	49.0	7.1	0.7	0.9	1.9	
Herring Gull								
1977-81						21.3	50.3	58.2
1981-86						14.9	31.4	44.3
1986-91						6.1	25.8	25.7
1991-96			4.1	0.0	14.3	5.1	16.6	22.2
1996-01		0.0	2.3	2.7	13.4	4.2	16.9	11.9
2001-06	1.1	2.9	3.2	5.1	5.9	2.2	7.0	15.8
2007-08		8.0	52.6	4.8	0.0	0.0	4.9	0.0

5.3.6 Conclusions

The results of beached bird surveys in the Wadden Sea area and its approaches indicate that oil rates have declined significantly over the last decades. The decline is most prominent in the Wadden Sea itself, whereas oil rates of birds found along North Sea shores (including the North Sea side of the Wadden Sea islands) are consistently higher than those in the Wadden Sea. Pelagic seabirds, notably common guillemots, still have relatively high oil rates and the designation of North West European waters as a Special Area under MARPOL Annex I in 1999 did not lead to a drastic decline in oil contamination levels on beached birds on the coasts in the Wadden Sea region. For most inshore species, as exemplified by shelduck, common eider and herring gull, recent oil rates are generally much lower than historic levels within the Wadden Sea). High oil rates for a number of species in Niedersachsen in the winter 2008/08 are a result of the Duncan Island oil incident.

The effect of the designation of the PSSA Wadden Sea in 2002 is unclear, for within the Wadden Sea, oil rates have always been lower than along the North Sea coasts. The decline in oil rates within the Wadden Sea is consistent with the overall decline in oil rates in Western Europe, but generally slightly steeper.

5.3.7. Evaluation of the target

A specific target regarding beached oiled birds has not been formulated in the Wadden Sea Plan until now. However, the Ecological Quality Objective (EcoQO), as developed within the OSPAR framework and described above, can be applied and evaluated. Although an overall decline in oil rates since the mid 1980s is obvious, the Ecological Quality Objective (EcoQO) of an oil rate of less than 10% in common guillemots has not yet been reached.

5.3.8 Recommendations

Continuation of beached bird surveys in each of the three countries as an important monitoring tool to evaluate trends in chronic oil pollution at sea is strongly recommended. The analysis presented here suffered from inconsistencies over time in the choice of sub-regions, shortening data series and reducing the statistical power of the material. It is therefore strongly recommended to keep the most recent subdivision of the survey area in the future, so that trends can be followed with greater confidence.

It is of great importance to maintain the spread of observer activity over the entire winter period, and not to fall back to a level of isolated mid-winter surveys. The Beached Bird Surveys in the framework of the TMAP should be ensured over the entire winter period with harmonized survey frequency in the three Wadden Sea states.

The implementation of the analysis of oil from bird feathers and beach samples is strongly recommended (cf. Dahlmann *et al.*, 1994; Fleet & Reineking, 2001). Uncertainties with regard to the sources of oil pollution, issues that are difficult to deal with in aerial surveys and satellite monitoring programs, can be solved this way. Oil analysis of beach and/or feather samples can also be successfully used as legal evidence in prosecuting oil discharge by ships (Dahlmann, 1991) and for North Sea wide oil pollution control measures.

With North West European waters established as a Special Area under MARPOL Annex I, a lot has been achieved. However, just making an area a Special Area is rather pointless if this is not enforced by (national) law and if this law is not adequately implemented. It is clear that additional measures are required to make sure that mariners obey the regulations and stop discharging oil or oily waters (<15 ppm) within this area. Among others, the following actions regarding pollution prevention as well as control and enforcement measures would help to reduce chronic oiling as a threat to marine wildlife:

- Mandatory on-board transponders and oil fingerprinting of all vessels in North Sea waters would facilitate surveillance, enforcement and the prevention of pollution;

- Harmonization and implementation of the EC Directive 2000/59/EC on port reception facilities, including 100% indirect financing of waste collection;
- Implementation of a ship accreditation system for skippers who promote and adopt best environmental practices and have clean environmental records;
- Increase of co-operation between EU-countries, including information exchange and increased frequency of joint exercises regarding, for example, aerial surveys;
- Stronger legal deterrence. Imposed (minimum) fines must be increased to clearly reflect the full extent of the crimes under both shipping and environmental laws;
- Improvement / extension of aerial surveillance.

As a more specific step to try and reduce oil rates in seabirds (and to protect sensitive areas), it is recommended to identify, monitor and protect sensitive areas at sea in the North Sea, also areas other than the PSSA Wadden Sea. Spatial patterns and seasonal trends in vulnerable concentrations of seabirds in the North Sea and west of Britain have been identified and published. Despite this knowledge, there is little evidence that this information is being used to improve planning of clean-up operations (e.g. Tricolor incident), in the decision process to either immediately combat illegal spills at sea or leave them to disperse naturally (and slower), or in the planning of aerial surveillances for oil at sea. A stronger emphasis on the most vulnerable areas could help to reduce the oil problem.

A final step is education. During training of sea cadets it should be emphasized that even a very small amount of discharged oil can cause immediate and serious damage to the environment, and that it is not so much the amount of oil spilled but the time and location where the oil is released that leads to significant mortality among seabirds and other marine wildlife. It may at least be hoped that the information provided will be remembered and that an illegal discharge will be recognized as a criminal act by the offender himself.

References

- Averbeck, C., M. Korsch, G. Vauk & J. Wilke, 1993. Seevögel als Ölopfers. – Umweltbundesamt, Wasser Forschungsbericht 102 04 414, Norddeutsche Naturschutzakademie, pp.58.
- Baker, J.M., 1983. Impact of Oil Pollution on Living Resources. *The Environmentalist* 3, Suppl. No. 4.
- Bergman, M.J.N., 1985. Behaviour and biological impact of (un)treated oil spills in estuarine areas. *Neth. J. Agric. Sci.* 33, 78-81.
- Bommelé, M., 1991. Harmful effects on birds of floating lipophilic substances discharged from ships. In: Camphuysen, C.J., and Franeker, J.A. van, (Eds.). *Oil pollution, Beached Bird Surveys and Policy: towards a more effective approach to an old problem.* Proc. Int. NZG/NSO workshop, 19 April 1991, Rijswijk, Sula 5 (special issue), 44-45.
- Camphuysen, C.J., 1989. Beached Bird Surveys in the Netherlands 1915-1988; Seabird Mortality in the southern North Sea since the early days of Oil Pollution. *Techn. Rapport Vogelbescherming 1, Werkgroep Noordzee, Amsterdam* pp. 322.
- Camphuysen, C.J., 1997. Olievervuiling en olieslachtoffers langs de Nederlandse kust, 1969-97: signalen van een schonere zee. *Sula* 11(2) special issue, 41-156.
- Camphuysen, C.J., 1998. Beached bird surveys indicate decline in chronic oil pollution in the North Sea. *Mar. Poll. Bull.* 36, 519-526.
- Camphuysen, C.J., 2003. North Sea pilot project on Ecological Quality Objectives, Issue 4. Seabirds, EcoQO element F. Proportion of oiled Common Guillemots among those found dead or dying. CSR Report 2004-011, Texel, pp. 26.
- Camphuysen C.J., 2004. North Sea pilot project on Ecological Quality Objectives, Issue 4. Seabirds, EcoQO element F. Proportion of oiled Common Guillemots among those found dead or dying - revised edition (June 2004). CSR Report 2004-012, Texel, pp. 26.
- Camphuysen, C.J., Barrevelde, H., Dahlmann, G. and Franeker, J.A. van, 1999. Seabirds in the North Sea demobilised and killed by polyisobutylene (C4H8)n. *Marine Pollution Bulletin* 38(12), 1171-1176.
- Camphuysen C.J. 1999. Olievervuiling op zee en olieslachtoffers op het strand: de registratie van dode zeevogels op de Nederlandse kust en de toepassingen als graadmeter van de conditie van de zee. RWS/DNZ contract 76/318381, dp 5142, CSR Consultancy Report 99.012, CSR, Oosterend, Texel, 35pp.
- Camphuysen C.J. 2005. Background Document on the Ecological Quality Objective on Oiled Guillemots. North Sea Pilot Project on Ecological Quality Objectives, Biodiversity Series, ISBN 1-904426-91-3. OSPAR Publication Number: 2005/252.
- Camphuysen C.J. 2007. Chronic oil pollution in Europe, a status report. Report Royal Netherlands Institute for Sea Research, commissioned by International Fund for Animal Welfare (IFAW), Brussels, 85pp.
- Camphuysen C.J., J. Chardine, M. Frederiksen & M. Nunes 2005. Review of the impacts of recent major oil spills on seabirds. In: Anonymous (ed.) *Report of the Working Group on Seabird Ecology*, Texel, 29 March - 1 April 2005. Oceanography Committee, ICES CM 2005/C:05, Ref. ACME+E, International Council for the Exploration of the Sea, Copenhagen, Denmark.
- Camphuysen, C.J., and Dahlmann, G., 1995. Guidelines on standard methodology for the use of (oiled) beached birds as indicators of marine pollution. Ad Hoc working group on Monitoring, Oslo and Paris Convention for the Prevention of Marine Pollution. MON 95/7, Agenda item 7, 13-17 November 1995, Copenhagen.
- Camphuysen, C.J. and Franeker, J.A. van, 1992. The value of beached bird surveys in monitoring marine oil pollution. *Technisch Rapport Vogelbescherming 10, Vogelbescherming Nederland, Zeist*, pp. 191.
- Camphuysen, C.J. and Garthe, S., 2000. Seabirds and commercial fisheries: population trends of piscivorous seabirds explained? In: Kaiser M.J. and Groot S.J. de, (Eds.). *Effects of fishing on non-target species and habitats: Biological, Conservation and Socio-Economic Issues*, Blackwell Science, Oxford, 163-184.
- Camphuysen, C.J. and Heubeck, M., 2001. Marine oil pollution and beached bird surveys: the development of a sensitive monitoring instrument. *Environmental Pollution* 112, 443-461.
- Camphuysen, C.J., and Meer, J. van der, 1996. Recent trends in oiled seabirds. Ad Hoc working group on Monitoring, Oslo and Paris Convention for the Prevention of Marine Pollution, Environmental Assessment and Monitoring Committee (ASMO) . MON 1995 summary record, Copenhagen, 20-48.
- Couper, A. (Ed.), 1983. *The Times Atlas of the Oceans*. Times Books, London.
- Dahlmann G. 1985. Herkunft der Ölverschmutzungen an der deutschen Nordseeküste. *Seevögel* 6(Sonderband): 73-80;
- Dahlmann G. 1987. Analysen von Gefiederproben verölter Seevögel. In: Umweltbundesamt (ed). *Ölopferrerfassung an der deutschen Nordseeküste, Ergebnisse der Ölanalysen sowie Untersuchungen zur Belastung der Deutschen Bucht durch Schiffsmüll.* Text 29/87: 47-64
- Dahlmann G. 1991. Oil identification for court evidence. In: Camphuysen C.J. & J.A. van Franeker (eds). *Oil pollution, Beached Bird Surveys and Policy: towards a more effective approach to an old problem.* Proc. Int. NZG/NSO workshop, 19 April 1991, Rijswijk, Sula 5 (special issue): 29-32.
- Dahlmann, G., Timm, D., Averbeck, C., Camphuysen, C.J. and Skov, H., 1994. Oiled seabirds - Comparative investigations on oiled seabirds and oiled beaches in the Netherlands, Denmark and Germany (1990-1993). *Mar. Poll. Bull.* 28, 305-310.
- Dahlmann, G. and A. Secheyay, 2000. Verölte Seevögel an der deutschen Nordseeküste 1998/99 – Ergebnisse der Ölanalysen. – *Seevögel* 21/1, 11 - 12.
- Directie Noordzee, 1995. *Verontreinigingen Nederlands Continentaal Plat 1992-1994*. Directie Noordzee, Dir.-Gen. Rijkswaterstaat, Rijswijk.
- Directie Noordzee, 2001. *Verontreinigingen op het NCP, 1995-2000*. Directie Noordzee, Ministerie van Verkeer en Waterstaat, Rijswijk, pp. 36.
- Durinck, J. and Skov. H., 2001. Trends in marine oil pollution in Denmark 1984-2001. Report to the Danish Environmental Protection Agency, Danish Ministry of Environment. *Ornis Consult Report*.
- Fleet, D. M. and Reineking, B., 2000. Have efforts to clean up the marine environment been successful? - German beached bird surveys provide an index for oil pollution levels in the southern North Sea. In: Rodrigues, G.R. and C.A. Trebbia, (Eds.). *Oil & Hydrocarbon Spills II, Modelling, Analysis and Control*. WITPress, 117-126.
- Fleet, D. M. and Reineking, B., 2001. Bestimmung, Quantifizierung und Bewertung der Öleinträge in der Nordsee zur Beurteilung der Schiffsentsorgung in deutschen Nordseehäfen. UBA-Berlin, FKZ 297 25 310, Hochschule Bremen, pp. 279.

- Fleet, D. M., s. Gaus & M. Schulze Dieckhoff, 2003. Zeigt die Ausweisung der Nordsee als MARPOL-Sondergebiet für Öl die ersten Erfolge? Ölopfer in der Deutschen Bucht in den Wintern 2000/2001 und 2001/2002. *Seevögel* Band 24/1, 16–23.
- Furness, R.W., and Camphuysen, C.J., 1997. Seabirds as monitors of the marine environment. *ICES J. Mar. Sc.* 54, 726–737.
- Hak, J., 2003. Toename lozingen paraffine en chemicaliën. *Nieuwsbrief Beheersvisie Noordzee* 2010 (6), 4–5.
- GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP 2001. A Sea of Troubles. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) and Advisory Committee on Protection of the Sea, Rep. Stud. GESAMP No. 70, 35 pp, <http://gesamp.imo.org/no70/index.htm>.
- GESAMP 1977. Impact of oil on the marine environment. Food and Agricultural Organisation, United Nations, Reports and studies No. 6, FAO Rome, 128pp.
- GESAMP 1993. Impact of oil and related chemicals and wastes on the marine environment. IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) Reports and Studies No. 50, IMO, London, 180pp.; Clark R.B. 2001. *Marine Pollution*. Fifth Edition, Oxford Univ. Press, Oxford, 237pp.
- Heubeck, M., Camphuysen, C.J., Bao, R., Humple, D., Sandoval, A., Cadiou, B., Bräger, S. and Thomas, T., 2003. Assessing the impact of major oil spills on seabird populations. *Mar. Poll. Bull.* 46, 900–902.
- Joensen, A.H., 1972a. Oil pollution and seabirds in Denmark 1935–1968. *Dan. Rev. Game Biol.* 6(8), 1–24.
- Joensen, A.H., 1972b. Studies on Oil pollution and seabirds in Denmark 1968–1971. *Dan. Rev. Game Biol.* 6(9), 1–32.
- Joensen, A.H., and Hansen, E.B., 1977. Oil pollution and seabirds in Denmark 1971–1976. *Dan. Rev. Game Biol.* 10(5), 1–31.
- Jong, F. de, Bakker, J.F., van Berkel, C.J.M., Dankers, N.M.J.A., Dahl, K., Gätje, C., Marencic, H. and Potel, P., 1999. Wadden Sea Quality Status Report. Wadden Sea Ecosystem No. 9. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Quality Status Report Group. Wilhelmshaven, Germany, pp.259.
- Kingston, P.F., 1992. Impact of offshore oil production installations on the benthos of the North Sea. *ICES J. mar. Sci.* 49, 45–53.
- Reineking, B., 1997. Verölte Seevögel im Spülsaum – Hinweise auf Ölverschmutzung durch den Seeverkehr. *Deutsche Hydrogr. Zeitschr., Aktuelle Probleme der Meeresumwelt, Supplement* 7, 113–123.
- Reineking, B., 2002. The Wadden Sea designated as a PSSA. *Wadden Sea Newsletter* 2002 - No.2, 10–12.
- Reineking, B., and Fleet, D.M., 2002. Einfluss von Öl auf Seevögel und Meeressäuger. In: Lozán, J.L., E. Rachor, K. Reise, J. Sündermann, H. von Westernhagen (Eds.). *Warnsignale aus Nordsee & Wattenmeer. Eine aktuelle Umweltbilanz. Wissenschaftliche Auswertungen*, Hamburg, 235–237.
- Reineking, B., and Vauk, G., 1982. Seevögel – Opfer der Ölpest. *Jordsandbuch* Nr 2., Ed. Verein Jordsand zum Schutz der Seevögel e.V. Otterndorf, pp. 143.
- Schallier, R., Lahousse, L., and Jacques, T.G., 1996. Toezicht vanuit de lucht: Zeeverontreiniging door schepen in de Belgische Belangenzone van de Noordzee – Activiteiten rapport 1991–1995. *Beheerseenheid Mathematisch Model Noordzee en Schelde Estuarium (BMM, Brussel)*, pp. 51.
- Stowe, T.J., 1982. Beached bird surveys and surveillance of cliff-breeding seabirds. *Royal Society for the Protection of Birds report to the Nature Conservancy Council, Sandy*, pp. 207.
- Timm, D. and Dahlmann, G., 1991. Investigations into the source of non-mineral oils in the feathers of seabirds. In: Camphuysen C.J. and J.A. van Franeker (Eds.). *Oil pollution, Beached Bird Surveys and Policy: towards a more effective approach to an old problem*. Proc. Int. NZG/NSO workshop, 19 April 1991, Rijswijk, Sula 5 (special issue), 15–17.
- Vauk, G. Dahlmann, G., Hartwig, E., Ranger, J.C., Reineking, B., Schrey, E., and Vauk-Henzelt, E., 1987. Ölopferefassung an der deutschen Nordseeküste und Ergebnisse der Ölanalysen sowie Untersuchungen zur Belastung der Deutschen Bucht durch Schiffsmüll. *Report Vogelwarte Helgoland, Umweltbundesamt Berlin*, pp.164.
- Vauk, G., E. Hartwig, E. Schrey, E. Vauk-Henzelt, and M. Korsch, 1989. Seevögelverluste durch Öl und Müll an der deutschen Nordseeküste von August 1983 bis April 1988. – *Umweltbundesamt, Wasser Forschungsbericht* 102 04 370, pp. 164.
- Viebahn, C. von, 2001. Oil spill statistics and oil spill monitoring. *DGMK research report* 564. Hamburg, DGMK, pp. 95.