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Eider Mortality in the Dutch Wadden Sea, Winter 1999/2000

Introduction

Mass mortality of Common Eiders *Somateria mollissima* was observed in winter 1999/2000. Approximately 21 000 Common Eiders died from November 1999 to June 2000, at least 36% (7500 individuals) of which were adults.

Methods

Systematic counts of dead birds (beached bird surveys, BBS) were conducted on all Wadden Sea area coastlines. BBS are conducted on foot by walking the tide-line with a group of people who record and describe every corpse found. Notes taken include (sub-) species, age, sex, and plumage of each bird, presence of oil on feathers, and state of corpse (fresh, old, very old, complete or disintegrated). Corpses are marked by clipping the primaries of the wings to avoid double counts during later surveys. BBS are organized so that as many coastal stretches as possible are visited at least every month.

Monthly BBS are sample counts and these were used to estimate the total number of dead Common Eiders in the Wadden Sea by means of extrapolation on short stretches of coast (mean length 6.6 ± 0.4 km) within sub-regions throughout the study period (November 1999–June 2000). 62.8% of values for monthly BBS were missing ($n = 584$). This figure was particularly high in May (79.4%, $n = 73$) and June (83.6%, $n = 73$), but lower in mid-winter (40–60%). As in Van der Meer et al. (1996), three log-linear Poisson models, which assumed independence of the data, were applied to impute missing counts. In each model, the expected value of beached birds was assumed to depend on a function of month and area (stretch of coast). The models differed in the extent to which they included interactions between these factors. Model parameters were estimated with the Genstat 5.1 program regression procedure (Payne et al., 1987). Estimates of the monthly total number of dead Common Eiders in each of the coastal stretches (summarized per sub-region) were obtained by extrapolation of either observed or modeled (only where observations are missing) densities.

Results

Unusually large numbers of dead eiders were first reported in November 1999 (overall density 3.3x long-term average, 1977–98). Numbers of dead and dying eiders increased markedly in December (9.6x long-term average) and slightly declined again in January 2000 (4.5x long-term average). A second episode of elevated mortality commenced in February (5.8x) and mortality levels peaked in March (12.8x) and April (12.4x), to decline again in May (9.6x) and June (5.8x long-term average). Since 1 November 1999, 7680 casualties have been recorded. The total number of casualties based on these systematic surveys between November 1999 and April 2000 was estimated at just over 18 000 (Table 1). Particularly high numbers were found on Texel, Vlieland, Terschelling, and Friesland. Estimates of total numbers in May and June are less reliable due to poor geographical coverage, but a further 3000 eiders may have died.

The oil rate of eiders found dead amounted to 4.0% ($n = 6044$), which was slightly lower than expected (6%), based on the long-term trend (decline in logit-transformed oil rates 1980/81–1998/99, $y = -0.1314x + 0.0334$, $R^2 = 0.43$).

In the winter of 1999/2000, non-oil related Common Eider mortality in the Wadden Sea was unprecedented, considering results of systematic BBS in the area over the previous 23 seasons. Overall densities of dead Common Eiders between November 1999 and April 2000 (4.3 km^{-1}) were 8.5x higher than the long running mean, calculated over previous winters (average \pm SE): $0.5 \pm 0.1 \text{ km}^{-1}$.

In December 1999, the proportion of adult males was very low (3.2%) and most birds found dead were identified as juveniles or un-aged birds in female plumage (probably also mainly juveniles). The proportion of adult males increased gradually through January–March and markedly in April (Table 1). Particularly high densities of adult males (>30%) were found in the western Wadden Sea between 21 March and 20 April (47.1%, $n = 958$ sexed and aged eiders), on the eastern Wadden Sea Islands in early April (54.3%, $n = 70$) and in the eastern Wadden

Sub-regions	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Noord-Holland	9	10	28	115	285	54	71	30	601
Texel beach	19	73	35	90	561	482	220	115	1596
Vlieland beach	32	39	69	115	244	376	76	50	1000
Terschelling beach	4	42	4	22	48	48	16	7	191
Ameland beach	20	100	64	97	204	205	74	42	806
Schiermonnikoog beach	24	112	42	360	136	169	83	47	973
Rottum	9	46	29	44	93	94	33	19	367
Texel Wadden Sea side	53	66	158	259	839	591	197	165	2329
Vlieland Wadden Sea side	15	85	47	75	157	162	67	32	640
Griend	24	110	71	49	37	457	82	47	877
Terschelling Wadden Sea side	276	387	306	458	962	973	353	202	3917
Ameland Wadden Sea side	1	10	5	10	23	23	8	3	83
Schiermonnikoog Wadden Sea side	12	74	39	60	127	121	45	25	503
Balgzand	7	40	25	39	62	84	55	17	329
Afsluitdijk (barrier)	4	34	14	31	47	32	17	9	188
Friesland coast W	67	427	594	563	652	585	224	41	3152
Friesland coast E	73	825	261	130	426	535	254	146	2650
Groningen coast W	23	112	59	108	294	182	83	48	910
Groningen coast E	1	7	4	6	14	15	5	2	54
	673	2599	1854	2632	5211	5189	1962	1047	21 167
% adult males sample aged		3.2%	8.6%	15.8%	14.3%	31.6%			
		1202	538	656	1813	2186			

Table 1: Extrapolated numbers of dead Common Eiders (rounded to nearest 10) based on systematic beached bird surveys between November 1999–April 2000 (corrected for stretches of coast not visited, but not corrected for Common Eiders removed by sanitary departments and others to clean up the coast and also not corrected for eiders dying inland; see text).

Sea between 21 March and 10 April (33.9%, $n = 56$). Using the extrapolations of Table 1, estimated 5275 adult males might have been involved in the strandings between November and June. Adult females were less numerous, but a similar increase and subsequent decline in adult females could be deduced from ringing recoveries received at the Netherlands Institute of Sea Research (NIOZ) from females ringed between the 1970s and early 1990s. It is difficult to estimate total numbers of adult females due to identification problems, but a conservative estimate of 2500 individuals would lead to approximately 7500 adult Common Eiders (one third of all birds found dead) involved in this mass mortality incident.

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References

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