

**THE STATUS OF BREEDING COMMON
SCOTER *MELANITTA NIGRA NIGRA*
IN BRITAIN AND IRELAND IN 1996:
THE EFFECT OF THE SEA EMPRESS OIL SPILL**

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SEA EMPRESS ENVIRONMENTAL EVALUATION COMMITTEE
managed by
COUNTRYSIDE COUNCIL FOR WALES

IMPORTANT

This report is one of a large number commissioned on behalf of the *Sea Empress* Environmental Evaluation Committee. Any views expressed here, however, are not necessarily representative of the views of the committee or its advisory task groups - which will be basing their conclusions on results from the whole programme of studies.

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1 SUMMARY

Following concerns regarding potential effects of the *Sea Empress* oil spill in Carmarthen Bay, February 1996, on the British and Irish populations of breeding Common Scoters *Melanitta nigra nigra*, their status and distribution were determined from a survey in May - June 1996. The survey was undertaken in five areas (Shetland, the Flow country, West and South Scotland, Islay and Ireland), using methods devised during the first complete British and Irish census of this species in 1995. Survey effort was concentrated on sites that held Common Scoters in 1995, and on sites with historical records. The survey visited 223 sites and located 376 birds (206 males and 170 females). This was 79 fewer birds than the previous year, a 17% decline in numbers (16% in Ireland and 19% in Britain), a 19% decrease in occupied 10-km squares and a 31% decrease in occupied sites, compared to visits made at a similar time in 1995. It is possible that a decline of this magnitude may be within the range of natural population fluctuations or it could be due to the late arrival of birds after the late spring in 1996. However, over the last eight years, the number of Common Scoters in the Flow country has declined by 42% from an estimated 48 pairs in 1988 to only 28 in 1996. Given the Common Scoter's threatened status in the UK, that the dynamics of the population are unknown, and the potential decline, annual monitoring of both numbers and productivity is a high priority.

2 INTRODUCTION

In 1995, The Wildfowl & Wetlands Trust (WWT), Irish Wildbird Conservancy (IWC), the Royal Society for the Protection of Birds (RSPB), Scottish Natural Heritage (SNH) and the Joint Nature Conservation Committee (JNCC) carried out the first comprehensive survey of Common Scoters *Melanitta nigra nigra* breeding in Britain and Ireland.¹ This provided a baseline for future monitoring of the species. The 1995 survey estimated the current British and Irish breeding population at 200 pairs; 111 in Ireland and 89 in Scotland.

British and Irish breeding birds are part of a much larger world population of the race *nigra*, currently estimated at 1.6 million individuals, which winter almost entirely within northwest Europe (Wetlands International, unpublished data). An estimated 47 000 individuals (3% of the world population) are concentrated in a relatively small number of coastal areas around Britain and Ireland.² With little known about the turnover or sex ratio in winter flocks this figure may underestimate the number of Common Scoters that utilise British and Irish coastal waters.

Oil pollution is known to pose a considerable threat to Common Scoters because of the concentration of birds in shallow waters close to oil related developments.^{2,3} For example, on 21 December 1994, Carmarthen Bay held 17 650 birds⁴ or 38% of the British and Irish wintering population. The *Sea Empress* oil tanker ran aground on St. Anne's Head at the entrance to Milford Haven on 15 February 1996 spilling 72 000 tonnes of crude oil into the sea.⁵ On 22 February 1996, the oil slick entered Carmarthen Bay where there were 4 000 Common Scoter (WWT/Countryside Council for Wales (CCW), unpublished data). Final casualty figures estimated 4 600 birds affected including 3 326 dead and the remainder rehabilitated and released or still in care (CCW, unpublished data). Of further concern was that an additional 10 000 Common Scoters arrived in Carmarthen Bay within two weeks of the oil spill (WWT, unpublished data). The effect of the spill on these birds, directly due to ingestion of contaminated food, and indirectly through reduced food intake whilst feeding in contaminated areas, remains unknown. Thus, nearly 15 000 Common Scoters or 32% of the British and Irish wintering population were potentially affected by the *Sea Empress* oil spill.

Very little is known about the origins of the Common Scoters that winter in British and Irish coastal waters⁶ and hence the birds affected by the oil. As the number of birds killed by the oil spill was more than three times the combined total of breeding birds in Britain, Ireland and Iceland, it is possible that all three populations may have been devastated by

this single incident. A repeat survey of breeding Common Scoters in Britain and Ireland was therefore organised in May 1996 by WWT, IWC, RSPB, and SNH. The aim was to visit all sites on which scoter had been located during spring and summer 1995 and to assess if there had been any major decline following the *Sea Empress* oil spill.

3 METHODS

3.1 Survey site selection

The Common Scoter's breeding distribution in Scotland, stretches from Shetland and the Flow country of Caithness and Sutherland, through the Inverness glens to Dumfries and Galloway.¹ The Irish population is concentrated on 3 large lowland lake systems in the northwest: Loughs Conn/Cullin, Corrib and Ree.

In 1995, Common Scoters were located on 70 sites (47 in the Flow Country, 21 in West and South Scotland, two on Islay and four in Ireland) in 27 10-km squares¹ (WWT, unpublished data). This includes sites on which birds were located during the 1995 survey, plus any sites on which scoter were observed during the remainder of the summer.

From past breeding records (RSPB, unpublished data), it appears that Common Scoter are mainly site-faithful during the breeding season, therefore visiting sites which held birds in 1995 were thought to be sufficient to identify any large scale population changes. However, as some site interchange may occur, sites with historical scoter records were also visited. All areas of standing water within the breeding range in the Flow country were surveyed. In West and South Scotland, historical and potentially suitable sites in the vicinity of 1995 sites were surveyed as determined by the available manpower. Two historically occupied sites were visited on Islay. In Ireland, breeding Common Scoters are restricted to Loughs Conn/Cullin, Corrib and Ree,⁷ therefore just these sites were visited. In effect, one other site (Lough Arrow) was also surveyed after scoter were observed on the lough in early spring.

3.2 Survey methods

The survey was organised to take place after the Common Scoters' arrival inland in Britain and Ireland, when birds spend most of the daylight hours engaged in pair formation on open water. In 1995, peak numbers of birds were recorded between 8-21 May¹ in all areas except Islay (peak count early June). Therefore, sites on the Scottish mainland were surveyed from 12-18 May and Islay was surveyed on 7 June. In Ireland, Loughs Conn/Cullin, Corrib and Arrow were surveyed between 16-19 May, but surveys of Lough

Ree were delayed until 22-25 May by poor weather.

During each survey, all open water and the entire mainland and island shorelines were scanned for birds using binoculars or telescopes. Most observations were land based, but boat surveys were used on larger and complex sites, including three in West and South Scotland and all four Irish sites.

Clear, calm weather was selected for all field visits and observers recorded the number of birds present, classified into pairs (male and female in continuous close consort), single adult males, single immature males, unaged males, single females and unsexed birds. To minimise the risk of double counting birds, where possible, surveys were organised to cover adjacent sites simultaneously. Eighteen field workers from IWC, WWT, RSPB, and local ornithological groups took part in the survey.

The census totals make no allowance for survey efficiency, and it is possible that some birds were not detected, especially on the larger lochs in West and South Scotland and Ireland. It is also possible that a small number of birds had not arrived on their inland breeding lochs, or were present on unsurveyed sites. Thus, the totals presented should be regarded as minima.

In order to investigate whether there had been any decline in numbers between 1995 and 1996, the numbers of birds present per site were analysed using a generalised linear model with Poisson error distribution and log link function in the GLIM statistical package.⁸ Sites were selected for analysis if birds were present either during the 1996 survey, or during the comparable visit in 1995. Four explanatory variables were included in the model:-

- a) Sex (factor of two levels: males and females).
- b) Area (factor of four levels: Flow country, West and South Scotland, Islay and Ireland). Shetland was excluded as no birds were present in 1995 or 1996.
- c) Site (factor of 62 levels).
- d) Year (factor of two levels: 1995 and 1996).

Site was added to the model nested within area and the interaction between sex and year added to investigate if trends were sex-specific. The minimum adequate model was produced by removing non-significant parameters, starting with the interaction term. The significance of model parameters was calculated by removal from this minimal adequate

model and parameters were deemed significant if they caused an increase in deviance significant at the 5% two-tailed probability level (as judged by χ^2 tests).

4 RESULTS

4.1 Coverage

In 1996, 223 sites were visited in 48 10-km squares (Fig. 1, Table 1). This included 73 sites which had held scoters in 1995, 77 historical sites on which birds had been recorded prior to 1995, and 73 sites not known to have ever held scoter but thought to be potential breeding sites. In Scotland, all sites which had held birds in 1995 were visited, and all but one site (Lough Erne) in Ireland. In the Flow country, complete coverage was achieved with visits to all waterbodies regardless of whether or not scoters had been recorded. In Shetland, 80% of historical sites were visited, 36% (14/49) in West and South Scotland and none in Ireland.

4.2 Numbers and distribution in 1996

A total of 376 Common Scoters (206 males and 170 females) was found on 37 sites in Britain and Ireland (Table 2). Ireland held 204 birds, or 54% of the total, including 82 birds on Lough Ree, 78 on Lough Corrib, 42 on Lough Conn/Cullin, and two on Lough Arrow (representing the first ever record for this site). West and South Scotland held 82 birds (22%) on 11 sites in 9 10-km squares, the Flow country 63 birds (17%) on 21 sites in seven 10-km squares, and Islay 27 birds on one site (Fig. 2). No Common Scoters were found in Shetland or in Dumfries and Galloway. Although birds in Scotland were more dispersed than in Ireland there were concentrations of birds, with 3 10-km squares (one in the Flow country; one in the Highlands; and one on Islay) holding 55% (95/172) of the birds. Most sites in Scotland held only small numbers of birds: 91% (31/34) held six birds or less, and 53% (18/34) only one or two birds. The three remaining sites held nine, 27 and 43 birds, respectively.

All birds located were adults and sex ratios were male-biased in all areas (mean 1.21 males per female; range 1.08-1.27). Most of the females ($\geq 83\%$) were paired except in South and West Scotland, where only 66.6% of birds were paired (Table 2).

Birds were located on seven sites without 1995 records (five in the Flow country, one in West and South Scotland and one in Ireland) representing 9% of the total number of sites used over the two years. However, five of these sites had historical records and only two were completely new (one in the Flow country and Lough Arrow in Ireland).

In accounting for birds which may have been missed during the 1996 survey, three areas received incomplete coverage of historical sites: Shetland, West and South Scotland and Ireland. As Shetland has not held birds since 1994, it seems reasonable to assume that there were no birds on the two historical sites not surveyed in 1996. In West and South Scotland, one pair of Common Scoters was located from coverage of 15 of 40 historical sites, suggesting that a further four birds may have been missed in 1996. In Ireland, Lough Erne was not surveyed in 1996, but held six males in 1995. Assuming the same number of birds was present in 1996, the total number of birds in Britain and Ireland would have been 386 (214 males and 172 females), 3% more than observed.

4.3 Comparisons with 1995

Overall, 79 fewer Common Scoters (17%) were located in 1996 than in 1995, with less birds recorded in all areas except Islay (Table 3). There was a proportionally greater decline in males (21%) than females (13%) in Britain, but a similar decline for both sexes (16%) in Ireland. Much of the decline in West and South Scotland was due to two sites on which there were 21 males and seven females in 1995 compared to only 11 males and three females in 1996.

Common Scoters were distributed across 17 10-km squares in Britain in 1996, compared to 21 at a similar time in 1995 (Figure 2), a decline of 19%. The same number of squares was occupied in both years in the Flow country, although the distribution of one square was different in each year. In West and South Scotland, one new square was occupied in 1996, and birds were absent from five squares occupied in 1995.

There were even larger declines in the number of sites occupied in 1996, apparent in all areas except Ireland. Birds were present on 15 fewer sites (31%) than during the comparable period in 1995 (Table 4).

After controlling for differences between the numbers of birds on different sites and for differences between sexes (there were significantly more males than females per site), there were significantly fewer birds per site in 1996 than in 1995 (Table 5). Although there was a proportionally greater decline in males than females overall in Britain (see above), a non-significant sex x year interaction suggested that this was not significant when analysed at the site level.

5 DISCUSSION

Significantly fewer Common Scoters were located in 1996 than in 1995 and less sites were occupied. A 16% decline in numbers was apparent in Ireland and a 19% decline in Britain. In Britain, the decline was proportionally, but not significantly, greater in males (21%) than females (13%). As 71% of birds (1 315/1 862) killed by the *Sea Empress* oil spill were males (CCW unpublished data), one explanation of this result could be that a proportion of Scottish breeding birds were still present in Carmarthen Bay at the time of the *Sea Empress* oil spill.

While the observed decline may be real, two factors need to be taken into account. Firstly, the spring in 1996 in Scotland was approximately two weeks later than the previous year and it is therefore possible that some birds may not have arrived on the breeding grounds by the time the survey was conducted. Secondly, the natural level of annual population fluctuation in Common Scoters in Britain and Ireland is unknown. Although for a long-lived species, such as Common Scoter, large natural fluctuations in annual population size may be unexpected, evidence from Lake Myvatn in Iceland, where the number of summering males varied from 223 to 407 between 1975 and 1989 (358 males in 1996) suggests that between year variation in breeding numbers may actually be high (A. Einarsson, pers. comm.).

In hesitating to suggest a genuine decline in numbers without qualifying the possible sources of bias, we should, however, bear in mind the facts. In the Flow country in 1988, there were an estimated 48 pairs of Common Scoter.¹ In 1995 this had fallen to 34 and in 1996 to 28 (if we assume that the two single females subsequently paired and bred). Therefore, within 8 years the population declined by 42%. Given that Common Scoters qualify under one criterion for red list status in the new list of species of conservation concern (serious decline in breeding population) and under two criteria for amber listing (rare breeder, and localised wintering population),⁹ the reasons behind this apparent decline should be ascertained as soon as possible. Annual population monitoring of British and Irish populations, including determination of the natural level of fluctuation in population size, productivity and breeding phenology, is essential.

Although seven sites with birds in 1996 were not occupied the previous year, all but two had historical records. Future breeding surveys should be carried out over all known historical sites in order to ensure complete coverage.¹

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Table 1. Number of sites surveyed in 1996 in relation to the number of sites which held scoter in 1995 and which have ever held scoter.

Area	Sites with scoter records in 1995		Sites with scoter records pre-1995 ¹ ("historical" sites)		TOTAL SITES WITH SCOTER RECORDS		TOTAL SITES SURVEYED IN 1996	
	Total	No. surveyed in 1996 (%)	Total	No. surveyed in 1996 (%)	Total	No. surveyed in 1996 (%)	Sites without previous scoter records	No. surveyed in 1996
Shetland	0	0 (100)	10	8 (80)	10	8 (80)	0	8
Flow country	47	47 (100)	55	55 (100)	102	102 (100)	65	167
West and South Scotland	21	21 (100)	39	14 (36)	60	35 (58)	7	42
Islay	2	2 (100)	0	0	2	2 (100)	0	2
Total Britain	70	70 (100)	104	77 (74)	174	147 (84)	72	219
Ireland	4	3 (75)	7	0 (0)	11	3 (27)	1	4
Total Britain & Ireland	74	73 (99)	111	77 (69)	185	150 (81)	73	223

¹ Excluding sites with records in 1995.

Table 2. Numbers of occupied sites and numbers of Common Scoters located in 1996.

Area	Number of sites	Number of Common Scoter				TOTAL
		Pairs ¹	Single ♂♂	Single ♀♀	Sex ratio (♂♂:♀♀)	
Shetland	0	0	0	0	-	0
Flow country	21	26 (93)	9	2	1.25	63
West and South Scotland	11	24 (67)	22	12	1.27	82
Islay	1	12 (92)	2	1	1.08	27
Total Britain	33	62	33	15	1.23	172
Ireland	4	77 (83)	34	16	1.19	204
Total Britain & Ireland	37	139 (82)	67	31	1.21	376

¹ Proportion of females paired in parentheses.

Table 3. Number of Common Scoters located in 1995 and 1996. Data are calculated from single visits made in May except for Islay which was surveyed in June.

Area	TOTAL NUMBERS			Males			Females		
	1995	1996	% change	1995	1996	% change	1995	1996	% change
Flow country	79	63	-20	43	35	-19	36	28	-22
West and South Scotland	107	82	-23	63	46	-27	41	36	-12
Islay	26	27	+4	14	14	0	12	13	+8
Total Britain	212	172	-19	120	95	-21	89	77	-13
Ireland	243	204	-16	132	111	-16	111	93	-16
Total Britain and Ireland	455	376	-17	252	206	-18	200	170	-15

Table 4. Number of occupied sites with Common Scoters in 1995 and 1996. Data are calculated from single visits made in May except for Islay which was surveyed in June.

	1995 total	1996 total	% change
Flow country	30	21	-30
West and South Scotland	16	11	-31
Islay	2	1	-50
Total Britain	48	33	-31
Ireland	4	4	0
Total Britain and Ireland	52	37	-28

Table 5. Analysis of deviance table for parameters explaining the number of Common Scoters per site in 1995 and 1996. The minimal adequate model accounted for 67.9% of the variation in the numbers of birds present (residual deviance = 159.89 with 184 d.f. compared to a total deviance in the null model of 2356.0 with 247 d.f.).

Explanatory Variable	Deviance	D.F.	Significance
Area/Site	2,182	61	0.000
Sex	8.194	1	0.004
Year	5.968	1	0.015
Sex x Year	0.011	1	0.916

LEGENDS TO FIGURES

- Figure 1.** Location of survey sites in 1996 by 10-km square. Geographical regions used in analysis are shaded.
- Figure 2.** Breeding distribution of Common Scoters in Britain and Ireland in 1995 and 1996 by 10-km square.