

# **SEABIRD REPORT 1970**



**The Seabird Group**

**50p**

# THE SEABIRD GROUP, 1970-1971

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## EDITORIAL:

### FLUCTUATIONS IN SEABIRD POPULATIONS

It has been known for a very long time that at least until very recently the greatest wonders of the marine ornithological world, the guano birds of Peru, periodically underwent marked fluctuations in their numbers. Under normal conditions these apparently remained fairly steady in the range of twenty to forty millions, but when the cold, food-bearing Humboldt Current was displaced outwards from the coast by a warm current from the north, el Niño, a mass mortality would occur, and the population shrink to a tenth of its normal figure, only to recover again rapidly as soon as the Humboldt Current returned. Similar fluctuations in other seabird populations elsewhere have received less attention, although it has also been known for a long time that some of the more numerous species, including various auks, gulls, terns, petrels, shearwaters, and storm-petrels were also subject to occasional local mass mortality. This was usually attributed to bad weather, because the birds usually come ashore with strong onshore winds. It escaped comment that these birdkills were usually composed of disproportionate numbers of some species while others escaped, or that a great many more spectacular onshore gales occur with little mortality at all.

More recently, with our growing knowledge of seabirds it has become increasingly clear that many of them are undergoing both long- and short-term fluctuations in numbers. Some of these may be natural, as for example the appearance of the Black-winged Petrel at an increasing number of sites in the south-west Pacific region in recent years, or the short-term fluctuations in numbers of the guano birds of Peru already mentioned. Many may result from human activity. Among the long-term trends, the very widespread decline in numbers of a great variety of seabirds over the last few centuries seems likely to be due to predation by mankind and the mammals he has introduced at an increasing number of previously secure island breeding stations. The usually welcome increase of some of these and other species over the last century equally seems likely to be due partly to the belated institution of conservation measures at some of these breeding sites, and partly to the provision by man of additional food-supplies in the form of offal from developing fisheries at sea, and the invertebrates inhabiting open farmland (which often closely resembles a mudflat) or dumped human waste on land.

It remains an open question to what extent the increasing human impact on the marine environment is still having a deleterious effect on seabirds. It has been postulated for at least a century, and demonstrable for at least half that time, that oil pollution causes serious harm to diving birds because it floats on the water where they are particularly likely to encounter it, and destroys the insulating capacity of their plumage so that they die of exposure if they do not poison themselves trying to clean themselves first. It is not entirely clear to what extent the long-sustained decline of European auks results from this, but it seems likely to be largely due to it, since it began before most other possible new causes except possibly the increase in gulls became apparent. More recently, it has been suggested that some seabird populations are also declining as a result of poisoning by toxic chemicals accumulated in marine food-chains. A good many birds are undoubtedly picking up some toxic chemicals, and there appear to be at least two good examples of major declines due to local pollution. The vast population of

Sandwich Terns and other birds breeding in the Dutch Waddensee declined greatly in the early 1960s as a result of pollution of water originating in the Rhine by a pesticide factory, while there has also been a disastrous decline of Brown Pelicans along both coasts of the United States apparently mainly due to the effect of a particular breakdown-product of DDT, DDE, in causing failure of the calcification of the eggshell.

There has been one suggestion that a mass mortality of seabirds in Britain resulted from poisoning by toxic chemicals, and especially polychlorinated biphenyls (PCBs), when large numbers of Guillemots died in the Irish Sea area in the autumn of 1969. The consequent outcry may have helped persuade one of the several manufacturers to take very necessary steps to restrict the dispersal of these undesirable contaminants, but it should also be pointed out that the long-delayed report on the Natural Environment Research Council investigation of the disaster eventually released eighteen months later (N.E.R.C. Publ. Series C No. 4) shows that while some birds contain rather alarming amounts of all sorts of contaminants, none of them was present in all the victims examined in sufficient quantities to explain the whole disaster, which remains unexplained but seems likely to be due to something else, possibly an undetected failure of the food-supply while the birds were in moult.

More recently it has been suggested by Dr. J. J. M. Flegg in B.T.O. News 46 that the long-sustained decline of the Puffin, which has now spread to north-west Scotland, may also be due to toxic chemicals. One drawback to this suggestion is that it appears to have been continuing a very long time. The population of Ailsa Craig apparently crashed in about the 1880s, that on Grassholm in about the 1890s, that in the Scillies in the early years of this century, and those in north Wales and on Lundy between the wars. The scale of the decline is hard to assess, since Puffins come and go mysteriously and are hard to count at the best of times. Many of the old estimates of the size of colonies as running into hundreds of thousands and millions could be wildly exaggerated, so that the decline could be attributed entirely to the progressive adoption of more realistic estimates of population size. In addition, in at least one case, Grassholm, it seems likely that at least some birds moved elsewhere, to the other Pembrokeshire islands, following their own destruction of their habitat by too much burrowing on Grassholm and the relaxation of human predation elsewhere.

In addition, the Puffin decline has often been curiously patchy. On Perroquet Island along the north shore of the St. Lawrence in Canada the birds declined from just under 50,000 in 1955 to just over 7,000 in 1960 while neighbouring colonies remained untouched, but had recovered to 21,000 by 1965, by which time a neighbouring colony of 21,000 on St. Mary's Islands had in its turn declined by half. Elsewhere in this report Peter Evans also records that a colony estimated to hold 25-30,000 pairs on Inistearaght off south-west Ireland in 1966 had declined to 7,500 pairs by 1969 while neighbouring ones remained untouched, and was likewise showing the first signs of recovery in 1970.

The cause for these fluctuations seems rather obscure, except that they seem rather reminiscent of the fluctuations of some other northern animals, such as lemmings. While as pointed out by Dr. Flegg, Puffins join most of our other seabirds in feeding their young on superabundant shoaling fish in summer, apparently they may differ from most of our other auks except the Little Auk, also prone to intermittent mass mortality, in dispersing widely to feed on plankton in the winter. Some of our few ringing recoveries come from the Grand Banks of Newfoundland then, and others from the Mediterranean approaches. Later in this report Garth Pettitt also describes a large

northward migration of Puffins past north-west Spain and Ireland in the spring, which suggests that many of the birds do indeed winter far south. If they are suffering there from oil pollution or some failure of the winter food-supply, it is unlikely we would easily secure evidence for it. The bodies would probably never even come ashore, but disappear towards America with the north equatorial current which Thor Heyerdal has recently reported to carry so much waste oil. The Puffin is apparently also unusual among our auks in keeping its young long in the nest and suspending its wing-moult until the early spring, possibly in order to take advantage of the spring flush of plankton, and a number of moulting birds were wrecked then on our north-east coast in 1969. This could be as vulnerable a time for Puffins in moult in their winter quarters as the autumn of 1969 proved to be for Guillemots moulting in the Irish Sea.

Otherwise there seems no easy explanation for the recent decline of breeding Puffins in north-west Scotland, which Ian Pennie and Michael Brooke report affects Clo Mor and the Shiantas as well as St. Kilda. There is one report by David Boddington of a mass mortality of young birds on St. Kilda in 1959, the year before Donald Baird first noticed that the colonies were smaller than in old photographs, but there appears to be little other information on breeding success in the area, apart from the report quoted by Peter Evans later in this report that Great Black-backed Gulls apparently ate many young birds when they started to fledge on North Rona in 1971. This may be normal, or because they were unusually weak and easy to catch. In any case, most of the large gulls in the area appear to live on offal and stray fish left by trawlers, and it seems incredible that if they were seriously interested in Puffins the latter would survive on North Rona at all, leave alone be increasing in the presence of vastly larger numbers of gulls along our north-east coast.

In general, therefore, it seems doubtful whether the cause of the long-sustained decline of our auks, shown to the greatest degree by the Puffin, is to be sought at the breeding stations. Oil pollution could provide an adequate explanation, especially for the overall trend, though it seems a little unlikely that it would affect individual colonies on quite such a large scale unnoticed. However, the Puffins on the Sept Isles, Brittany, suffered by far the worst of all the birds there during the Torrey Canyon disaster, declining from 2,500 pairs before it to 400 afterwards with little evidence of the slaughter on the beaches. Alternatively, it needs to be remembered that there are many other causes for mass seabird mortality besides pollution. A holocaust of wintering terns in South Africa in 1961 was eventually proved to be due to influenza, and another of Shags in Northumberland in 1969 was caused by plankton poisoning. We also include a note later in the report of the occurrence of avian pox amongst auks at sea. It seems likely that a good many seabird wrecks in the past were really caused by such things.

In addition, mankind is influencing the sea in other ways besides causing pollution. Possibly the most serious news for marine ornithologists in recent times is the report by M. B. Schaefer in the July 1970 number of the Transactions of the American Fisheries Society that following the recent explosive development of the anchoveta fishery off Peru the guano birds have failed to recover from the last Niño year in 1965, while it has been possible to secure an increased yield-per-effort from the fishery equivalent to the amount of fish that they used to eat. A similar industrial fishery is of course being developed rapidly off the north-west coast of Europe.

# SEABIRD MIGRATION OFF CAPE VERDE, SENEGAL, IN APRIL 1968

A. J. Gaston

Cape Verde is situated at the most westerly point of the bulge of Africa a few miles west of the port of Dakar. At first glance its position suggests that it would afford an ideal point from which to observe the off-shore migration of northern seabirds which winter in the South Atlantic and Gulf of Guinea.

The accompanying sketch-map shows that the coast at the Cape is by no means ideal for sea-watching, however. The reef on which the lighthouse stands, though more or less submerged at high tide, tends to keep oceanic birds such as shearwaters well away from the most suitable observation point at the extreme western tip of the mainland. In addition terns often stop to feed in the lagoon formed by the reefs, and this introduces difficulties in counting those birds which are actually passing. The point itself, marked 'A' on the map, is only a few feet above sea-level, and this makes observation of birds flying low over a heavy swell difficult. In the afternoon observations also have to be made west into the sun with a strong glare off the sea.

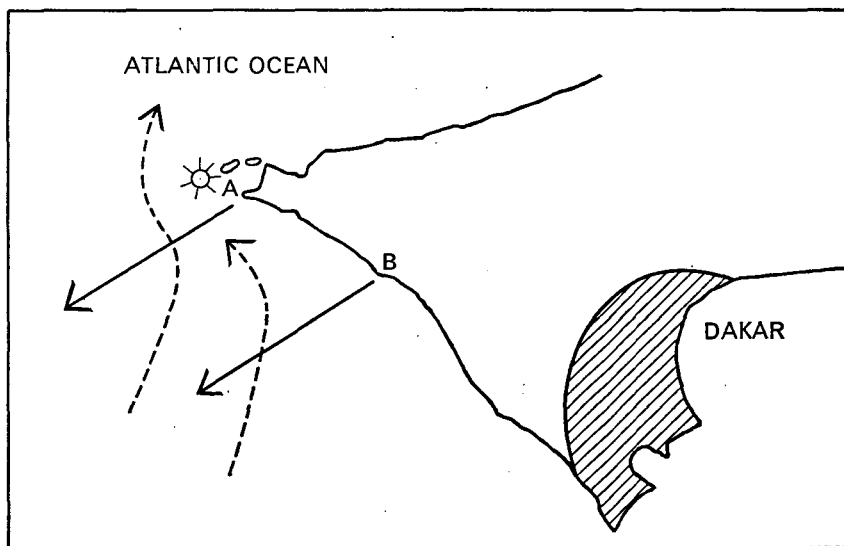
A total of twenty-three hours of observation were carried out from point 'A' during the five days 13-17 April 1968, and the daily rate of movement of the more numerous species is summarised in the table. The weather conditions during the five days remained more or less uniform, with some light cloud most of the time but no precipitation during the day, and the wind mainly north or north-east except on the 15th, when there was a west wind in the morning. The sea was generally slightly choppy off the point with at least a moderate swell at all times. On the afternoon of the 15th, however, it was almost calm, and observations from a low hillock about thirty feet above sea-level 250 yards east of the point revealed a small passage of large shearwaters that might well have been missed from the point itself. The visibility was particularly good then, but in general was restricted to three or four miles by haze.

Two hours of observation from point 'B' on the afternoon of the 15th revealed no movement whatsoever although there are cliffs at this point rising to about 200 ft. which extends the view considerably.

The large shearwaters seem likely to have been Cory's and the small ones Little Shearwaters, but in neither case was a positive identification possible. In addition to those tabulated at least 19 large shearwaters were present offshore on 16 April, presumably feeding. Nearly all the Gannets seen passing were in brown plumage. On several occasions birds thought to be Brown Boobies were seen offshore, but a re-examination of my field notes fails to confirm this, and the identification remains inconclusive. Most of the skuas, which were largely adults, were Arctic and 76% of them were in the dark phase as opposed to 24% in the pale or intermediate phases. Only one bird was thought to be a Pomarine Skua, although C. G. Bird only recorded this species from a boat off Port Etienne, Mauretania, at this season (Ibis, 1937: 721-731), while two birds might have been Long-tailed Skuas. Most of the skuas passed quite close inshore, and on the 17th four dark-phase birds were seen chasing terns in Dakar harbour. It seems possible that the Arctic Skuas migrate much closer inshore than the Pominers, and this may account for the discrepancy between the present observations and those of a much higher proportion of Pominers further out to sea.

Common, Arctic and Roseate Terns were all definitely identified among the sea terns, but in the majority of cases it was not possible to be sure of the species. Four Little Terns were seen on the 15th, and a total of seven Gull-billed Terns on the 15th and 16th. Most of the terns were in full breeding plumage, but a number of the Black Terns were still in winter dress. The only common seabird around the point was the Herring Gull. They had yellow legs and greyer mantles than *L. a. argentatus*. Two Black-headed Gulls were also seen moving north, while a sub-adult Little Gull was present nearby in Dakar harbour on 17 April. Black Kites were common everywhere, and several small parties were seen to come in from the sea and continue north-east along the coast as if migrating. Two Ospreys moved north offshore. Whimbrel, Common Sandpipers and Turnstone were the only waders recorded along the shore.

#### Cape Verde Area



Arrows: direction of observation. Dotted lines: apparent track of passing seabirds. Star: lighthouse. A and B: observation points.



**Rates of movement in birds/hr.**

	13th		14th				15th				16th				17th		Total	
	p.m.		a.m.		p.m.		a.m.		p.m.		a.m.		p.m.		a.m.		individuals	
Species	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S
Hours watching	2		3		2		3½		1½		5		3		3		23	
Large Shearwaters	-	-	0.3	-	-	-	-	-	5	-	2	-	-	-	3	-	27	-
Small Shearwaters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3	-	4	-
Gannet (brown)	50	5	40	5	25	-	6	0.3	17	1	6.4	0.8	10	1	1	1	400	36
Gannet (white)	-	-	2	-	-	-	-	-	0.5	-	0.8	-	-	-	0.3	-	18	-
Skuas	0.5	-	6	0.3	0.5	-	1	-	1	-	3	-	0.3	-	3	-	50	1
Lesser Black-backed Gull	-	-	9	-	1	-	2	-	7	-	11	-	4	-	33	-	208	-
Black Tern	-	-	1.3	-	-	-	1.5	-	-	-	51	-	391	-	-	-	2042	-
Sandwich Tern	5	-	-	-	-	-	27	-	-	-	72	3	22	0.3	30	-	637	16
Royal Tern	1	2	5	2	1	-	2	0.3	1.3	-	3.4	0.4	2	0.3	0.6	-	53	14
'Comic'/Roseate Terns	5	-	59	-	9	-	-	-	-	-	102	-	365	-	18	-	1849	6
Unidentified Terns	-	-	2.6	-	2.3	-	2	0.3	5	3	43	4	42	-	31	-	475	29
Rounded Totals	61	7	125	7.3	39	-	41	0.9	37	4	295	8.2	836	1.6	121	1	4763	102

Table 1: Comparisons between birds present in 1959 and 1969.

Sub-section	Boyd: May, 1959	Seafarer: July, 1969
56 and 57	769	865
50 and 48	560	805
46	380	518
33 and 34	959	752
13, 14 and 15	1,009	1,284
8 to 12	1,052	1,298
1 and 2	45	165
99 and 100	6,297	5,404
102 to 105	1,241	1,357
106	151	129
Total	12,463	12,439 (Overall difference—24)
Sub-section	Boyd: May, 1959	Seafarer: August, 1969
83, 84, 85 and 87	2,048	1,697
42 and 43	716	404
51	297	74
45	557	354
48 and 50	560	229
49	508	278
107-110	1,718	1,433
Total	6,404	4,469 (Overall difference—1,935)
Sub-section	Boyd: May	Seafarer: September
53, 54 and 55	1,491	1,317
56	446	682
107	517	485
112 and 113	6,863	4,763
114	799	1,182
3, 4, 6, 7, 8, 9, 10	1,244	664
Total	11,360	9,033 (Overall difference—2,327)

Since the count of the whole population of the Gannetry could not be made from the photographs taken by the R.A.F., an estimate was made based again on the information in Dr. Boyd's paper of 1961. This was done by finding sub-sections throughout the colony which were comparable for both counts made, in 1959 and 1969. Dr. Boyd had already worked out the percentage for each sub-section of the whole colony and this figure was substituted with the total from the 1969 count. By multiplying up using the percentages given an estimate for the whole population was made in table 2. However the estimate is based on only 21 sub-sections out of 116 and must therefore be considered cautiously. If the areas where the colonies expansion occurred are not well represented then total numbers cannot be inferred.

Table 2: Estimation of the total population in 1969.

Sub-sections	Boyd total	% of each section	Section total	Seafarer total	Derived total	% of whole by sections
1, 2	45	100	45	165	165	0.1
8-12	1,052	56.9	1,849	1,298	2,281	3.9
13-15, 33, 34	1,968	32.6	6,042	2,036	6,245	12.7
46	380	18.8	2,016	518	2,755	4.3
48, 50	560	52.4	1,068	805	1,536	2.3
56, 57	769	28.8	2,667	865	3,003	5.7
99, 100, 102-106	7,695	85.8	8,967	6,880	8,018	19.0
				Derived total	27,008	48%
				Estimated population	56,267	100%

### Photographs taken in May, 1971 and 1973

Mr. Weir's photograph of the south face of Stac Lee taken in May, 1971 compares almost exactly in date and aspect with the sub-sections for that face devised by Dr. Boyd, although in the former there are areas on the periphery, especially on the eastern edge, where the numbers counted are likely to be suspect due to the curvature of the face and the blurring in the photograph. Mr. Weir's photograph was a standard 35 mm. colour transparency which was counted by being projected on to a large sheet of white paper. The outline of the stack was filled in and all birds dotted, working from top to bottom, with a felt-tipped pen. It was then covered with a grid and lines drawn through each dot, linking up all dots in the same square to avoid double counting. All squares were then given a total. No error margin was allowed for on this count except for the areas where distortion or blurring occurred. These were checked again and the totals for the square revised. The totals counted for the whole of the south face of Stac Lee were 9,260 compared with Dr. Boyd's 8,967, an apparent increase of 293 individuals or about 3%. This would seem to be accurate although not reflecting an apparent overall increase in the colony of 17%. This may be due to the physical lack of space for extra nests and further strengthens the idea that the extra numbers in the colony will be mainly on the periphery.

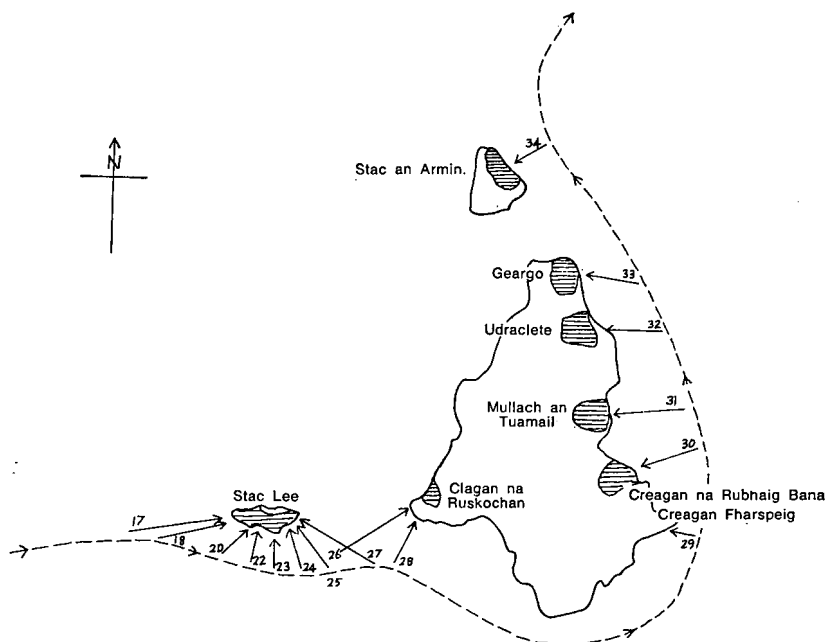


Figure 4: Route of fishery cruiser "Brenda" on 18 May, 1973. Arrows show angle, cover and film number.

Since the number of Gannets on St. Kilda was estimated for Operation 'Seafarer' I have also been able to visit the islands on one of the fishery cruisers and took colour photographs of the southern and eastern colonies as the ship sailed past (Fig. 4). I was fortunate in having good weather conditions and an adequate 200 mm. telephoto lens which has enabled me to count some of the colony again from the photographs obtained. The only

sections counted from these photographs were those on Boreray since my photographs of Stac Lee could not be compared directly with Dr. Boyd's coverage, again due to the lack of clear demarkation between the different sections and sub-sections on the southern face of the stack. However, the counts which have been undertaken appear to cover 35% of the total colony. I used the same technique as with Mr. Weir's photograph of May, 1971.

The use of colour transparencies may be preferable in good conditions with a steady hand and sunlight to highlight the birds against the usually grey background since this gives a better contrast for counting and a similar margin of counting error. In these photographs this margin was 5.3% against 5.2% for 'Seafarer' and 3.6% for Dr. Boyd.

These new photographs were taken in May this year and are directly comparable with the counts made by Dr. Boyd in May, 1959, unlike the 'Seafarer' series which were taken in July, August and September, which were subject to fluctuations in the numbers of birds present.

Table 3: Comparisons between birds present in 1969 and 1973.

Sub-section	Boyd: May, 1959		Mean	Dixon: May, 1973		Mean	% change
	Min.	Max.		Min.	Max.		
1 and 2	43	48	46	119	122	120	+ 215
3-4, 6-12	1,738	1,781	1,752	1,068	1,141	1,104	- 36
42 and 43	692	742	716	481	492	486	- 32
45	544	574	557	453	461	457	- 17
46	358	405	380	579	591	585	+ 54
48 and 50	1,025	1,117	1,068	1,108	1,155	1,131	+ 6
89	237	275	254	321	333	327	+ 22
114	770	828	799	1,232	1,337	1,289	+ 38
			Total 5,572			5,499 diff.	- 73

Table 3 indicates large fluctuations between the sub-sections for the two years with an increase of 215% in sections 1 and 2, and a 36% decrease in sections 3-4 and 6-12. Both these areas have numbers of 'club' birds which tend to gather near nesting ledges and cause counts to vary. These birds are highly restless and several of the 'Seafarer' photographs show them being 'put up' by the aircraft. No allowance has been made for these groups although they may greatly affect the totals for one or two ledges.

The same method has been used to give a figure for the total population although again this is based on calculating the increase from 19 out of 116 sub-sections and can therefore only be an estimate, subject to error, depending on where the increase in the colony has occurred.

Table 4: Estimation of the total population in 1973.

Sub-section	Boyd total	% of each sub-section	Dixon total	Derived section total	section as % of whole colony
1, 2	45	100	120	120	0.1
3-4, 6-12	1,752	94	1,104	1,174	3.9
42, 43	716	27.5	486	1,767	4.3
45	557	7.7	457	5,935	4.3
46	380	18.3	585	3,196	4.3
48, 50	1,025	100	1,131	1,131	2.3
89	254	100	327	327	0.5
114	799	10.4	1,289	12,354	16.2
	Total: 19 sub-sections			26,044	35.9%
	Derived population of the whole colony			72,295	100 %

## Discussion

Since once Gannets have occupied a nest site at least one member of the pair normally guards it at all times, the number of birds present at a gannetry normally varies according to the proportion of sites attended by two birds and the number of birds which have not yet taken up sites (usually referred to as "club birds") which are present. J. B. Nelson (Ibis 108: 584-526, 1966) found that on the Bass Rock the proportion of occupied sites attended by two birds rose from about 18% in March and April to 24% in June and then declined steadily to under 10% in October, with considerable diurnal variation. The number of mobile club birds present is particularly hard to estimate, since while they often assemble in a distinct area outside the main colony they may also settle on unoccupied areas within it, and this may help explain many of the more marked variations in our sectional totals compared to previous ones. They and the females of pairs which have not yet started to lay are also particularly easily disturbed, so that for example whereas Dr. Boyd calculated that 21.9% of undisturbed nests examined from the land held pairs in May 1969, much the same proportion as was found by Dr. Nelson at the Bass Rock, he found that only 10.7% of nests held pairs in aerial photographs taken at much the same time, possibly as a result of disturbance by the aircraft. By applying appropriate correcting factors to different types of count he then estimated that the 47,189 birds counted in 1959 represented a total of 44,526 pairs occupying nests.

If we assume that when our photographs were taken near the middle of the day in reasonably good weather an average number of birds were present, it seems possible that the 1969 figures were comparatively low both because it was late in the season and because many birds were disturbed by the aircraft, whereas the May 1971 and 1973 counts may be comparatively high because this is the time of maximum attendance at the colony and in the latter case in particular because it was observable from the boat that the birds were little disturbed, while only the photographs giving a clear view of them were counted. If we in our turn apply similar correcting factors to our totals and assume that in accordance with Dr. Nelson's figures in the late summer of 1969 an average of about 16% of the nests would have been attended by two birds, of which about half the spare members of pairs were frightened away by the aircraft in the way reported by Dr. Boyd, the number of occupied sites would then be 52,099. Similarly, if we assume that in May 1973 about 22% of the nests were attended by two birds, of which none were frightened away by the boat, the total number of occupied nests would be 59,258.

## Acknowledgements

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## Conclusions

1. The Gannet population of the St. Kilda group appears to have included about 52,099 pairs occupying nests in 1969 and 59,258 occupied nests in 1973, representing increases of 16% and 33% on the last estimate of 44,526 pairs in 1959. The 1969 counts may, however, be an underestimate because they are based on photographs taken late in the season.

2. The accuracy of these estimates may be seriously affected by the presence of non-breeding "club birds" in some parts of the colony, and because fluctuations in numbers around the periphery of the colony were missed owing to the incomplete cover.

3. For any further counts the cover must either be total or as close as possible to the areas covered in previous photographs, and at the same seasons.

4. The use of colour transparencies is probably easier and quicker for counting than black and white prints and will give a similar margin of error.

**T. J. Dixon, The Seabird Group, Zoology Department, Aberdeen University.**

## **THE ANNUAL SEABIRD SAMPLE CENSUS**

**C. J. Bibby**

Operation Seafarer, the total census of British seabirds in 1969, was envisaged as a project not likely to be repeated frequently. Thus, to detect and assess the magnitude of changes it was apparent that a different and more sensitive system would also be required. This view was reinforced by the occurrence of a massive Guillemot mortality in the Irish Sea in autumn 1969 immediately after Seafarer.

In early 1971 plans took shape when the R.S.P.B. agreed to administer such a survey in conjunction with the Seabird Group. Originally the primary aim of the project was to collect information on fluctuations of breeding populations of auks, these being with the exception of some of the terns, especially the Little Tern, the only British seabirds to have shown signs of decline in recent years. The Fulmar and Kittiwake were then added as their population fluctuations might provide useful information on changes in the marine environment; they have been counted in the past, frequently occupy auk cliffs and are also relatively easy to count. All the terns have now been added as well, since some of their colonies are suffering increasingly from disturbance.

Unlike Seafarer, the emphasis of this survey is on accuracy rather than extensive coverage. The intention has been to choose small, easily-reached and clearly-viewed sample colonies with a high chance of being counted every year. The distribution of these shown in the figure reflects the distribution of ornithologists, with very thorough cover in the Irish Sea and less in Scotland by comparison with the distribution of cliff-nesting seabirds.

A substantial problem with many seabirds is knowing how to count them, as the value of such a survey relies entirely on the accuracy of its counts. O'Connor (1969) has discussed this problem in detail and most of his observations remain valid. Subsequent work on Guillemots has indicated the kind of variation of counts to be expected and it seems that a single head count taken in June in the middle of the day is likely to be within 10% of the "true" value. This means that if four such counts are made in each successive year one can confidently detect a 10% change in breeding population and with ten counts the figure can be reduced to 5%. If ten counts are to be made, this should ideally cover a period of several days, so it is immediately apparent that this is a time-consuming job. If a single count of this accuracy is made each year one can only be confident about detecting a 100% change!

Puffins are notorious for the variability of head counts from day to day, and even from hour to hour. It is quite possible to see a colony with no birds at

# A COMPARISON OF AUK MOVEMENTS IN SPRING IN NORTH-WEST SPAIN AND WESTERN IRELAND

R. G. Pettitt

Substantial movements of auks (Alcidae) are regularly observed in March and April in the west of Ireland at, among other places, Cape Clear, Co. Cork, the Mullet Peninsula and its islands, Co. Mayo, and Malin Head, Co. Donegal. There has been some doubt as to whether these movements are to any extent of a migratory nature, or whether the passage of auks from their wintering to their breeding areas takes place far out to sea or is obscured by the movements of birds from local breeding colonies. Devlin (1966) analysed observations made by members of the Seabird Group in March and April 1965, and found that simultaneous peaks of movement occurred at the northern and southern extremities of Ireland at Malin Head and Cape Clear, but that their significance was hard to interpret because they were not obviously related to meteorological conditions and the direction of movement was sometimes obscure, especially in the north.

Small numbers of Guillemots of the southern race *Uria aalge albanica* breed in western Spain, but birds of the northern race *U. a. aalge*, Razorbills and Puffins are not known to breed south of Brittany. In order to obtain observations of movements from a site well outside the likely range of birds which had already returned to the breeding sites I paid a short visit to an area which had already provided interesting observations of autumn migration in north-west Spain (Pettitt, 1969) in early April, 1970. Three days, from 2 to 4 April, were spent watching at the northward-facing Estaca de Bares, followed by five days, 5 to 9 April, at westward-facing Cape Finisterre. Whereas birds coasting south in autumn are known to pass Bares in large numbers moving west around the north-west extremity of Spain, it seemed possible that birds wintering offshore to the south would pass Finisterre if they took the shortest return route to any of the main breeding areas east of Ireland, though they would miss Bares unless they made a detour around the Bay of Biscay afterwards.

It is interesting to compare the results of these observations with those at another site on the north-west aspect of a land-mass lying between the winter and summer quarters of auk populations, Inishkea in Co. Mayo, Ireland. This region has also provided one of the most convincing observations of possible auk migration (Cabot, 1962), although the fact that the auks were only seen moving in one of the three years for which there are observations has led to some doubt about the nature of the movements observed.

## Movements observed

The observations in north-west Spain are summarised in table 1. On the west coast at Finisterre significant movement occurred every day, and 1,070 birds passed north and 13 south in a total of 18 hours' observations. Most passed some way out and were seen by telescope, so that specific identification was not possible. The majority appeared to be Puffins, which provided 84 out of 94 positive identifications, with eight Guillemots, two Razorbills, and 37 large, dark-backed auks which were either Razorbills or Guillemots of the dark-backed northern races. The movement on the last day appeared to involve mainly the larger auks. Only 14 auks passed in eight hours'

watching at Bares covering all times of day, eight of which went west and six east. One of these was a Puffin, and at least six were Guillemots.

**Table 1**  
Auk passage in north-west Spain in April 1970.

Place/Date	Hours	Total auks	
Estaca de Bares		East	West
April 2	1	0	2
3	5	5	4
4	2	1	2
Total	8	6	8
Finisterre		South	North
April 5	5	6	48
6	4	1	237
7	5	4	435
8	2	2	54
9	2	0	296
Total	18	13	1070

The fact that the majority of the birds identified belonged to forms which do not breed in the area suggests that the birds must have included many migrants. The lack of movement at Bares suggests that they must travel directly from north-west Spain to the breeding areas across the Bay of Biscay, an impression reinforced by their tendency to pass Finisterre far out to sea. The movement occurred at the time of a previous passage of Puffins past Inishkea in 1961, summarised in table 2. 37,883 auks passed north here during 34 days of observation. 8,854 were identified specifically, of which 6,596 were Puffins, 2,174 were Razorbills, and 84 were Guillemots, with the Puffins predominating between 6-18 April. Puffins also predominate at Cape Clear in the first half of April, although auk passage as a whole reaches a maximum in the second half of the month (Sharrock, 1967).

**Table 2**  
Auk passage at Inishkea, Co. Mayo

March-April 1961												
Date	20	21	22	23	24	25	26	27	28	29	30	31
Hours	3	2	4	4	4	4	2	5	4	3	3	3
North	292	265	700	800	491	54	754	1026	2162	73	388	1010
South	0	0	0	0	0	0	0	0	3	0	0	0
Date	1	2	3	4	5	6	7	8	9	10	11	12
Hours	3	3	2	2	2	4	3	4	4	2	2	5
North	5550	1165	133	18	221	2420	3290	962	575	372	51	1372
South		0	0	0	0	0	100	34	0	3	17	8
Date	13	14	15	16	17	18	19	20	21	22	—	—
Hours	2	4	3	1	2	2	2	3	4	2	—	—
North	1267	2615	2020	303	271	2708	260	187	3569	1463	—	—
South	17	52	40	7	176	100	5	12	106	46	—	—
April 1965												
Date	1	2	3	4	5	6	7	8	—	—	—	—
Hours	2	2	2	2	2	0	2	2				
North	31	6	166	59	17	—	149	600				
South	210	388	447	17	8	—	805	368				



Two other short series of observations from Inishkea and an adjacent rock, the latter also summarised in table 2, obscure the clarity of the pattern of movement. During a second visit to Inishkea for a week in early April 1965 Cabot only saw a slight south-westerly auk movement. Likewise when I visited Blackrock off Inishkea between 17-26 April, 1969 I only saw 515 auks pass north (75 Puffins and 15 larger auks) and 166 pass south (75 Puffins and 40 larger auks) during 36 hours of observation of the sea both inside and outside the rock. Puffins were, however, passing north at a rate in excess of 500 an hour following a westerly gale during the journey out to the island on 17 April.

The fact that Finisterre seemed to be passed by a concentrated passage of auks moving north in spring, and the similarity in timing and other features of the movement seen there and at Inishkea, strongly suggests that the movement of Puffins at least, and probably the other auks as well, seen at Inishkea in 1961 involved migration. It is not clear why the birds were not seen again in 1965, and few large auks in 1969. Possibly the period of observation was too short. Alternatively, the Puffin migration may only be visible when westerly weather brings the birds close to the shore. This could explain why Cabot saw no northward movement in 1965, while I may have arrived too late in the season in 1969 so that I only saw the end of the Puffin movement following a westerly gale on 17 April.

Another explanation is also possible for the larger auks in particular. They assemble in local concentrations in the waters over the continental shelf before the breeding season, and may migrate to a different extent and use different areas in different years because of variations in the weather and feeding conditions from season to season. The routes and times of return to the breeding areas may therefore vary. The fact that Razorbills once appeared to start moving sooner after the end of bad weather than the other species suggests that they may have travelled a shorter distance.

### Time and Rate of Passage

At Finisterre most of the movement occurred in the early morning, when the average rate of passage was 128 birds per hour. It rarely continued after 1000 hrs. C.E.T., and had declined to an average of eight birds per hour in the afternoon. On 5 April the movement stopped about 0945 hrs. The following day it was still in progress when observations were discontinued for the morning at 1040 hrs., but the birds were starting to land on the water then. On the 7th it continued in unpleasant weather until at least 1045 hrs., but had died away by the afternoon. On the 8th it had stopped by 1000 hrs., and on the 9th, the one day on which the larger species predominated, it ceased abruptly at about 0910 hrs.

**Table 3**  
Average number of auks passing per hour at Inishkea

Start of watch in hours G.M.T.	7-8	8-9	9-10	10-11	11-12	12-13
Number of watches	9	14	21	21	19	17
Average number of birds per hour	553	542	477	319	205	107

*(The records for 1 April, when the rate of movement was more than ten times the above average, have been omitted, as they produce a distortion of values for the hourly periods watched compared with those not watched on that date).*

At Inishkea, the movement of auks was greatest between 0700-0900 hrs. G.M.T., and declined during the morning, though little time was spent watching in the afternoon. The average rate of passage is set out in table 3.

The rate of decline during the periods of Puffin movement on 6-7, 14 and 18 April was similar, falling by half between 0900-1000 hrs. Significant passage only occurred in the middle of the day on 1 April, when 2,670 birds mainly of the larger species passed north between 1120-1220 hrs., and 1,490 and 1,390 during the next two hours respectively. Unfortunately the numbers passing earlier in the day were not recorded.

The average rate of passage of 128 birds per hour in the morning at Finisterre may be compared with an average rate for the same period, the first half of April, of 269 per hour, about half Puffins, at Cape Clear during the eleven years 1959-1969, and 489 birds per hour at Inishkea in 1961. If the averages for different years and sites are comparable, and we ignore subsequent negative observations at Inishkea when observations were carried out at the wrong time or the wind did not bring the birds inshore, the observations, which are compared in table 4, suggest that an increasing number of birds pass at successive stations from south to north, as might be expected if a winter population spread out all down the coast of Europe is moving north.

**Table 4**  
Average rate of auk passage per hour for half-monthly periods

Station	March 16-31	April 1-15	April 16-30
Finisterre, 1970	—	67	—
Cape Clear, average 1959-1969	185	269	495
Inishkea, 1961	201	489	547

#### **Effect of the Weather**

Sharrock (1960) has pointed out that unlike other seabirds the auks are most commonly recorded moving past Cape Clear in conditions of good visibility, without rain. Particular attention was paid to their response to the weather at Finisterre. The amount of data is inadequate for a detailed analysis, and there was never either really poor visibility or high seas. However, the highest rate of movement occurred on the one really calm, bright day, 9 April, when 266 birds per hour passed between 0745-0945 hrs., and the passage ended earlier than usual. The birds concerned were mainly large, dark-backed auks (not southern Guillemots) with some Puffins. On 6 April force 5-6 north-east headwinds with fairly calm seas did not appear to prevent movement, which occurred at a rate of over 100 birds per hour, including both Puffins and the larger auks, though it may be significant that the movement now continued longer than usual.

Fortunately, an opportunity was provided on 7 April to observe the response of the auks to variations in the weather. The previous night was wet, and there was a calm, sunny spell in the early morning with an excellent visibility. This soon gave way to north-east winds of force 5 or more and intermittent squally rain-clouds. Between 0815-0915 hrs. auks which appeared to be mainly Puffins could be seen passing north in the extreme distance. When a large rain cloud approached between 0915-0925 the Puffins came closer to the shore, and began to land on the sea. When it started to rain lightly, not sufficiently to prevent the birds being seen, at 0925 hrs., all movement ceased, and no more was seen during either the rain or periodic dry intervals. Then when the cloud left the area at 0954 hrs. the passage started again as suddenly as it had stopped. A similar break occurred when another cloud with a little rain passed to the north at 1015 hrs., when birds which had been moving far out stopped and only started again when the cloud had passed at 1038 hrs. In this case, while

Table 5

Major auk movements at Inishkea in 1961 in relation to weather conditions

Date	Hours	Number	<u>Birds</u>		<u>Weather</u>	
			Species	Present local	Past local	Past to south
March 27/28	7	3,188	Large Auks	NW 2-3, ex vis (27) SW 2-4, var vis (28) Calm sea (27-28)	SSW 5-6, fog (25) NW 3-4, heavy sea (26)	Good; several days of anticyclone
March 31/ April 2	9	7,725	Large Auks	SW 4, mod vis (1) N 1, ex vis (2) calm sea (1)	W 3-5 mist/fog (29) calm, mist/fog (30) heavy sea (31)	Good; anticyclone persists
13 April 6/7	7	5,710	Puffins	N 3, ex vis, calm sea	E 7-8 rain/hail, drizzle (4) NE 7, rain (5) choppy sea (4)	Poor, fronts (4) nil (5) S airstream ahead low (6)
April 13/14	7	3,902	Puffins, Razorbills (13)	SSE 1-2, ex vis (13) W 3, ex vis (14) calm sea	SW 7, rain/fog (11) SSW 2-3, sea mist (12) choppy sea	Poor, front (12) Westerlies (13) Light W (14)
April 18	2	2,708	Puffins	SE 1-2, ex vis (21) calm sea	NE 2-3, fog/drizzle (17) drizzle (17) calm sea	Poor, front (16) S airstream ahead deep low (17)
April 21/22	6	5,032	Puffins, Large Auks	S 5, SW 2-3 ex vis (22)	S 8 (19), SE 6-7 poor vis, rain (20)	Poor, strong W airstream (19) Front (20) passed night (20/21)

the rain was insignificant, the clouds were clearly associated with considerable gustiness, which may have been the factor which inhibited movement.

There were six periods of intense auk activity at Inishkea, summarised in table 5, together with details of the local weather for the previous days, the period in question, and the sea area south of Ireland. The local weather in the case of all six movements was good, with winds below force 5 except on the first day of the last movement, excellent visibility, and calm seas. In four of the six cases the sea had previously been heavy or choppy. In all six the previous days had been foggy. In all but two the wind had been force 6 or more. In one of the cases where the wind had not been particularly high, there had been high seas resulting from a long period of westerly winds, largely affecting the area north of County Mayo. To this extent, any hiatus in the movement of auks can be explained by local conditions, without considering those in the area of origin of the birds to the south.

The first and second movements involved mainly the larger auks. These followed long periods of anticyclonic conditions over the sea areas Sole and Biscay which would have provided suitable conditions for passage during periods when there was little. Clearly, it must have been local, rather than distant, conditions which inhibited migration. However, the four movements involving mainly Puffins occurred after poor weather had cleared from the sea areas south of Ireland and been replaced by what appear to be suitable conditions for migration. Fronts passed on 4 and 5 April, to be followed by a southerly airstream in front of a depression next day, and the peak Puffin movement occurred then and the following day. A front dominated the Bay of Biscay on the 12th, with strong westerlies next day and lighter ones the day after, and Razorbills started moving on the 13th and Puffins on the 14th. Another front blocked the seas south of Ireland on the 16th, but passed leaving a southerly airstream ahead of a deep depression next day, and the Puffins started moving again the day after, following a period when local conditions were calm with fog and drizzle. Westerly winds then occurred again in Sole and Biscay on the 19th, followed by the passage of a front on the night of the 20th-21st, and both Puffins and larger auks started moving again over the next two days as a southerly airstream set in behind it. In the case of the Puffins at least an explanation of the fluctuations in the rate of passage can be found in the conditions at sea further south, movement occurring with south winds following the clearance of a front to the east.

### **Acknowledgments**

I am indebted to Dr. J. T. R. Sharrock for access to the records of the Cape Clear Bird Observatory and helpful suggestions, and Dr. David Cabot for permission to use his records from Inishkea.

### **Summary**

Northward movements of Puffins, and to a lesser extent the larger auks, were observed in north-west Spain in April 1970. The occurrence of more birds along the west coast than in the north suggested that they continued across the Bay of Biscay. They occurred at the same time as similar movements of increasing size at Cape Clear in south-west Ireland, and in one previous year at Inishkea in north-west Ireland, which suggests that these also involve migrants. More birds normally moved in the morning than the afternoon, but local fog, wind, or high seas inhibited the migration, which

was suspended temporarily during the passage of squalls of even short duration, though it started again afterwards. The larger Puffin movements, and to a lesser extent those of the larger auks, occurred in Ireland after the clearance of fronts from the sea areas to the south.

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# LARGE PASSAGE OF SEABIRDS AT CAP GRIS NEZ

P. J. Oliver and D. L. Davenport

## Introduction

Regular observations in recent autumns at Cap Gris Nez, Pas de Calais, France, have shown that seabird passage in the Straits of Dover frequently takes place on a far larger scale than has been recorded off the south-east coast of England (Gibbs *et al* 1965; Cap Gris Nez Bird Observatory Rep. 1965, 1966-67 and 1967-68). In particular Oliver (1971) has shown that south-westerly passage of Sooty Shearwaters has occurred in most recent autumns. In October 1970, however, passage of several species took place on a greater scale than previously recorded, and the purpose of this paper is to describe these movements in relation to those observed at the same time in the North Sea. The movements occurred on 2 and 3 October, and again from 19 to 22 October, with good numbers of ducks and geese continuing to be seen on 23 October.

## Weather Conditions

On 29 September a depression approached the British Isles, following a period of light southerly winds. This depression moved east from the Atlantic giving rise to the normal pattern of weather associated with such conditions. At Cap Gris Nez the wind veered gradually from south-west force 2 on the 29th, to west force 6 on the 1st, and there were several hours of rain on the morning of the 30th. The cold front passed over in the early hours of 2 October, and the wind increased to force 7, veering gradually to north-west. This strong air stream covered the whole of the British Isles and the North Sea on the 2nd and 3rd, while the centre of the depression moved from Iceland to the southern Baltic Sea, without appreciably filling.

On 4 October, the weather became milder and there followed a period of light to moderate westerly winds until the 9th, succeeded by easterly winds until the 17th. On the 18th a large depression, centred at a latitude of 70°N over the Norwegian Sea, brought westerly winds to Cap Gris Nez again. During the night of the 18th—19th, the centre of this depression moved 500 miles south in only 12 hours, bringing with it strong winds. At Cap Gris Nez the wind at dawn on the 19th was west-south-west force 7, and the cold front, which could be seen clearly as a belt of squally rain, passed over soon afterwards. The accompanying drop in temperature was very noticeable. As on 2 October, the passage of this front left a north-west airstream covering the British Isles and the North Sea continuing, on this occasion, for five days as a result of the development of a strong ridge of high pressure west of Ireland. The weather conditions at 0600 hours on 19 October are depicted in Figure 1, which also shows the location of the principal places mentioned in this paper.

## Observations at Cap Gris Nez

Table 1 gives details of the numbers of the principal seabirds recorded at Cap Gris Nez during the two movements. The timing of these movements in relation to the weather was broadly comparable in each case with earlier observations, little movement occurring until skies cleared after the fronts had passed. As is usual at Cap Gris Nez the first birds to be seen were Sooty

Shearwaters, and then Gannets, followed by Kittiwakes and Skuas. Comments on certain species follow; references to the previous status of species at Cap Gris Nez are based upon the observatory's records.

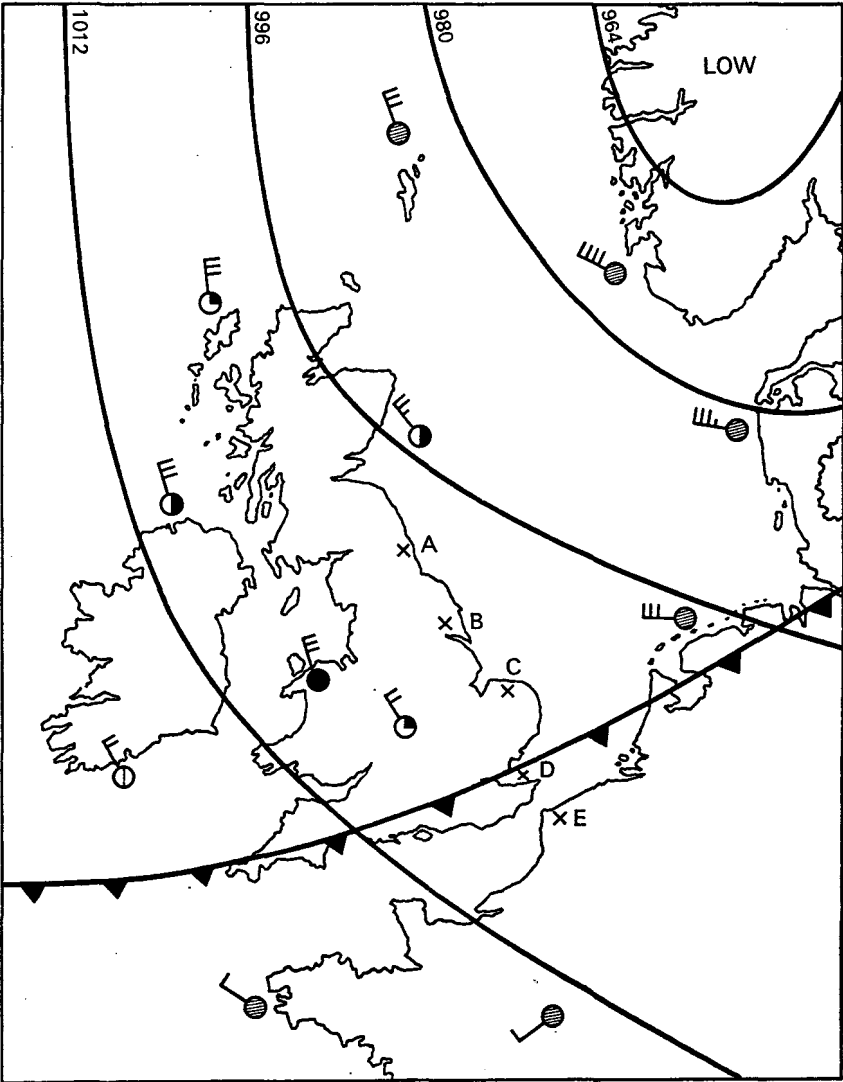


Figure 1. Weather situation at 0600 hours, 19 October, 1971 and location of principal places mentioned in the text.

A: Hartlepool. B: Spurn. C: Cley. D: Shellness. E: Cap Gris Nez.  
Leach's Storm-petrel and British Storm-petrel. No petrels were seen in the first movement. In the second, none were seen until rather more than

24 hours after the cold front had passed Cap Gris Nez and the wind had veered to north-west; thereafter individuals of both species were seen more or less regularly for three days. At times two or three were seen in quick succession, and a number of British Storm-petrels fed briefly quite close inshore, but for the most part both species flew rapidly south-west. More Leach's than British Storm-petrels were identified in the rougher weather of the 20th than subsequently. The sea-watch point at Cap Gris Nez is sufficiently high to enable fair views of petrels passing reasonably close to be obtained in the roughest conditions, but those further out were frequently obscured behind the waves, and it seems certain that only a small proportion of the total number that passed the Cap was actually seen. Nevertheless, including those not specifically identified, a total of 53 small petrels was recorded. In no previous year have more than two of either species been observed at Cap Gris Nez.

Manx Shearwater and Sooty Shearwater. The numbers of both species recorded were unexceptional and followed the pattern of previous movements described by Gibbs *et al* (1965) and Oliver (1971). Fulmars, of which only two were seen, have always been scarce in the autumn at Cap Gris Nez.

Gannet. The numbers recorded were comparable to those observed at Cap Gris Nez in most recent years, but well below the total of 1,100 counted in nine hours on 2 October, 1969.

Velvet and Common Scoter. Normally at Cap Gris Nez the migration of these species at the time of other seabird movements is greatest when the wind begins to slacken. The large number seen on the 3rd was therefore unusually early in relation to the sequence of weather conditions, whereas the pattern in the second movement was more typical. It should be emphasised that the movement of such numbers, which were about usual for October, are not restricted to periods of westerly gales as are those of the other species under consideration.

Brent Goose. Movements of more than a few individuals past Cap Gris Nez have not previously been recorded, so the total of over 700 counted flying south-west between 21 and 23 October was unprecedented.

Arctic and Pomarine Skua. Identification of the various species of skuas can at times be difficult and a proportion of those seen in large movements off Cap Gris Nez is usually not specifically identified. It is generally clear, however, which is the more abundant species in any movement, and Arctic Skuas have always been the commonest species except on 17 and 18 October, 1967 when at least 64 Pomarine Skuas were identified in weather conditions closely similar to those obtaining at the time of the movements now under consideration. In the case of the movement on 2 and 3 October, 1970 complete details are unfortunately not available. It is known that some Arctic Skuas were specifically identified, but the great majority of the 519 counted were thought to be Pomarine. A slightly higher proportion of the total was identified during the second movement, and again a significant proportion were Pomarine, the totals for the four days being 286 Arctic, 220 Pomarine and 658 unidentified. Most of the latter were thought to have been Pomarine but at longer ranges it was not always possible to distinguish with certainty between this species and Bonxies or Great Skuas. A high proportion of the Pomarine Skuas was of immature birds (only 12 adults being seen in the second movement) but with practice many were identified by their broader based wings, rather more ponderous flight and deeper-chested appearance compared with the Arctic Skuas; from time to time these features could be confirmed as a flock containing an adult with complete tail feathers flew by. No information concerning flock size or rate of passage is available for 2 or 3 October, but in the later movement the skuas passed in flocks of up to 18, and in the hour after first light on the 21st, 110



Pomarine or Arctic Skuas were counted passing, with Bonxies, in an almost continuous stream. The rate of passage declined thereafter. Apart from the movement in October, 1967 already referred to, no more than 11 Pomarine Skuas have previously been recorded on any one day at Cap Gris Nez. The numbers of Arctic Skuas were less exceptional, although the 193 identified on the 20th exceeds by about 40 the previous maximum for one day.

Bonxie. As noted above, it was difficult at times during the second movement to distinguish distant Bonxies from Pomarine Skuas, and these indeterminate birds are thus included in table 1 as not specifically identified. Prior to 1970 the highest number of Bonxies observed in one day at Cap Gris Nez was 24 on 18 October, 1967, at the time of the movement of Pomarine Skuas referred to above. It will be seen from table 1, however, that the numbers in the second movement were so large in relation to these earlier movements as to constitute a quite exceptional passage, with over 150 in the two days 20th—21st. As with all the other species the Bonxies flew rapidly south-west without pause.

Lesser Black-backed and Great Black-backed Gull. No counts were made of these species but as is usual at the time of other seabird movements at Cap Gris Nez in October large numbers (several thousands on the 22nd) passed south-west.

Little Gull. Table 1 shows that relatively few were counted on 2 and 3 October, but it is of interest that 120 flew south-west on 17 October, before the subsequent depression had affected the southern North Sea. The large numbers seen thereafter, totalling nearly 1,470 in the four days, are, as with those of the Bonxie, much greater than previously recorded at Cap Gris Nez, where 200 on 26 October, 1969 represents the highest previous autumn count.

Kittiwake. This is a typical species in October movements at Cap Gris Nez, and the numbers recorded call for no special comment.

Auks, Razorbills and Guillemots were not usually separated and the proportions of each species included in the figures in table 1 are not known. In total the count of 1,200 on 19 October is a little higher than the maximum previously recorded.

Puffin. Doubtless some Puffins were not identified and were thus included in the totals of auk sp. in table 1. Nevertheless, the total of 60 recorded between 19 and 22 October is much higher than has been previously recorded at Cap Gris Nez, the maximum for recent autumns having been only five.

Of the scarcer species seen, Phalaropes have not previously been recorded at Cap Gris Nez, and in addition to the two that flew south-west, a Grey Phalarope was feeding off the Cap on the 22nd. Sabine's Gulls have occurred in small numbers in most recent autumns, not exclusively at the time of gales.

#### **Comparison with Other Localities**

Table 2 shows the numbers of Skuas and Kittiwakes recorded at other stations in the North Sea at the time of the movements observed at Cap Gris Nez. Records from the Wash have been published in the Cambridge Bird Club Report 1970. Information received from stations in the English Channel, and also from Belgium and Holland, showed that with the exception of 46 skuas (some Arctic and some undoubtedly Pomarine) seen in two hours at Westapelle, Holland, on 3 October (Huyskens, in litt.) the only significant movements elsewhere were observed from the east coast of England between the Thames Estuary and Hartlepool (Co. Durham). The movement at Westapelle was regarded as exceptional, Huyskens commenting that 'normal passage there being no more than ten skuas for a period of watching of eight hours'.

Numbers of Sooty Shearwaters, petrels, auks and Little Gulls recorded elsewhere in the North Sea were much less than at Cap Gris Nez, and apart from skuas, only Kittiwakes were consistently recorded in high numbers on the British coastline, and then only in the movement of 19–22 October. Table 2 shows that a southerly movement of Kittiwakes took place in the northern North Sea on the 20th resulting in a large increase in numbers in the Wash and Thames Estuary the next day. There was a corresponding northerly movement, presumably of birds which had already been as far as the Wash, in the northern North Sea on the 21st. These movements contrast with the much more steady south-westerly movement at Cap Gris Nez which lasted four days. The total numbers of skuas show a similar distribution; whereas the peak numbers occurred at Cap Gris Nez on the 20th, the main build-up in the Wash and Thames Estuary occurred on the 21st, and there was a return northerly movement off the Durham coast lasting until the 22nd. Apart from unspecified numbers of Pomarine Skuas at Weybourne on the 20th and 60 in the Wash on the 21st, this species was much less numerous off the English coast than at Cap Gris Nez.

## Discussion

The coincidence of movements of seabirds, notably skuas, with north-west winds has already been commented upon with respect to the north Norfolk coast, the Thames Estuary and Cap Gris Nez (see, for example, Cambridge Bird Club Reports for 1962 and 1965, Wheeler (1970), Davenport (1971) and Cap Gris Nez Observatory Reports). No attempt has, however, been made to explain this coincidence and so far as we are aware the autumn of 1970 is the first period for which observations are available for the same movements at all three localities.

The main feature of such movements is that they typically follow the eastward passage of cold fronts across the North Sea. Thus movements at Cap Gris Nez have normally started when the wind has been westerly force 6 to 8 and continued as it veered to the north-west and moderated. Large movements may still occur even if the wind remains from the westerly quarter, as happened at Cap Gris Nez in September 1963, when 290 Arctic Skuas and 190 Sooty Shearwaters occurred in a period of west and south-west winds (Gibbs *et al* 1965). Neither is a strong wind necessarily a critical element in the meteorological conditions. In two movements of seabirds in the Thames Estuary in 1969 the wind was only force 3 (Davenport, 1971), and one of these coincided with the peak count of Gannets at Cap Gris Nez on 2 October referred to earlier.

Thus broadly the same conditions appear to precipitate movements in the North Sea as have been described, for example, at Erris Head on the west coast of Ireland (Phillips and Lee, 1966), Anglesey (Eades, 1966) and St. Ives, Cornwall (Phillips, 1966). The movements at Erris Head were related to the period of good visibility and clear skies that normally follows the passage of a well defined cold front, but it was suggested that the movements at St. Ives and Anglesey were of birds blown onto a lee shore by west winds and returning west as the winds moderated and/or backed north or north-west. Similarly, Vine and Easy (1965) have suggested that the occurrence of large numbers of seabirds in the Wash can be attributed to northerly gales that blow the birds into this confined area.

The fact that in the Thames Estuary and at Cap Gris Nez some movements have been recorded without a northerly component in the wind, and indeed without strong winds, shows that in these areas the birds are not necessarily wind-blown.

When a series of depressions passes east, the periods of clear weather behind the cold fronts are often the only times when the weather remains fine, and for those sea birds seen flying past Cap Gris Nez they provide the best opportunities for the migratory step from the North Sea to the Atlantic. Indeed for those species such as shearwaters, Gannets and skuas which are able to fly in a 'bounding' fashion, the opportunity to migrate in strong winds and fine weather should be a distinct advantage.

On this hypothesis, the concentrations in the Thames Estuary and on the north Norfolk coast would be the result of a generally southerly direction of flight by birds migrating on a broad front, and the 'guiding line' effect of an opposed east-west coast. The skuas (if not other species) evidently clear the coast either by gaining height and flying inland, west or south-west, or returning to the North Sea (for examples of inland migration of skuas see Cambridge Bird Club Reports for 1954 and 1962 and Davenport (1971)). That not all of these birds continue south is, however, demonstrated by the records of those flying north off Spurn and Hartlepool. Why some birds should behave in this way is not clear.

It follows from the foregoing that the immediate origin of the seabirds that passed Cap Gris Nez in October, 1970 must have been the North Sea. A more specific clue is provided by Bonham (1971) who reported a noticeable departure of Bonxies from Shetland at the time of the movement of 19 to 22 October. In the case of other species one can only speculate that they too were feeding in the North Sea or further north in the Atlantic and took advantage of the weather conditions in the manner postulated above. This supposition would appear to be valid for the Gannets, shearwaters, skuas and Kittiwakes, all of which have previously occurred in similar circumstances, if not always in such large numbers.

The appearance of petrels and Little Gulls at Cap Gris Nez in far greater numbers than hitherto recorded calls for further comment. Boyd (1954) following earlier authors showed that, alone among small petrels occurring in the Atlantic, Leach's Storm-petrels appeared prone to be storm driven. The fact that both this species and British Storm-petrels occurred at Cap Gris Nez together, and in all cases appeared to be flying strongly in the rough weather, suggested that neither species was storm driven, but rather making a deliberate migration. Admittedly, the fact that such movements have not previously been recorded at Cap Gris Nez, detracts from this argument, and it seems that on present information no definite conclusion can be drawn on the occurrence of these species there in 1970.

Little Gulls have an eastern rather than northern breeding distribution (Voous, 1960) and those seen in October, 1970 at Cap Gris Nez could therefore have come from the Baltic. On the other hand, large concentrations have been observed on the Belgian coast, though apparently only in the early autumn (see, for example, Van Impe, 1966). It is therefore perhaps equally likely that those passing Cap Gris Nez had their immediate origins in these concentrations in Belgium. It is not at all clear, however, in view of the regularity with which large numbers are noted there, why similar numbers have not been seen in earlier seabird movements at Cap Gris Nez.

To conclude, therefore, it is clear that the passage of Sooty Shearwaters, and Gannets, Auks and Kittiwakes that took place at Cap Gris Nez on 2 and 3, and between 19 and 22 October, accords with previous experience at Cap Gris Nez and elsewhere in the North Sea, and can apparently be explained by the associated meteorological conditions. However, the factors that precipitated the movement of unprecedentedly large numbers of petrels, Pomarine Skuas and Little Gulls have not been identified. Moreover in the case of the Pomarine Skuas these movements are the largest that we have been able to trace having occurred in the North Sea since the massive

numbers reported off Yorkshire and the east coast of Scotland at this season at the end of the last century, notably under similar weather conditions on 14 October, 1879 (Nelson, 1907; Baxter and Rintoul, 1953; Wynne-Edwards, 1963).

### Acknowledgments

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Table 1

Numbers of selected species recorded flying south-west past Cap Gris Nez,  
France, October 1970.

Date	2nd	3rd	19th	20th	21st	22nd	23rd
Wind direction and force	W 6	NW 7	WSW 8	NNW 6	NNW 6	NNW 5	N 4
Hours	3	7½	9½	10	9	9	7
Leach's Storm-petrel				6	9	2	
British Storm-petrel				1	11	13	
Petrel sp.				1	9	1	
Manx Shearwater	13	16	7	3			
Sooty Shearwater	34	21	133	5			
Fulmar			1			1	
Gannet	245	524	130	300	300	43	50
Common Scoter	180	3,030	30	450	1,700	1,300	2,200
Velvet Scoter		18	6	11	190	350	500
Brent Goose				8	420	68	248
Phalarope sp.			1			2	
Arctic Skua	48	?	20	193	72	1	1
Pomarine Skua	3	58	3	165	46	6	1
Bonxie	11	24	3	44	108	1	
Skua sp.	106	461	100	200	338	20	
Little Gull	1	25	48	800	350	270	13
Black-headed Gull	?	?	50	50	500	1,000	500
Sabines Gull		2	2				
Kittiwake	1	325	1,500	2,200	6,000	5,000	700
Auk sp.	6	434	1,200	370	37	155	16
Puffin			3	25	25	7	

Table 2

Numbers of skuas and Kittiwakes at selected localities, October, 1970.

Locality	Hours of count	Direction of flight	Arctic Skua	Pomarine Skua	Bonxie	Kittiwake
3rd October						
Hartlepool	6½	N/S	11/32	3/4	4/-	•
Spurn	5½	N/S	2/16	-/-	-/8	25/-
Southern Wash	3	*	120	—	100	60
Hunstanton/Holme	4½	SW	150	5+	100	50
Cley	*	'inshore'	70	—	50-60	*
Weybourne	4	W	45	7	127	*
Shellness	9	NW	70	2	200	120
19th October						
Hartlepool	5	N/S	2/5	—	-/3	*
Spurn	•	S	2	—	—	1/1
Southern Wash	•	*	'few'	2	30	—
Holme	1	SW	30	—	60	—
20th October						
Hartlepool	6	N/S	-/221	10/17	36/12	'many'
Spurn	4*	N/S	-/14	-/-	1/12	-/10,000
Holme	6½	SW	160	7	78	1,100
Shellness	9	SW	26	—	82	200
at Weybourne skuas flew East at '50-100 per hour—Bonxies, Pomarine and Arctic, in that order of abundance.'						
21st October						
Hartlepool	11	N/S	50/20	-/11	3/-	5,000/200
Spurn	3½	N/S	-/5	-/6	3/4	'hundreds'
Southern Wash	*	*	400	60	40	20,000
Shellness	9	SW	87	8	161	3,000
22nd October						
Hartlepool	6½	N/S	93/2	—	2/-	—
• Not known						

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## THE MOVEMENTS OF TERNS AROUND EAST ANGLIA IN SUMMER

**R. G. Pettitt**

In 1948 David Butt and I began a series of dawn to dusk watches at Lowestoft in Suffolk, in the course of which we became interested in the diurnal movements of Common Terns. I continued these watches during the next three summers and again aided by P. Moss, P. Lever, H. Jenner and J. C. Eaton at this and other sites in 1960.

In the earlier years the terns from the large north Norfolk colonies fed locally or in the Wash. The coastline where the observations were carried out was exploited by birds from the smaller and ill-fated colony on Scroby Sands off Great Yarmouth (Fig. 1). The history of this colony is reported by Robin Harrison in 'Wild Bird Protection in Norfolk' for 1947, and the subsequent Norfolk Bird and Mammal Reports. Breeding was first reported when the bank became fully stabilised in 1947, and continued until 1964. In 1966 the bank became submerged, but it has since reappeared, and breeding occurred again in 1971. During most of the early years, including all those when watching was carried out, the eggs or young were destroyed by high tides. The extent of breeding recorded and date of destruction is set out in table 1.

Table 1: Common Terns nesting on Scroby Sands.

Year	Number of nests	Date of destruction
1948	368 +	5 July
1949	(not known)	Between 5-26 June
1950	170 +	3 July
1951	360	24/25 June
1960	270	1 July

## **SHEARWATERS AND OTHER SEABIRDS AT SLYNE HEAD, CO. GALWAY, IN THE AUTUMN OF 1969**

**J. Sheldon and D. Bradshaw**

During late August and early September, 1969 we paid a second visit to Slyne Head off the western extremity of Co. Galway to observe seabirds. Our findings were much the same as in the same period the year before (Seabird Bull. 7: 34-41), with large northward movements of Fulmars and Manx Shearwaters and some Sooty Shearwaters at the end of August, but we saw more large shearwaters in September. These included three Cory's Shearwaters passing north on the third, and a similar number passing south, one passing north, and a large unidentified shearwater passing south next day. Three Cory's, twenty-four large brown shearwaters and forty Sooty Shearwaters were seen again on the 7th, rather more birds passing north than south, and there was then a massive northward movement of large brown shearwaters, which where they could be identified appeared to be Great Shearwaters, the following day, followed by a slightly smaller southward movement the day after. Details of the observations are given in the table.

At 0700 hours on the morning of 8 September the wind was westerly, force 4·5, with a choppy sea, seven-eighths cloud, and a visibility of 25 miles. A front passed through between 0830—1000 hours with heavy drizzle, and the visibility dropped to less than a mile, but rose again to five miles afterwards, while the wind remained steady all day. The bulk of the large shearwaters moved north further out than the main stream of Manx Shearwaters three to four hundred yards offshore, and most of them could not be identified specifically, but occasional birds left the line and came closer in with the Manx Shearwaters, and all of these were clearly identified as Great Shearwaters. Most birds were seen between 1700—2030 hours, when 835 moved north and none south.

At 0700 hours on 9 September the wind had risen and backed to south-west, force 7, and the sea was very rough. The sky was overcast, and rain fell intermittently between 0800—1030 and 1115—1600, after which the wind had dropped to force 5. Before it started raining the line of moving birds could only be seen in the distance again, and they could not be identified specifically, though 78 were seen to pass south and one north. After 1030 hours they started passing only three hundred yards offshore, and some 186 Great Shearwaters were seen passing south, and one north. Observations were resumed at 1800 hours with a fair light though the sea was still rough. A large party of birds were then seen to get up off the sea to the north at 1830 hours and fly south, some 600 passing in two or three minutes just too far away to be certain that they were Great Shearwaters. Only five other large shearwaters were seen during that hour, all going north, while in the following hour six went north and twelve south. The rate of passage of Manx Shearwaters in this period was also low, with only 35 going north and seven south.

It seems possible that a mass of Great Shearwaters came in north-west with poor visibility when the front passed on 8 September, perhaps in many cases settled somewhere offshore to the north, and returned south when the weather cleared next day. It is notable that there was also an exceptional southward movement of Fulmars (which had previously shown an overall tendency to move north) the following day as well, while unusual numbers of Gannets also started feeding close to the point at this time as well, with up to 850 seen at once.



Table 1

Birds passing north (N) and south (S) at Slyne Head, August-September, 1969

		August					September										Total
Date		27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	
Hours		2½	10	9	5½	4	8	4	3½	11	6	5	8½	10	8	7	102
26	Cory's N								3	1			3				7
	Shearwater S									3							3
	Great N													38	7		45
	Shearwater S													1	186	1	188
	Cory/Gt. N									1			15	1051	12	1	1080
	Shearwater S									1	1	2	9	70	690	3	776
	Sooty N	8	57	27	4	2	14	3	2	1			27	49	6	13	213
	Shearwater S			1			6		1		3	9	13	49	83	7	172
	Manx N	1300	2877	797	1971	1062	797	598	48	597	950	314	218	372	36	163	10991
	Shearwater S	1	294	436	297	4	247	80	389	267	368	252	151	261	121	67	3532
	Fulmar N	558	1470	952	586	336	470	164	250	634	437	189	321	251	136	411	7193
	S	—	101	73	25	15	74	41	41	40	34	40	65	37	185	2427	3203
	Gannet N	81	591	461	441	458	940	174	216	1090	726	415	508	385	Not counted		6184
	S	—	29	28	20	9	45	47	67	31	36	112	119	261			800
	Kittiwake N	11	46	47	34	19	60	34	33	72	42	49	79	94	53	59	720
	S	—	2	4	6		6	1	2	4	1	2	12	8	15	14	72
	Auk sp. N	—	2	10	3	7	24		16	79	47	39	41	33	6	10	317
	S								1	2			1			2	7

(The Gannets were only counted for the first 87½ hours, since many began feeding nearby afterwards).

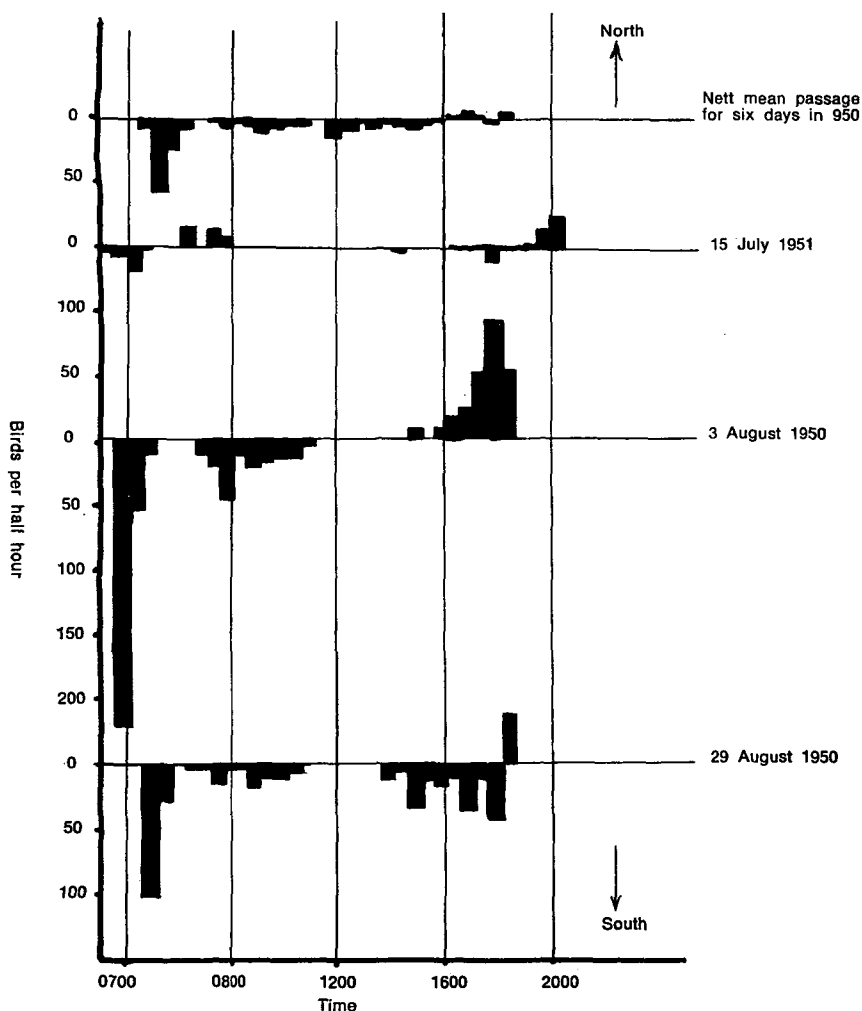


Figure 2: Tern Passage at Lowestoft.

The major activity occurred in the first hour or so after dawn, following a period when no birds were seen. Other periods of activity occurred in the mid-morning and mid-afternoon, with a strong revival in the evening. An impression of the general pattern is given first in figure 2, which shows the mean nett movement per half hour in the six full day watches of 1950. The rhythm, however, showed a distinct change during the summer months in this and the following year. The only observations for May (13 May, 1951) and June (30 June, 1951) revealed no movement past the Ness. In July there was little nett southerly movement, but a small number of terns passed south, and an equal number later returned north. The second part of figure 2 shows

the movement during 15 July, 1951. Fifty birds passed in the hour after dawn. Then there was a lull, after which the same number returned north. From mid-morning till the late afternoon no movement was seen, but in the late afternoon a similar movement occurred, the birds first passing south and then returning north. It appeared as though a double feeding-movement was taking place from Scroby Sands.

In August the total number of birds passing the Ness increased to between two and nine hundred per day, but the nett southerly movement varied considerably more. Two basic patterns occurred. The first seen on 3 August, 1950, and shown in the third part of figure 2, involved a quick movement in the first hours after dawn, a lull, when any birds seen were usually feeding, a smaller southerly movement during the morning which tailed off during the afternoon, and then a substantial number of birds hurrying north in the late evening. If these were the same birds that passed south during the morning, the greater number would eventually have returned.

A second pattern is shown by the movements seen on 29 August, 1950, illustrated in the fourth part of figure 2. A similar series of southward movements during the morning were followed by further southerly movement in the afternoon and a very small northward movement at the end of the day. It was not possible to tell until the end of the day whether a major nett overall southward movement was occurring or not. In any case, the terns were now clearly settling out on longer southward movements from which they did not return in the middle of the day. On some nights they failed to return at all, possibly beginning the first stage of their post-breeding dispersal.

It is tempting to think that on the nights when the terns did not return they reached the feeding area of the next colony or roost, perhaps at Benacre (which then had a Little Tern colony which was also used as a roost by Common Terns) or Orfordness. The birds which passed Lowestoftness in the early morning rush must have come from Scroby that morning unless they slept on the sea or flew by night, but they must also have included birds which had not bred or been reared there; for example, on 29 August, 1950 juveniles passed in the morning rush although none had been reared at Scroby Sands that year.

The date of the last northward return was not often ascertained, but clearly varied from year to year. There was still a good return movement at the end of the day in early September, 1948. There was a large return movement on 3 August, 1949, and again on the same date in 1950, when the return north remained noticeable until early September. In 1951 the return north was already small on 2 August; it may be significant that the destructive tides obliterated the Scroby Sands colony unusually early, on 24 and 25 June, in this year, instead of in early July. In 1949 high tides also occurred early, but the birds continued to attempt to breed throughout the season that year.

In the only year during which observations were continued during September, 1950, the nett movement was south then, with the pattern of movement established in August persisting until 15 September. During one later watch, on 19 September, the small number of birds passing continued fairly evenly distributed throughout the day. No doubt they came from distant colonies, and did not use Scroby Sands as a staging-post. In any case at this time of year the movement was doubtless mainly migration and much may have occurred unseen.

### **Observations to the North**

To the north of Scroby Sands the movement was mainly southerly, though on some days there was no nett movement. The nett southerly passages on

the four full day watches in the first years of the study, and the nett northerly movement in the three days in 1960, are set out in table 3. A northward movement in the morning, with a return in the later morning or the same evening, was discernible, but it never reached significant proportions. In 1951 it totalled 60 birds on 8 July, 20 on 22 July and 60 on 6 August. There was thus no indication of an extension and increase of the movement away from the colony during the season in this direction as there was in the case of the southerly movement.

Table 3: Common Tern movement at points north of Scroby Sands.

Date	Place	Maximum number north	Nett passage & direction
11 September, 1950	Scratby	negligible	—
8 July, 1951	Winterton	60	22 south
22 July, 1951	Winterton	20	224 south
6 August, 1951	Winterton	60	1,030 south
16 July, 1960	Winterton	£80	50 north
30 July, 1960	Winterton	212	27 north
6 August, 1960	Waxham	102	74 north

## Discussion

Where the daily routine to the north or south of the colony departed from the pattern described this was usually due to a single movement of birds on a day of greater than usual activity, commonly a movement in the middle of the morning on a day with east winds. This suggests the arrival either of birds of continental origin, or from further north along the British coast, which might otherwise have passed by further out to sea. Little Gulls sometimes also occurred with these movements, which particularly suggests an eastern origin for them. On days with a heavy movement it often continued over the period when activity was usually suspended, especially during the middle of the day. It was however interesting to observe that when conditions were adverse the progress made was better when the birds were normally passing south than when they were not doing so. On two September watches it was noted that they continued to fly into a fresh head-wind until 13.30 hrs., but then allowed themselves to be blown back until 14.30 hrs., when the passage was resumed.

The persistence of pauses in activity during certain periods of the day whether there was a nett southerly movement (i.e. presumed migration) or the birds were only feeding is interesting. Besides the watches at Lowestoft, the one full day watch carried out at Thorpeness, twenty miles further south, revealed a pause in activity at the same times, between 05.00-06.00 hrs., in the mid-morning, and the early afternoon. The watches at Winterton showed similar lulls during the very different movements observed there. If, as seems the case, these lulls are general, an explanation is probably to be found in the feeding-habits of terns. Either the lulls are periods of feeding, or periods of inactivity after feeding. No opportunity was found to test whether this connection existed during the period of this study.

The watches during the period 1948-50 were carried out at one site at a time which made it difficult to establish with clarity the apparent development of the southward feeding movements and their conversation into migration or dispersal. I was unable to carry out any observations in the following decade and it was not until 1960 that an attempt could be made with the help of other observers to mount simultaneous watches north and south of the colony. Observations were then carried out at Lowestoft and Winterton or Waxham on 16 and 30 July and 6 August; on the last date a watch was also carried out at Chapel Point in Lincolnshire by Roger Norman.

Conditions unfortunately proved quite different from those in the earlier years. The birds on Scroby Sands lost their nests on 1 July, and on 16 July there was no movement of any significance at Lowestoft, while at Winterton there was an extensive northward movement in the early and again in the late morning, each followed by a nearly equal movement south in the mid-morning and afternoon. On 30 July a small movement of the conventional sort occurred at Lowestoft, with a nett southerly component, while a small northward movement in the morning was followed by a return in the evening at Winterton. On 6 August, however, there was a nett northward movement at all three observation points, immature birds being conspicuously numerous. It seems possible that as suggested in the Norfolk Bird Report the birds from the Scroby Sands left early, moving on to the north Norfolk colonies, where a big westward movement was seen at Cley on 15 July and many birds accumulated further west at Scolt three days later, and that these birds were followed by others of conventional origin including many young birds. As a result of the loss of the breeding population the Scroby Sands featured neither as an important source of feeding birds nor as a roost for migrants at this time.

Whatever the explanation for the pattern found then, the watches in 1960 threw no light on the pattern found in earlier years. Whether the tendency of adult birds or failed breeders to go south rather than north as the season of migration approaches, and to go further afield as the season advances, was merely a chance feature of the earlier years of the study or is a general phenomenon remains obscure.

The regular movements appeared to be confined to Common Terns and closely allied species not distinguished from them. Sandwich Terns, which also attempted to breed on Scroby Sands, did not participate. Few were seen moving in August. Larger southward movements occurred in September, without much variation during the day except that the largest number were seen during the first hour of the day, when the passage started about half an hour after that of the Common Terns.

## Summary

In the early 1950s it was found that Common Terns based on the Scroby Sands off east Norfolk tended to feed to the south. During the summer their daily movements extended further south and they ceased to return north in the middle of the day. After early August an increasing proportion ceased to return at all, and this happened unusually early in a year when the nests were flooded out early in the season. Whether the movements involved feeding birds or passing migrants their timing was similar, and at times they included immature birds which could not have been reared locally. In 1960 the pattern was found to have changed; the birds were going north to feed, and when the colony was flooded out they appear to have moved on in that direction to the colonies in north Norfolk, followed by young birds which probably came from the continent. It is suggested that the initial dispersal of Common Terns consists of flights between roosts or colonies which are made primarily as feeding movements. The fact that these took place in the direction in which the birds eventually appear to have departed both in the years in which they left to the south and one in which they may have left to the north may be significant. Sandwich Terns failed to show such well-defined movements.

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# THE SEABIRDS OF THE FIRTH OF CLYDE IN SEPTEMBER, 1970

W. R. P. Bourne

Two of the many questions posed by the exceptional seabird mortality in the region of the Irish Sea in the autumn of 1969 were whether it was likely to recur, and what the normal distribution of the birds at sea off this coast is at this season in any case. Through the courtesy of the Marine Superintendent, Captain F. Chisholm, it was therefore arranged that Captain Macbride would take me around the Firth of Clyde in the Fishery Cruiser 'Rona' to inspect the scene of the largest number of bird deaths at the same season the following year. While fortunately no further extensive mortality was encountered the cruise did reveal useful information on bird distribution and behaviour in the area at this season, for comparison with the official report of the disaster (Holdgate, 1971).

## The Site of the Maximum Bird Mortality in 1969

At the start of the survey S.S.P.C.A. Inspector Alec Miller, who first observed the arrival of the dying birds in 1969, and Mr. Graham Stewart, who reported the main disaster (1970), were good enough to meet me and discuss it on the site, Prestwick Beach, Ayrshire, on the first anniversary of the peak of the mortality, 28 September, 1970. On this occasion the weather was fine, and there had been no sign of bird mortality on the shore for weeks except for one oiled juvenile Guillemot a few days before, which was presented to me by Inspector Miller. We noted that a hundred yards or so offshore south of Ayr was grossly polluted with offensive sewage, and that a few apparently healthy Guillemots could be seen at the limit of vision offshore.

Inspector Miller reported that at the beginning of the wreck the year before many birds came ashore very weak but still alive during the gales, many of the first arrivals becoming polluted by oil released by the rough sea from a blocked drain as they came ashore. These often showed 'rigors' or tremors shortly before death. Later an increasing proportion of the birds came ashore already dead, and in the terminal stages of the wreck already decaying, by which time masses of seaweed torn up by the gales were coming in too and bodies and weed were piled up feet high in places along the shore, so that it was difficult to estimate the total mortality. Mr. Stewart examined some thousands in an unsuccessful search for rings, however, so that it seems unlikely that the estimate of a total mortality of the order of 9,000 birds was excessive.

The ultimate disposal of 666 birds collected alive during the early stages of the disaster is shown in table 1. The birds taken into captivity were washed when necessary with 'Janitol', a mild detergent, and when they appeared strong enough a variable number of weeks later, were released in a secluded cove where they were fed at irregular intervals until they eventually left the area. It seems likely that many of the young Gannets in particular were fat fledglings that had just left the colony on Ailsa Craig offshore which were still unable to take off from the water so that they were blown ashore by the storms, but which were able to fledge normally once they had lost some of their excess weight. There were other reports of Gannets blown inland at the time.

Table 1

Fate of live birds collected in Ayrshire in late September, 1969.

Ayr	Destroyed	Died in care	Released	Total
Guillemots	387	48	71	506
Puffins	2	—	—	2
Gannets: adult	6	2	3	11
juvenile	17	—	7	24
Herring Gulls	4	—	—	4
Ayr, total	416	50	81	547
Kilmarnock	119	(species not specified)		119
Grand total	535	50	81	666

### Observations in the Firth of Clyde

The 'Rona' left Campbeltown shortly before noon on 29 September, a fine clear day with a brisk west wind, and sailed round Sanda off the south end of the Mull of Kintyre, east across the mouth of the Firth of Clyde, passing south of Ailsa Craig, and then north past Girvan across Ayr Bay to anchor off Rothesay, Bute, overnight. Thereafter there were increasing westerly gales, and for the next two days she cruised in the Kyles of Bute, Loch Striven, Loch Riddon, and Loch Fyne, anchoring overnight off first Tarbert and then Rothesay again, eventually returning to Campbeltown via the Kyles and Sound of Bute and down the east shore of the Mull of Kintyre through Kilbrannan Sound in a force 9 westerly gale on the morning of 2 October. Concorde passed overhead on this last morning, and there was some debate whether the noise was a sonic boom or the sound of a door slamming; it seems unlikely to cause serious disturbance to wildlife at that intensity.

The number of birds seen and their behaviour and direction of movement were noted at ten minute intervals during the main passages of the cruise. The route followed, and the number of Guillemots seen, are shown on the map (the light was failing coming up the coast of Ayr, and a few birds may have been missed but not many). The Guillemots were already all in winter plumage, and the great majority were noticeably brown and presumably belonged to the southern race *U.a.albionis*. Some stayed on the water and may still have had short wings, but many flew freely and already had them well grown. On both 29 September and 2 October flocks were seen flying down the east side of the extremity of the Mull of Kintyre, and on the first day other birds were also converging on its tip across the sea to the east, while on 1 October other flocks were flying north into the approaches to Loch Sween and milling about there, as if they were seeking a route to open water in the north-west approaches beyond it. A few birds, about fifty in all, apparently mainly young of the year, were also swimming about in harbours and well up the inner sea-lochs; one juvenile shot in Loch Riddon on 30 September was already well grown with plump muscles and some body fat, and weighed 850 g; its gullet was crammed with the remains of small fish, the most complete about 5 cm long, and there were also a few round-worms.

Among other species, adult Gannets were seen scattered throughout the area, a few individuals penetrating far up the sea-lochs, and there were still a large number at the breeding colony on Ailsa Craig; they flew rather high compared to birds out at sea, but were diving throughout the area. Only three immature birds were seen, off Ailsa Craig, one pied and one dark

one in the air, and one probable bird of the year on the water, swimming vigorously into the wind towards the open sea about three miles west of the colony; immature birds formed nearly half the population among birds coasting north up the east coast of Scotland at this time. The larger gulls were also scattered in twos and threes throughout the area, mainly Herring Gulls with a few Greater Black-backed and occasional Black-headed and Common Gulls, with more of the last two in the harbours and sea-lochs. About 500 gathered rapidly when a trawler started cleaning its catch approaching Ayr, but only half of this number when another boat did so approaching Tarbert on the opposite side of the firth, and about a tenth as many Gannets joined them. Kittiwakes were seen in twos and threes throughout the outer firth and Sound of Bute, with the largest number, 25, off the Mull of Kintyre, but did not appear to follow vessels or enter the sea-lochs to any great extent. A Great Skua was seen three times in the Sound of Bute, and Arctic Skuas four times flying south down the east side of the firth (but in contradistinction to the auk flocks, not in the west), and a Fulmar, a Puffin, and two Razorbills in company were seen off the Mull of Kintyre or Ailsa Craig, but no further up the firth. Although some young Kittiwakes could have been overlooked as dark young Guillemots further in, there cannot have been many adults there. Flocks of up to fifty Cormorants and Shags, twenty Eiders, and six Red-breasted Mergansers were also seen along the shore and up the sea-lochs, and Shags in particular were also encountered fishing singly up to five miles out to sea.

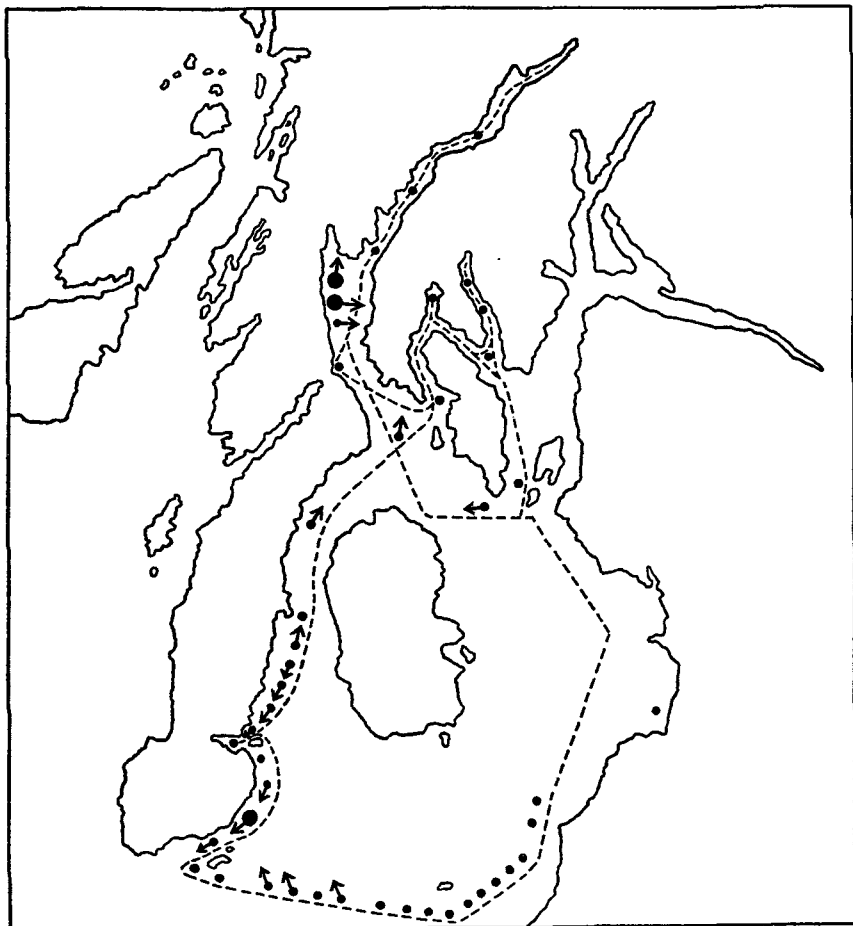
## Discussion

In the first place, it may be remarked that the fishery cruiser provided an excellent means of surveying the area. All the birds may not have been seen, especially because of the poor weather—the tally returning down a sea-loch was not always identical with that going up—but a fair sample were seen. It appears from the survey that at least in the autumn of 1970 the area does not appear to have been an important resort for seabirds, despite the occurrence of strong west winds approaching in force those which caused major wrecks of large numbers of birds in the area the year before. In fact, the populations of many species appeared considerably reduced from the summer breeding population (which I saw during a cruise through the outer firth in June 1966), while none were noticeably increased; indeed, Fulmars, Puffins, Razorbills and non-breeding Gannets appeared largely to have evacuated the area, and even the numbers of Guillemots and Kittiwakes that remained seemed reduced from those present in the summer, and both species also appeared to be leaving the area around the Mull of Kintyre at the time of observation in the face of strong contrary winds under conditions when they might have been expected to prefer to shelter in the inner sea-lochs instead.

The north-westward movement of Guillemots (contrasting markedly with the southward movement of Arctic Skuas on the other side of the firth) is of particular interest because this species is known to move north in the late summer along the southern edge of its range in both the North Sea, where the birds congregate off Norway then (Stechow, 1938) and off eastern Canada (Tuck, 1960). An ancient report that large companies occur inshore off south-west Scotland at this time as well (Gray & Anderson, 1896) has raised the possibility that birds from the Irish Sea may move north then as well, although little confirmation can be found among our own ringing recoveries. It is therefore instructive to consider the observations of this species in more detail.



It is debatable how far Guillemots can be seen at sea, especially in rough weather, since even when they can fly they spend much time on the water and a good deal of it underwater, and in the autumn they are liable to be flightless on the water in moult and particularly prone to dive. On the average it seems probable that only birds occurring within about 220 yards of the boat are noticed, and since most of the time a watch was only kept to one side of it, the forty birds seen during the thirty-mile transect across the mouth of the firth probably indicate a density of about 11 birds per square mile of sea there. At this rate, if we allow that the whole firth includes a sea area about 25 miles square, and that the birds are uniformly distributed, it would hold a population at the most of about 7,000 birds, which is about the same as the main breeding population in the area on



Route of voyage around the Firth of Clyde in September, 1970. Small symbols represent totals of 1-10 auks and large ones totals of over ten in ten minutes with the direction of movement of flying birds shown by arrows.

Ailsa Craig (4,000 pairs in a normal year, 3,000 in 1969). In point of fact, there were fewer birds in the inner firth, but on the other hand, it seems likely that most Ailsa Craig birds feed to the west, so these two factors probably cancel each other out, and we can probably assume that however many birds may have been passing through the area in the autumn of 1969, at the time of observation the firth only held the rough equivalent of the normal summer breeding population. On the other hand, it also seems likely from these calculations that there must have been a considerable influx of birds from elsewhere the year before to produce a wreck of thousands of birds on the Ayr beaches, and still leave much of the breeding stock present on Ailsa Craig in the spring. We know from an examination of the bodies and the ringing returns (Bourne & Mead, 1969) that these birds came from the south.

There was also a noticeable difference in the condition of the Guillemot bodies washed up in the autumn of 1969 and the birds seen in the area at the same season in 1970. In 1969 the bodies were all very light and wasted, and the adult birds still retained much summer body-plumage while the young birds were often under-sized, and both had made little progress with the growth of the flight-feathers. The single young bird shot far up a sea-loch in 1970 (where only sick birds might be expected) was fit and well-grown with a weight far above that of most birds weighed the year before. All the adults seen at sea also appeared to have completed the body moult, and most were sufficiently advanced with the growth of the flight-feathers to be able to fly as well. If, as seems possible, it was an invasion of weak, underweight birds backward in the moult and growth from the south which was responsible for the wreck the year before, these were certainly not conspicuous in the Firth of Clyde in 1970 despite reports of a recurrence of mortality on a small scale in the Irish Sea. On the other hand, there was some evidence for a smaller northward movement by a limited number of fitter birds, so that it seems possible that this is a normal trend in late summer along the west coast of Britain as it is elsewhere, which only exceptionally develops into a mass movement and then a wreck with major mortality when there is some deterioration in conditions further south.

Dr. J. Bogan of the School of Veterinary Medicine, Glasgow University, reports that an immature Guillemot which came ashore oiled on Prestwick Beach in late September and another and a young shag collected under licence in Loch Riddon on 30th September all contained well under 1 ppm of PCBs and 0.1 ppm of DDE in their muscle and liver, which is rather low for British waters.

## Summary

A survey of the Firth of Clyde in late September, 1970 at the time of the mass mortality of Guillemots the year before revealed no evidence for a recurrence, though there was a small passage of this species along the east side of the Mull of Kintyre apparently involving birds heading for the north-west approaches. It was concluded that the firth held little more than the breeding population of this species, and while there may normally be a northward movement in late summer in this area as there is elsewhere, it is probably usually inconspicuous, and exceptional for it to develop into a wreck as it did in 1969. It was noticed that most other seabirds, except a

minority of Kittiwakes and Gannets, had also withdrawn from the area, and that a westerly gale approaching in force those of the year before caused no sign of a repetition of the wreck of Guillemots seen then. Also that the Guillemots appeared to be completing the moult much earlier and their chicks were considerably advanced in growth in 1970 compared to the birds which died in 1969. Organochlorine residues in three specimens were low.

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## ROYAL AND LESSER CRESTED TERNS IN CADIZ PROVINCE, SPAIN

F. G. H. Allen

Since there are comparatively few reports of the southern "*Thalasseus*" crested terns in Europe, it may be useful to place on record some additional notes of the occurrence of the Royal and Lesser Crested Terns in the south of Spain supplementing those already reported in *Ardeola* 15: 144, 16: 262.

Although a Royal Tern in winter plumage in the L. H. Irby collection at the Royal Scottish Museum was killed before 1867 in the Straits of Gibraltar, and another in similar plumage in the Dalgleish collection there appears to be one of two collected near Tangier in 1882, Dr. F. Bernis informs me that he knows of no Spanish record before 25 April, 1970. On that date I accompanied a group of Dutch ornithologists to the salinas near Sanlúcar de Barrameda, Cadiz province and saw two large terns, subsequently identified with the help of colour photographs as Royal Terns in full adult summer plumage, as already reported. On 27 April, 1971 we again visited this area and were amazed to find two Royal Terns within a hundred yards of where they were seen before, together with two, and possibly three, pairs of Caspian Terns, which were again photographed in flight. I have consulted Dr. P. A. Buckley who has been making a special study of Royal Terns in North America about their identity and the possibility that they might be breeding, and he accepts the identification of the transoceanicity sent to him. He comments that the birds normally nest colonially or with other "*Thalasseus*" terns, so that if they were breeding locally (which is pure surmise on my part) in the absence of more closely-related species it is "a statistical certainty" that they would nest alongside the Caspian Terns. I do not think that these have been found nesting in Spain yet although for some years they have been suspected of doing so on the beaches of the Coto de Doñana only about 3½ miles in a direct line from where we saw them.

On 15 May, 1968 Col. H. Morrey Salmon also saw a tern on the beach just north of Tarifa which he believed to be the Lesser Crested Tern. I know the bird well from long residence in the Far East, and his photograph leaves no doubt in my mind that he is correct, as also already reported. On 20 October, 1972 I saw two more in the Bay of Algeciras while in company with E. G. Turbott. The diagnostic yellow bill was unmistakable as they flew by 70 yards away beneath us as we looked over the cliffs.

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(Although the Royal Tern was only known to nest along the Atlantic and Pacific coasts of America until quite recently, large colonies of this species and many other seabirds have recently been found in west Africa (R. de Naurois, *Mem. Mus. Nat. Hist. Nat. Paris Series A Zoologie*, 56: 1-312, 1969), so that it is to be expected to stray north towards the approaches to Gibraltar. The main distribution of the Lesser Crested Tern lies in the Indian Ocean, and

## A VISIT TO BURHOU, CHANNEL ISLANDS

B. C. Potter

Burhou is a small volcanic member of the Channel Islands, separated from Alderney by two miles of severe currents called the Swinge. It measures approximately 600 yards by 200 yards, and has a central ridge 60 to 70 feet above sea level running east—west from which the land slopes down to the sea in all directions. Between projecting rocks, the whole island is covered with a peaty soil formed by Sea Spurrey which represents 90% of the vegetation. Almost every square yard has at least one rabbit or puffin burrow, making walking hazardous. Two clumps of Bracken are the only suitable cover for small birds, and the remaining botany occupies only a few small patches here and there. Little Burhou, which is much smaller, and accessible only at low tide, has a remarkably different vegetation in that it is covered entirely with a thick layer of White Sea Campion upon which the greater proportion of the gulls nest.

The States (or Government) of Alderney own and control access to the island and since it is close to major shipping lines maintain a small wooden shelter there with emergency supplies for the use of mariners wrecked on the square mile of reefs lying mainly to the north. The hut is occasionally let by the States Office to students of natural history who can offer suitable credentials for a fee. Landing is not easy and transport across the Swinge has to be arranged privately with an experienced fisherman from Alderney when conditions are suitable. When my wife and I had the good fortune to spend eight days on the island at the end of June, 1967, we had to take every necessity including fresh water. We were the first human visitors for nine months and the first to discover that, thankfully, Torrey Canyon oil had by-passed the area while on its way to Guernsey.

Our main interest was the colony of British Storm-petrels which nest in the crevices of this hard igneous rock and which according to reports of earlier visitors, numbered between 8,000 and 10,000 birds. In recent years as many as 1,000 have been ringed in seven nights. In anticipation of this we took a good stock of Channel Island rings but were unable to use a single one, for we found no evidence of their presence. We were out on five of the seven nights, and searched in vain for traces and signs of the birds by daylight. Just what had happened to them is mysterious. It has been suggested that they are temperamental and were just giving Burhou a miss for a season. I hope this is all.

In consequence we turned our attention to the Puffin, which we estimated to number approaching 2,000 birds, though we discovered later that in recent years it had exceeded 5,000. Our initially slow catching rate improved with practice and the 112th bird finished a ring sequence on the fifth day. The nets were used in two positions (with orientation), yet surprisingly we did not get a single retrap. The only bird caught twice had a ring of previous years. Very small young below ground were indicated by the tiny fish brought in. Fish which were dropped through fear or accidentally, provided extra nutrition for Gulls and Starlings. About 15% of over 70 dead Puffins found were fairly fresh and none had rings.

Two Manx Shearwaters flew by during a period of high winds and Gannets were constantly in view passing continuously to and from the colonies on Ortac and Les Etacs very close to Alderney. The latter could be seen clearly and completely from Burhou and we estimated that there were 3,000 to 3,200 birds on the rocks plus 250 in the air and on the sea. We saw up

to 28 Shags mainly on Little Burhou where a few young were ringed. There were 25 pairs of Oystercatcher breeding, but up to 180 came to roost with a handful of Curlew, Turnstone, Redshank and Dunlin. On the main island we counted 117 Herring Gulls, 86 Lesser Black-backed Gulls and 45 Great Black-backed Gulls. Little Burhou had a dense flock of these three species numbering about 400. Up to ten Razorbills were seen but were not proved to be breeding. Horizontal ledges are rather scarce.

Meadow and Rock Pipits were sitting on eggs and we found a Blackbird's nest in a corner on the ground in the middle of a Lesser Black-backed Gull colony. A pair were present in the area but successful breeding is very doubtful. 200 juvenile Starlings combed the island and four Linnets were present for two or three days. We had 14 Lapwing, 2 Sandwich Terns, 5 Swallows, 1 Swift, 4 Carrion Crow and a Little Ring Plover calling continuously, pass overhead during the week. In all, we saw 25 species during our short time on the island.

## THE SOUTH-WEST IRISH SEABIRD POPULATIONS

P. G. H. Evans

South-west Ireland holds some of the most important seabird colonies in Europe. The mountains of west Cork and Kerry plunge into the sea in a series of parallel headlands, their ends drowned so that the outlying peaks form tall, rugged islands. Tidal currents sweeping through the area provide rich local fishing-grounds for seabirds which find secure breeding-places on the islands nearby. Since they are remote and inaccessible, they were neglected for a long time, but in recent years it has become clear that there are a number of growing threats to them, and a series of expeditions have been mounted to explore them.

The following figures should give some idea of the wealth of seabirds on these islands. The islands of Kerry hold over 50,000 pairs of British Storm-petrels, perhaps the largest concentration in the world. There are estimated to be over 25,000 pairs on Inishtearaght alone. The Little Skellig with 18—20,000 pairs of Gannets has the second largest colony in the northern hemisphere. Puffin Island may hold the largest colony of Manx Shearwaters in Ireland. Over 1,000 pairs of Kittiwakes breed on the Little Skellig, 950 pairs on Skellig Michael, and 400 pairs on Inishtearaght, while there is a colony of about 2,000 pairs of Kittiwakes and nearly 3,000 pairs of Guillemots on the mainland coast of Kerry near Doulus Head. Puffins also breed in thousands on Skellig Michael, Puffin Island and Inishtearaght. Razorbills occur in smaller numbers, with probably only Skellig Michael, Puffin Island, Inishtearaght and the Bull Rock off County Cork holding populations in the region of 1,000 pairs. Apart from the Doulus Head colony, and another of 1—2,000 pairs on the Cow Rock in County Cork, the same applies to the Guillemot, which on the whole tends to be the rarest of the three auks.

Skellig Michael was the original site of the colonisation of south-west Ireland by the Fulmar and now holds 700 pairs, with smaller colonies on the other islands and along the coast, where it is now as common as the gulls. There are tern colonies sometimes running into hundreds of pairs on the inshore islands and along the coast, mainly Common and Arctic Terns with two small ones of Roseate Terns and one each of Sandwich and Little Terns.

There is a general pattern to the distribution to the seabird colonies. The low flat islands in all the large south-western bays hold tern colonies as well as large populations of gulls, particularly Herring Gulls, with Shag and Cormorant colonies on the cliffs, and scattered pairs of Black Guillemots. All these birds except the terns also occur in the mainland cliffs. Along the more exposed parts of the coastline around the headlands the cliffs are higher, and hold small populations of Fulmars, Kittiwakes and auks, except where human disturbance has prevented all but the Fulmar from breeding, as has happened, for example, on the Great Blasket. Puffin Island is an exception, since it lies only about half a mile from the mainland, and yet has large seabird colonies. However, it is relatively inaccessible, and resembles the outer islands in many ways. On its north side it is flat with vegetation dominated by Plantains *Plantaginietum* and tussocks of Thrift *Armeria maritima*, and it is here that the large Shearwater colony is found.

The more rugged outer islands such as Inishtearaght, the Skelligs, and the Bull and Cow rocks receive little disturbance, and their rock formations are ideally suited for large numbers of most of the more marine birds. British Storm-petrels are present in the greatest numbers here, while the colonies of *Larus* gulls are reduced to only a few pairs. If there is enough soil for

burrows, then Manx Shearwaters and Puffins may also be found in numbers.

If the main reason for the presence of these concentrations of seabirds is the presence of good supplies of food in the turbulent tide-races offshore and on the fishing-banks along the coastlines to the north and east, then the location of the colonies is determined by the availability of suitable breeding-sites and their freedom from disturbance. Those islands that do not conform to this pattern do not hold large colonies. The Great Blasket has been inhabited by man for centuries, and in the 1950s as it was evacuated the long predation on the seabird colonies finally drove the auks and Kittiwakes away. However, owing to the lack of suitable sites the bird population can never have been very large, and possibly the birds have always preferred to nest elsewhere. Now that the island is uninhabited perhaps the birds will start to return again, at least in small numbers.

The human exploitation of the seabird colonies appears to have been particularly severe during the great potato famine of the 1840s, when many of the local mainland human population turned to the sea for food, and settled on the islands. In the eighteenth century there was a thriving Gannet colony on the Little Skellig, but this had been reduced to thirty pairs by 1880. Since then, the birds have been left alone, and the colony had increased to about 20,000 pairs by 1970. There is still room for expansion, though before long the rock will overflow and the birds will have to move elsewhere, to sites such as the Bull Rock, where the gannetry had already grown to 1,500 pairs in 1970. Unfortunately there is less information on the past history of the other bird populations, though it may have been fairly similar for some species.

Some of the seabird colonies are having a noticeable effect on the vegetation of the islands. On Skellig Michael and Inishtearaght, amongst others, the extensive burrow systems excavated by the auks and Shearwaters are undermining the ground, leaving great patches of bare earth. At the same time, the guano from the gull colonies is resulting elsewhere in an increasing luxuriance of such plants as Thrift, Red Fescue *Festuca rubra*, Plantains, Yorkshire Fog *Holcus lanatus*, and Common Bent *Agrostis tenuis*.

To reach any conclusions on the apparent status changes of the south-west Irish seabird populations, it is necessary to consider the methods used for counting them, and the various factors that influence the number of birds present at any time. In all our expeditions we have sought the maximum figure we can obtain for birds apparently occupying nest-sites. This has involved counts from the land and sea and sometimes the air. For the Kittiwakes and Gannets, photography was used to supplement the direct counts, and the birds were counted by projecting colour slides on to sheets of white cartridge paper. By taking maximum totals, a proportion of non-breeding birds is included, and depending on the stage reached in the breeding cycle the counts may be increased considerably. On the other hand, with species such as the auks, numbers feeding at sea or hidden from view may also be missed.

We carried out counts at two Fulmar colonies at the beginning of July and then repeated them a month later. The number of birds occupying sites had decreased by 38% and 40% respectively. In July, the Kittiwake colonies contained a fair proportion of unsuccessful pairs sitting on nests, while up to 30% of the population might be non-breeders sitting on ledges at the edge of the colony. Near the end of the breeding season, a count of nests may be inaccurate, since many disintegrate with high winds or as a result of the theft of material by other Kittiwakes. A count of one colony in August showed a decrease of 25% over the total counted in June.

All our counts of auks were made either in the morning between 0730—1000 hours, or after 1930 hours in the evening, when the numbers on land



were at a maximum, and the number of pairs was calculated from this. As the season progresses, the arrival of non-breeders at the colony may result in overestimates again, but unless actual nest-sites or eggs are counted this cannot be prevented. With the size and difficulty of access of some of the colonies this was an impractical task.

We did not attempt to count British Storm-petrels or Manx Shearwaters as in the time available we could not engage in the concentrated ringing necessary to arrive at reasonably accurate estimates. We would also have been faced with the problem of sorting out which birds actually bred in the colony under investigation. From ringing recoveries it appears that there is considerable visiting from one colony to another, so one is often virtually counting the breeding population of the whole west coast of Ireland, not to mention the non-breeders. All the estimates of population size for these species that have been quoted were made by previous expeditions.

Having taken all these factors into consideration, one can gain a general impression of the status of each seabird species and some idea of how it has altered on the last half century.

Although only general estimates have ever been made for the British Storm-petrel and Manx Shearwater, it is probable that the status of these species has remained at least stable over the last fifteen years or so, with possible increases in Storm-petrels on all islands, and possibly a decrease of Shearwaters on Puffin Island. Judging by the high rate of recapture of ringed birds and the number of young birds taken by gulls it seems possible the numbers have fallen from those estimated in 1955. The general status of the Shag and Cormorant has also remained fairly stable, with a possible increase in the former and decrease of the latter. The Fulmar and Gannet are increasing in numbers as they are elsewhere in north-west Europe, and the Fulmar is also spreading. The number of birds that were obviously prospecting at established colonies illustrates this, while many new colonies have been founded along the mainland coast.

The Kittiwake has also increased on the islands, probably much faster than the 3% per annum estimated to occur elsewhere by John Coulson. This suggests a mass influx of birds from elsewhere, and reports of a recent decline along the south coast of Ireland may be related to this. Although their numbers fluctuate, the three common large gulls have also increased, some islands holding over a hundred pairs each of Greater and Lesser Black-backed and Herring Gulls, where fifteen years ago there were only one or two pairs. Only on some of the remoter outer islands are the numbers still restricted to a few pairs. However, at present the numbers still do not approach those at some of the colonies around the Irish Sea.

On the debit side are significant decreases of the auks (except the Black Guillemot) and possibly also in the tern colonies, though these are mobile and less well documented. Colonies of this family are very prone to shift suddenly from one site to another, often several miles away. Thus, in 1966 about 150 pairs of Common Terns were breeding on Beginish, one of the small inner Blaskets, but in 1969 there were none. Human disturbance may be a factor influencing such shifts in population, but is unlikely to be the only one, for movements of the fish on which the birds feed, disease, or physiological changes in the birds at critical stages in the breeding cycle may also be major factors.

The auk situation is a complex one. The true numbers are hard to determine, and only when large population changes occur is it possible to say with conviction that the numbers have really increased or decreased. While it appears that the colonies are now much smaller than they were thought to be fifty years ago, despite some fluctuations, they have probably remained fairly stable on some islands in recent years. However, on others, notably

Puffin Island and Inishtearaght, there have been definite decreases. This is so marked on Inishtearaght that some special factor in addition to that causing the general decline observed in this family must be involved. In 1969 the Puffins had decreased from the 20—30,000 pairs estimated five years before, to an estimated 7,500 pairs, the Razorbills from 5—7,000 pairs to about 500 pairs, and the Guillemots from 500 pairs to 75 pairs. In 1970 their numbers had recovered slightly but their populations are still only shadows of what they were before. The most likely cause is possibly disease, especially a virus infection. It is also notable that the remaining 30% of the Puffin burrows which are still occupied are now heavily infested with ticks and mites, which may weaken the young birds or assist the spread of infections among them. We investigated the microfauna of a number of the more humid burrows, and collected blood samples from a number of bird species to be tested for evidence of past infections.

Fortunately the Kerry islands are relatively free of animal predators. They have no rats, while the few Hooded Crows, Kestrels and Peregrines that visit them can only have a minimal effect on the seabirds. Gulls are a worse problem, but have not increased to sufficient numbers to be a great menace yet. They may be having some effect on the Shearwater and auk colonies on Inishtooskert and Puffin Island, however.

Man is the most serious threat, both through increased disturbance at some colonies, and as a result of pollution of the sea. South-west Ireland is at present being developed as a resort for tourists. Increasing numbers of people are visiting the coast, and more trips to the islands are being organised. There is also a danger that they may be acquired for holiday homes. This can only put pressure on the seabirds, and may explain why such species as the Kittiwake and the terns are moving to remoter islands. Unfortunately, in the case of the terns in particular this is not always possible, because only the inshore islands provide suitable nesting-sites. It is significant that the Bull Rock, which is the least visited of all the south-western islands, also has easily the most accessible seabird colonies.

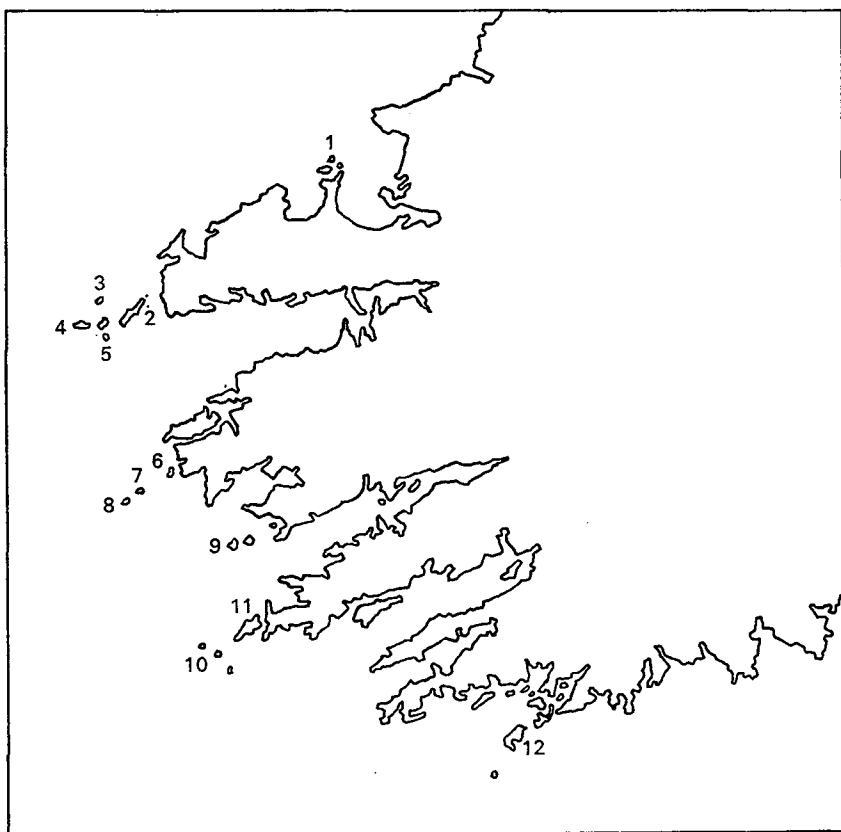
In the autumn of 1969 the Irish Lights Commission introduced a helicopter relief service to those outer islands with lighthouses, which include most of the best ones. It was feared that this would cause undue disturbance to the seabird colonies as well as endangering the lives of flying birds, particularly the Gannets on the Bull Rock. During the summer of 1970 trips were made by helicopter to these islands, and fortunately the disturbance to the birds appeared to be minimal. The helicopter approached to within fifty feet of the Gannet colony, and the birds did not appear to take fright at all. Bird-strikes are very rare, for naturally the pilot takes all precautions to avoid collisions. While the colonies may have been disturbed to some degree initially, they appear to have become accustomed to the helicopter. It is probably too early, however, to conclude that they are not affected.

South-west Irish seabirds do not appear to have been affected by two major disasters in recent years, the wreck of the Torrey Canyon in the spring of 1967, and the birdkill in the Irish Sea in the autumn of 1969. Few bodies were washed up locally, and the numbers of local breeding birds did not decline noticeably afterwards. It seems probable that they disperse in other directions. Whether toxic chemicals are present in this area in significant quantities is not known yet. We collected a number of eggs of Guillemots and Razorbills and three adult Guillemots for analysis by the British Nature Conservancy, and await news of the result. It may be noted that pollutants seem more likely to reach this area in the north Atlantic drift from America than from Europe.

Oil is possibly now the worst threat to seabirds in this region. A vast oil terminal has recently been established on Whiddy Island in Bantry Bay,

where super-tankers unload their cargo for trans-shipment in smaller vessels to European ports. In addition to the general threat to local seabird colonies presented by any spillage at sea, towards the end of the breeding season several thousand flightless moulting auks and their young congregate in the bay. There has already been at least one oil spillage there, on Christmas Day, 1968. Another in the summer could result in a major disaster.

In recent years the south-west Irish seabirds have flourished as a result of a general neglect of the area by mankind. If they are to survive and perhaps even increase in the face of such new threats as increasing human disturbance resulting from developing tourism and the introduction of new means of transport such as helicopters, the acquisition of the islands for holiday homes, and the possibility of pollution by oil or other chemicals, it seems time more active conservation measures were introduced.



South-west Irish seabird colonies

- 1: Magharee Islands. 2: Great Blasket. 3: Inishtooskert. 4: Inishtearaght.  
 5: Inishnabro and Inishvickillane. 6: Puffin Island. 7: Little Skellig.  
 8: Skellig Michael. 9: Scariff and Deenish. 10: Bull and Cow Rocks.  
 11: Dursey Island. 12: Cape Clear Island.

## **Acknowledgments**

For assistance during various stages of our work I am grateful to Bill Bourne, Tony Diamond, Tom Kelly, Frank King, Roger Lovegrove, Brenda McHenry, Oscar Merne, David Saunders, and the members of all our expeditions, which will be discussed in more detail by Roger Lovegrove elsewhere. I am very greatly indebted to Dr. Michael Grimes and his crew for taking us out to the islands, to many in Cahirciveen, particularly Tom and Mary Shortt of the Tourist Office, for their unceasing help and kindness, to the Irish Lights Commission for permission to stay on Skellig Michael, Inishtearaght and the Bull Rock, and John Moore for permission to stay on the Blaskets. The British Trust for Ornithology, the Royal Society for the Protection of Birds, the Irish Society for the Protection of Birds, and the Seabird Group provided generous grants.

# SEABIRDS AT FARAID HEAD, NORTH SUTHERLAND, AND ON NORTH RONA AND SULA SGEIR IN 1971

P. G. H. Evans

Between 26 June and 18 July, 1971, A. N. Osborn and I carried out a series of observations of seabirds in north-west Scotland, with particular attention to comparative studies of Puffin density and gull interactions for Dr. David Nettleship of the Edward Grey Institute, Oxford, which provided a grant towards expenses.

The majority of the time was spent at a colony of about 1,800 pairs of Puffins rather unusually situated on a steep cliff slope of sand with a sward of *Puccinellia*, *Holcus*, *Plantago* and *Ammophila* at Faraid Head. A small quantity of the food which they dropped was examined, and included 15 small Clupeidae ranging in length from 29 to 54 mm with a mean of 38 mm, and one sand-eel *Ammodytes* measuring 74 mm. A number of gulls, mainly Common Gulls, were robbing the Puffins, usually where they were densest in the centre of the colony. Thirty-three British Storm-petrels attracted by tape-recordings were caught at Faraid Head; they weighed 20 to 30 g, mean 26.1 g. A number of Fulmars, Guillemots, Razorbills and Puffins were ringed here and in the neighbouring colonies on Clo Mor to the west.

On 17 July we landed on North Rona from a trawler arranged by Dr. Finlay Macleod of Aberdeen University, and spent three hours on the island between 6—9 a.m. The area of the Puffin colony appeared to have decreased slightly from that reported by David Wilson in June 1969, and we estimated that it now held 6,000 pairs ( $\pm 2,000$ ), and that the Greater Black-backed Gull colony was much the same size and held 1,500 pairs. We only saw two instances of gull predation on the Puffins during our visit but understand from John Love of Culterty Field Station, Aberdeen, who remained on the island, that when the young Puffins started to emerge from their burrows many more were taken, and they formed at least 30% of the prey remains found in the gull colony. Later on the 17th we also landed on Sula Sgeir for half an hour. Judging by the extent of the colonies, the numbers of Fulmars and Gannets have now increased again to the level reported in 1958 by Bagenal and Baird. The food of the Gannets was mainly Herring *Clupea harengus*. Little seabird movement was seen on the round trip from Stornoway, with no Manx Shearwater, only occasional Storm-petrels, no large movements of Gannets, and only small numbers of Fulmars, Kittiwakes, Lesser Black-backed Gulls, and auks. One Great Skua was seen off North Rona, and some Great Black-backed Gulls flying north between North Rona and Sula Sgeir between 4—5 a.m. in the morning.

# PREMATURE DEPARTURE FROM THE NEST BY YOUNG FULMARS IN CORNWALL IN 1971

R. A. Harper

During the month of August, 1971 I was brought seven young Fulmars which had been found along about twelve miles of the north coast of Cornwall between Newquay and St. Agnes. They appeared to be in good health, but all of them were insufficiently developed in their feather growth to be able to fly. I am used to dealing with sick and injured birds, and they were carefully examined for any outward sign of injury and disease, but nothing was found except moderate numbers of lice. They all weighed over 2 lbs (900 g), and the heaviest weighed nearly 2½ lbs (1,130 g).

They were kept in separate pens, and were allowed out for wing exercise at least once a day. All but one became very tame, and would allow themselves to be picked up and examined without panic or threat display. They refused to eat or drink, and their droppings appeared quite normal for the type of bird, though they were passed somewhat infrequently. Daily weighing provided a check on their progress, and over two weeks the weight of the majority declined to between 1 lb. 10 oz. to 1 lb. 8 oz. (about 700 g), by which time their primaries had grown well and in some cases exceeded the length of the tail.

The first bird was released from the top of a cliff on 31 August. It shuffled to the edge of the cliff and stood for some moments as if wondering what to do. Then it spread its wings, planed off, and flew the whole length of the beach, three miles, before heading out to sea. The second bird which was released at noon the next day was at once mobbed by Herring Gulls, one of which hit it in flight and knocked it to the beach. At this point there is little doubt in my mind that if it had not been for a considerable number of people in the area where the bird fell the gulls would very soon have killed it. Fortunately I was able to recapture it, and it revived and was released at a later date. The remaining birds were released at dusk from high cliffs. Four flew strongly out to sea, while two faltered in their flight when about half a mile from shore, and landed heavily on the water. One of the latter birds could still have been one or two ounces overweight at the time of release.

The weather at the time was calm, and there had been no gales or sudden storms which could account for the birds leaving their nesting ledges prematurely. Although they showed no external evidence of disease, they were not checked for internal parasites, and if more are found in future one will be sent for laboratory examination. I have three possible explanations why the birds might have left the nest prematurely. Fulmars have only bred in the area for a few years, but many pairs now rear young all along the coast. Possibly until now members of the enormous gull population have hesitated to attack the old birds, but some may now have learnt to prey on young Fulmars, and begun to knock them out of their nests or attack them in the air when they try to fledge, so that birds which escape are subsequently found on the beach. There has also been an increase in the rabbit and fox populations along the cliffs, even the steepest ones, and it seems possible that if they appeared suddenly on a ledge one of these might frighten or knock Fulmars out of their nests prematurely. Alternatively, it seems possible that the birds may be affected by toxic chemicals so that they are failing to fledge normally.

(While Fulmars normally feed their young until they fledge, according to J. L. Mougín (Oiseau 37: 57-103) the latter normally lose weight during the last two weeks very much as reported here, and it seems doubtful how necessary further food is once they pass their maximum weight. This type of abnormal behaviour might also be due to the occurrence of a virus disease such as puffinosis, which infected post-juvenile Fulmars in Orkney and Shetland in 1966 (J. W. Macdonald *et al.*, Brit. Birds 60: 356-360), which provides another reason to send birds to a laboratory. Ed.).

Table 1: A Table of Analysis of Variance. See text for further details.

Source	Sum of squares	Degrees of freedom	Variance estimate
Days	315956	20	15798
Hours	160471	23	6977
Residual	786780	460	1710
Total	1263207	503	

F — ratio for hours=9.326, on 20 and 460 degrees of freedom,  $p < 0.001$ .

F — ratio for hours=4.079, on 23 and 460 degrees of freedom,  $p < 0.001$ .

If Q is the total number of Kittiwakes passing the observatory between 2100 hrs. and 0300 hrs. divided by the total number passing between 0900 hrs. and 1500 hrs. over the following noon period, then the value of Q is greater than 1 on 18 out of 21 days ( $X^2$ , using Yates' correction=9.33,  $p < 0.01$ ). The mean value of Q is 3.11 (S.D.  $\pm 2.44$  : range 0.54–9.01).

Likewise if q is the total number passing between 2100 hrs. and 0300 hrs. divided by the total number passing between 0900 hrs. and 1500 hrs. over the preceding noon period, then the value of q is greater than 1 on 18 out of 20 days ( $X^2=11.25$ ,  $p < 0.001$ ). The mean value of q is 3.04 (S.D.  $\pm 2.56$ : range 0.39–12.08). Kittiwake passage at the site of the observatory is therefore generally greater around midnight than around mid-day by a factor of about three.

This result is unlikely to be due to any observer bias since our group was divided into two three-man parties, each of which maintained watch for about three days at a time. When his party was on duty, every member of the group took two four hour watches per day, both at the same clockface time. Thus it arose that on about four-fifths of the days the same two people covered the 2100-0300 period as covered the 0900-1500 period on either the following or preceding day.

## Discussion

In April and May, 1960, Myres (1963) observed with radar an orientated northward departure of responses in the evenings from the vicinity of a large colony of seabirds in the Shetland Isles. In the mornings a southward movement was observed which appeared to be their return (c.f. Moss' observations on Fulmars quoted on p. 1). Various lines of evidence strongly suggested that Kittiwakes were involved and Myres speculated that this oceanic species flew north to feed along the edge of the Continental Shelf to the north of the Shetlands and, additionally, to take advantage of the long twilight at high latitudes in summer, thereby increasing its daily feeding time. If this were so, there might be an area where Kittiwakes were present in greater numbers around midnight and the possibility that the Spitsbergen results are also interpretable in terms of feeding activity is considered below. It should be remembered, however, that the Shetland and Spitsbergen data refer to the beginning and end of the breeding season respectively.

As has been mentioned Fulmar movement was not recorded since preliminary observations showed that Fulmars flew a few hundred yards into wind before turning and flying for a similar distance downwind and so only made nett progress in one direction slowly. It would thus have been impossible to make useful observations on them without reducing the value of the data on other species. The data on the Little Auk were unsuitable for analysis, since the bulk of movement, which took place far out to sea, could only be seen using a telescope. All observers preferred using binoculars which were more efficient for recording the movement of all other species closer inshore. Of the other four species seen in numbers adequate for analysis, namely Black



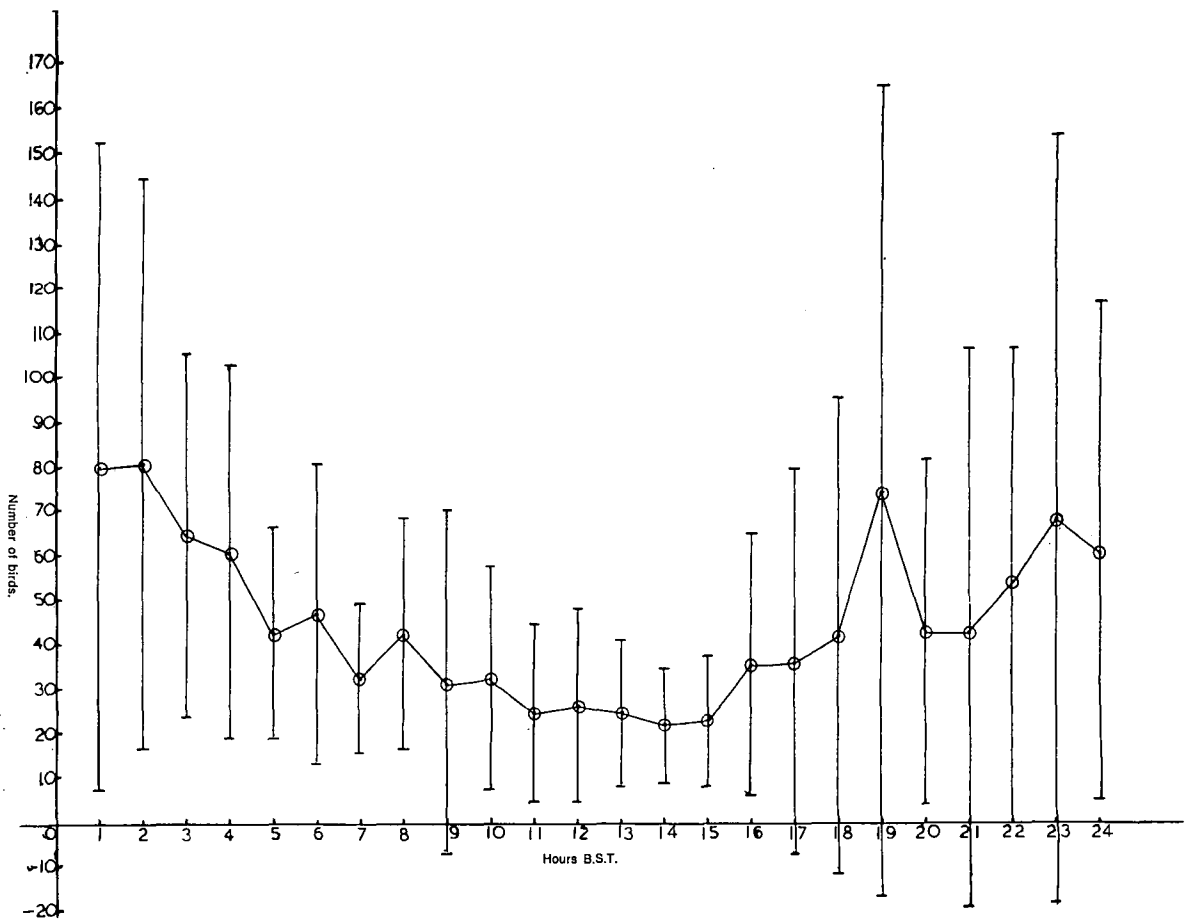


Fig. 2: Mean and standard deviation for the number of Kittiwakes flying past the observation point in successive hours B.S.T.

Guillemot, Brünnich's Guillemot, Puffin, and Glaucous Gull, none showed a significant diurnal rhythm of movement at the place of observation, though the latter three species, in contrast to the Kittiwake, showed a tendency towards increased activity in the middle of the "day" and reduced activity during the "night".

The auks feed by diving and the Glaucous Gull is a scavenger and predator, while the Kittiwake is primarily a surface feeder. It is possible that the Kittiwake's apparently distinct activity rhythm might be related to its different feeding habits. In Spitsbergen the Kittiwake feeds mostly on surface macroplankton (Lovenskiöld, 1964). The detailed study of Fisher & Hartley at a glacier-snout feeding zone revealed that the euphausiid *Thysanoessa inermis* was the most important food item. *Thysanoessa* spp. are vertical migrants in temperate waters, the population being, on average, nearer the surface by night than by day (Hickling, 1925 and Gardiner, 1934). However, Bogorov (1946) and Digby (1961) noted little vertical migration in a wide variety of planktonic forms (*Thysanoessa* is not mentioned) in polar seas in summer, but Bogorov did find that some species, non-migrants in summer, begin a migration in autumn. Towards the end of the present period of observation the sun nearly reached the horizon at midnight and the amount of light entering the sea would be a small proportion of that entering at mid-day, as would be the case in autumn. The proportion would have been higher three weeks earlier at the beginning of the observation period. As light is one important factor controlling the migration of plankton (Bainbridge, 1961), it might be expected that if the greater Kittiwake passage around midnight was related to increased availability of food the observed activity rhythm would become more marked during the observation period. This was tested by comparing by analysis of variance the first eleven with the last ten days of observation and found not to be the case. Nevertheless the possibility of a relationship between the present observations and feeding behaviour cannot be excluded.

Alternatively it is possible that the observed rhythm of Kittiwake activity is due to the particular siting of the observatory. Thus the observed rhythm may not in fact reflect the activity cycle of individual birds. One among several explanations of a site-effect is that Kittiwakes have an activity rhythm which is roughly, but similarly, synchronised with the sun and travel from breeding colony to feeding ground along one route, returning along another. If this were so, a correlation between the proportion of birds flying in one direction and the number passing the observatory would be expected. If the mean number passing in a particular hour (see Fig. 2) is correlated with the number flying north in that hour (over the entire 21 days) divided by the number flying south, then  $r = -0.41$  ( $p > 0.05$ ). This figure may be influenced by many factors, including the presence of non-breeding birds in the area and the tendency of Kittiwakes to fly into wind regardless of direction. Winds were dominantly southerly for the first week of observation and the majority of birds flew south. Thereafter the situation was reversed. Nevertheless the weak correlation established above might suggest that the number of birds seen is greatest when the proportion flying south is greatest, and the possibility of a loon movement between colony and feeding ground remains open. Dr. J. C. Coulson (in litt.) has noticed at an English Kittiwake colony that the departing birds fly directly out to sea whilst many of the returning birds hit the coastline above or below the colony and follow it to the nesting point. Similarly Dr. W. R. P. Bourne (in litt.) comments that it seems to be birds returning to the Kerry seabird colonies that are seen at Cape Clear in summer.

No complete explanation of the Spitsbergen situation is possible without further knowledge of the colonies of origin of the birds seen, the location of

major feeding sites in the region, the proportion of non-breeders and some ability to separate migratory and local feeding movements.

### Summary

After 21 days of continuous sea-watching at a site on the west coast of Spitsbergen in the summer of 1968 it was found that Kittiwake passage at the observation point was generally greater around midnight than around mid-day by a factor of about three. No similar effect was found in any of the other species investigated. Two explanations of this diurnal activity rhythm in the Kittiwake are discussed; that it is due to increased availability of food around midnight and that there is a loop movement between breeding colony and feeding ground. No certain conclusion can be reached in spite of some evidence in favour of both possibilities

### Acknowledgements

The efficient organisation of the British Schools Exploring Society and especially Lt.-Cdr. R. I. Sinclair made this expedition while the cheerful perseverance of D. Jonas, C. Morton, J. Stowers, S. Sweet and P. Wright saw to the success of the fieldwork. I have profited from discussion with C. J. Bibby and M. Norderhaug, and Dr. J. C. Coulson and D. Jonas helpfully criticised an earlier draft of this paper. The staff of I.C.I. (Buxton Lime Group) generously made available office and computer facilities.

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(In early July, 1972 it was noticeable that there was a very marked increase in the feeding activity of Kittiwakes and to a lesser extent Arctic Terns at sea

off Bear Island around midnight, though there was little reduction in the amount of daylight there then. The birds appeared to be catching something resembling a worm, possibly a pelagic polychaete, which they were never seen to do at other times. Indeed, they spent much of the rest of their time resting in large flocks ashore. Ed.)

## BIRDS AND SALMON NETS

David Melville

Brief details of a kill of Guillemots in salmon nets off Portrush, Co. Antrim, were given in the *Ulster University Bird Club Report for 1971*. Since then two other reports of auks being drowned in nets have appeared (Bibby 1972, Tull et al. 1972). Further work was carried out at Portrush during part of the 1972 salmon season and this note summarises some of the information obtained—details of taxonomic and chemical investigations are still awaited—and gives some general information from several areas in Ireland and Scotland.

### Ireland

At Portrush salmon are caught using both fixed and drift nets. Fixed net fishing began in early May but it was not until the third week of June that drift netting started. No fishing is allowed on Saturday or Sunday but if it is rough it may not be possible to lift fixed nets. Generally fixed nets are left in the water from Monday to Friday, while drift nets are only set at night. In calm weather drift nets are seldom set as the salmon catch is small. I was present in Portrush until 17 July except for the period 21-28 June. During the study period there were three boats using drift nets and three fixed nets around Portrush.

Table 1 shows the number of birds recovered from nets during the study period. During the period 21-28 June a maximum of ten Guillemots was caught and what was probably a non-breeding diver. Between 17 July and the end of the drifting season in early August very few birds were caught and due to the calm weather the salmon catch was small. It can be seen that the majority of birds are caught in drift nets, a similar situation probably existing around

Table 1: Numbers of birds recovered from salmon nets at Portrush.

Species	Drift net	Fixed net
Guillemot	64	1
Razorbill	5	1
Shag	—	2
Eider	—	1
Black Guillemot	—	1
Kittiwake	—	1

Greenland (Tull et al. 1972). As the majority of birds are caught in drift nets they must be caught at night, while birds caught in fixed nets may be caught at any time. Bibby (1972) reports one case where Guillemots had been caught during daylight and I have seen Guillemots in fixed nets at Troup Head, Banffshire which must have been caught during daylight. A fisherman at Portbradden, Co. Antrim, found that slightly more birds were caught during daylight than at night in his fixed nets. Although O'Connor (1967) suggests that there is usually full attendance of Guillemots on colony ledges during the night, Greenwood (1964) found that birds from Handa, Sutherland spent the night at sea in early July. Tull et al. (1972) suggest that auks are feeding when caught in drift nets off Greenland, but have no evidence to support this view (Tull pers comm.).

## SONIC BOOMS AND SEABIRD COLONIES

D. R. Wilson

There has been considerable speculation whether the sonic booms caused by Concorde are likely to cause serious disturbance to wildlife. During the spring of 1971 I was able to observe the effect of two of them on seabird colonies in Wigtonshire, south-west Scotland. At approximately 1132 hours on 28 April one, heard at the Mull of Logan, Galloway, sounded like a field gun nearby. All the land and seabirds in the vicinity immediately took off. The land birds soon settled, but the seabirds, mainly Shags, Fulmars and Herring Gulls, flew around for some minutes. Another boom was heard at approximately 1155 hours on 30 April along the north-east side of Loch Ryan, sounded very much louder; indeed, the ground shook. Some two hundred pairs of Herring Gulls, fifty Cormorants and fifty Shags all took off from the cliffs with a great noise. The Cormorants and Shags immediately settled on the water, and after ten minutes while they were still disturbed half the gulls had settled there too. There was little change and some birds were still flying about calling after twenty minutes. The birds were quieter and some were beginning to return to the cliffs though there were still many on the water after thirty minutes.

(Out of three sonic bangs which I have heard, when a squadron of French fighters buzzed an R.A.F. Station, it sounded as if bombs had gone off in the next building, and all the people got up and made a great noise for at least twenty minutes; whereas other people present when an aircraft made a trial supersonic run over London, and when Concorde crossed the Clyde, did not recognise the subdued distant report for what it was at all. The effects clearly vary locally, in which case it seems doubtful whether at the worst they present more than a local hazard to wildlife. Ed.).

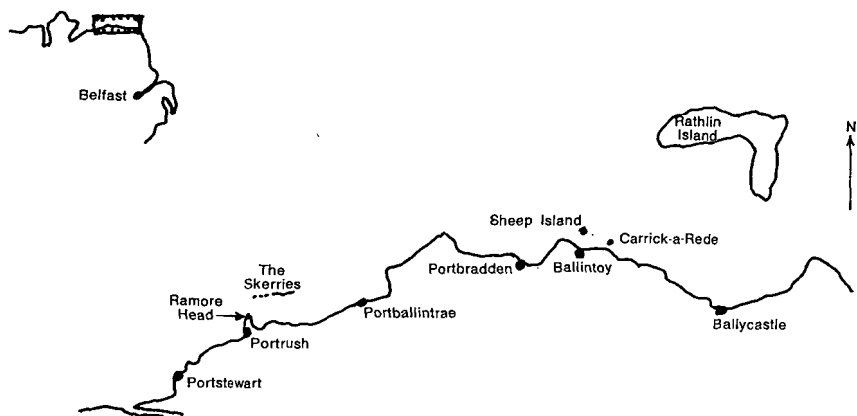


Fig. 1: Area of observation in Northern Ireland.

A total of 60 Guillemots was examined (29 males, 31 females) and of these only nine had obvious signs of food in the crop (five males, four females), while one female Razorbill had food out of one male and two females examined. Tuck (1960) found that Guillemots digest food very rapidly and that "Rarely can undigested fishes be found in their stomachs." Thus posthumous digestion may account for the very low number of birds with food, although on several occasions posthumous digestion did not appear to have occurred. It is also possible that the birds may regurgitate while drowning.

Unfortunately it was not possible to determine at what time of night the birds had been caught and thus it is still not clear how they were caught. Were they resting on the surface and dived when they encountered the net? Were they caught near dawn when they might have just begun feeding? The majority of birds caught in fixed nets must be caught while feeding—Holger-son (1961) reports birds caught in nets at a depth of 70 fathoms and Tuck and Squires (1955) report Brünnich's Guillemots caught in longline trawls at 40 fathoms, and it is difficult to imagine what these birds were doing if not feeding.

The number of birds caught in nets varied almost as much as the salmon catch—the maximum auk catch was 35 in one night, but averaged five, while the salmon catch varied between 130 and one per boat per night. Due to the variability of both catches and the short period during which the study was conducted it is not possible to formulate a valid relationship between numbers of salmon caught and numbers of auks caught. There was no correlation between sea conditions, wind speed or direction and auk mortality.

The variation in catch size is also great between different drift netting sites along the coast. At Portballintrae no birds had been caught up to 7 July and the maximum catch of salmon had been 73 in one night, while at Balintoy no birds and only one salmon had been caught after two weeks fishing. Few birds were caught around Ballycastle (P. Watson pers comm.) and one fisher-son considered that the numbers of birds caught had declined considerably in recent years.

At Portbradden it was estimated that 20-30 birds (Shag/Cormorant, Eider, Razorbill, Guillemot) are caught each year in fixed nets. At Carrick-a-Rede very few birds are caught since the fixed net is on the opposite side of the

small island to the seabird colonies; during the 1972 season only two birds were caught, one of which was released alive. Usually young birds are caught which are trapped in the "bag," having apparently followed the "leader" along. Both Greenwood (1964) and Pennycuik (1956) report cases of adult Guillemots apparently deserting their young and it seems likely that it is these waifs which are caught at Carrick-a-Rede. Birds were also found in the "bag" of the Portbradden net but some were caught in the "leader" where it passed over a sandy area. These birds may have been caught while feeding on sand-eels (*Ammodytes* spp) which tend to remain above the light coloured sand rather than the dark kelp (*Laminaria*) beds.

The "Blackfowl" have been used by fishermen along the North Coast as a sign of salmon for generations and many say that no birds are caught unless there are small fish fry about, thus suggesting that they are caught while feeding. The large kill off Portrush in 1971 occurred in a very small area just to the southeast of the Skerries and although this area was fished subsequently there were few birds caught. Tull (pers comm.) has found a similar tendency for Guillemots to congregate in small areas off Greenland. This could indicate that the birds were following fish shoals.

It is interesting that the majority of birds caught are Guillemots (all of the 72 examined in 1971 were Guillemots), because although more Guillemots than Razorbills are seen during seawatches, the ratio is much nearer 50:50 than in the catch figures. During the day mixed groups of auks can often be seen moving along the coast. On 28 June, 1971 when a vast auk movement was observed Razorbills were seen feeding in the tide race off Ramore Head, Portrush, while Guillemots flew past without putting down. On 13 July, 1972 a large shoal of Mackerel (*Scomber scombrus*) was feeding on small fry or sand-eels to the north of the Skerries, and although there were probably thirty Guillemots feeding as well as various gulls, Razorbills were seen to fly straight past. Fisher and Lockley (1954) and Harris (1970) found that the two species may feed on the same prey species but different size categories, and this might account for the catch differences—assuming that the birds were caught while feeding.

Tull (pers comm.) suggests that the birds might be decoyed to the floats of a net and says that they are easily lured to hunting decoys in Newfoundland. There are a great variety of floats used, the shape, size and material varying, and it seems strange that if birds were lured that only Guillemots were attracted. This is supported by several fishermen who said that they had never seen any signs of auks being attracted to nets.

### Scotland

Drift netting is prohibited in Scotland and thus the total annual mortality is probably quite small. Apart from large stake net complexes along the Solway there appeared to be little salmon fishing along the west coast with only a few bag nets in sheltered sea lochs. Near Montrose, Angus, each stake net was reported to catch four or five birds per annum (mainly Cormorants). Around Troup Head on the Banff-Aberdeen border, bag nets are placed directly below the seabird colonies, and a high mortality results throughout the whole breeding season, mainly Guillemots. Due to their estuarine location stake nets are unlikely to catch many auks but might cause a considerable mortality of Shags, Cormorants and Eiders. Bag nets are used in the more rocky areas which are more suited to auk feeding and thus might cause a high mortality. However, due to the exposed nature of much of the coast it is not usually feasible to fish except in the more sheltered areas which are less likely to be frequented by auks.

Obviously the results in this brief study are of very limited value and it will be necessary to make a much wider study of auk catches before it will be possible to determine how the birds are caught, and then possibly how the kill could be reduced. In any case the corpses themselves are of considerable value in various studies (taxonomic, pollution, feeding, parasites, etc.).

### Acknowledgements

I would like to thank all of the fishermen who so patiently put up with my enquiries and provided bodies from the nets: the members of the Ulster University Bird Club who helped in collecting some of the data: and H. M. Coastguard, Ballycastle for providing meteorological data.

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(We have also received a report from A. C. Macleod on the birds caught in salmon nets around the approaches to Loch Broom, Wester Ross. During the season extending from 30 May to 26 August, 1972 they had three conventional bag-nets and one of green monofilament nylon set in the channel between the Summer Isles and Achiltibuie on the mainland, three of them at Dorney Sound, and one at Achuart Point. Four Shags and a Black Guillemot were caught in the three bag-nets, and seven Shags in the nylon net. Two of the Shags and the Black Guillemot were still alive, caught by the wings in the bag-nets, and were liberated with the loss of some primaries. At a neighbouring station close to a breeding colony 50-70 Shags were caught in six bag and four nylon nets, and also a tern, the first ever recorded. Elsewhere an adult Gannet and a Red-throated Diver were caught in nylon nets, and a Fulmar by the leg in a bag net, and subsequently rehabilitated in captivity. The number of birds caught is clearly much influenced by both where the net is set, and the material of which it is made, nylon nets catching many more birds. Ed.).



## AN ARTIFICIAL RAFT AS A NESTING SITE FOR TERNS ON THE DEE

R. Eades

Common Terns have traditionally nested in the Dee Estuary for many years, usually some two miles out from the shore upon grassland. Since the war this colony has had an unhappy history, as high tides have annually destroyed many nests and human disturbance has increased.

A steady decline in numbers has been noted, and in 1969 it was estimated that only 40 to 50 pairs remained. In addition, the proposed Dee Barrage scheme would cover the nesting area with a reservoir. The future of this colony looked bleak. However, for the last few years, one or two pairs of Common Terns have attempted to nest upon the walls of a reservoir inside John Summers Steelworks, but without success. Predation by feral cats, foxes and rats, and disturbance by workmen prevented even one young bird fledging.

In 1970 the British Steel Corporation entrusted this area of reservoirs to the Merseyside Ringing Group as a nature reserve to mark European Conservation Year. It was felt by the group that the Terns would stand a better chance of successful breeding if an island were situated in this reservoir. As it was impossible to build an island it was decided to instal a raft as an experiment. Four telegraph poles were dovetailed together and a decking of railway sleepers and discarded timber was nailed upon this framework, which was covered with slag, shingle and grass sods. Buoyancy was provided by blocks of expanded polystyrene which were pushed under the raft. The final 'island' was ten feet square and rode six inches out of the water. It could take the weight of three men with ease.

The raft was moored in the middle of the reservoir by the end of March, using nylon ropes tied to anchors of scrap iron. At this stage, it seemed very incongruous to imagine a Tern colony in such an industrial area, surrounded by slag tips, coke ovens, blast furnaces, power stations, and the constant disturbance inherent in a modern steel works. On 3 May, Common Terns were sighted feeding upon the reservoirs, no doubt freshly returned from their West African winter quarters. To everyone's delight two pairs took up residence on the raft and defended their territory with great vigour against the attentions of a resident flock of Herring Gulls. As the summer unfolded the colony gradually built up. Possibly these later arrivals had nested on the marsh, and after their first clutches failed owing to high tides, were trying again.

Two trips were made out to the raft to ring young birds. Sixteen in all were ringed before fledging, and it seems probable that others fledged before being ringed, as it was desired to keep disturbance to an absolute minimum. These fledgelings were the first to be reared upon the River Dee for several years, and the Merseyside Ringing Group were delighted at this achievement. The constant activity over the tern raft, with adults landing, displaying, feeding young and chasing gulls, was a delight to the eye in such a blighted environment.

Encouraged by this success, and assisted by financial grants from the North Wales Naturalists Trust, Flintshire Ornithological Society, Merseyside Naturalists Association, and private donations, three more rafts have been built by the M.R.G. using oil drums and good quality timber. It is hoped that the Dee Tern colony will soon be up to its old numbers and will survive the Barrage across the Dee Estuary. However, if the Barrage is built, surely some islands can be constructed in the new storage reservoirs for the Terns to nest upon?

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## GREY SEALS AND SEABIRDS

**D. R. Grant and W. R. P. Bourne**

During the course of a cruise up the west coast of Scotland in the Fishery Cruiser Brenda in January, 1972 W.R.P.B. noticed that a flock of gulls feeding busily over a fish shoal in the Inner Sound all immediately departed when a Grey Sea *Halichoerus grypus* surfaced amongst them. On arrival in Stornoway it was also noticed that the disreputable Grey Seals which frequent the harbour to feed on fish-offal would commonly come up under gulls sitting on the water, which gave them a very wide berth, and it was reported locally that the seals would catch the gulls whenever they could. It may be useful to place on record some instances when seals have actually been found attacking seabirds, in one case with an unfortunate outcome for the seal.

On 25 August, 1958 vast shoals of Mackerel *Scomber scombrus* in Village Bay, St. Kilda, attracted large numbers of Gannets and Grey Seals to feed on them, and the air was filled with milling birds and the water with threshing seals and fish. D.R.G. noted that Gannets diving for fish were frequently chased by seals as they surfaced. On one occasion a seal was seen actually to seize a Gannet while it was on the water which had the greatest difficulty in escaping, though finally it did, and struggled away along the surface, eventually becoming airborne. It may or may not have been the same bird as a Gannet washed up freshly dead with a serious wound underneath near the legs the next day. It may be remarked that while the seals were prepared to molest the Gannets, a very large male Killer Whale *Orcinus orca* which briefly entered the bay also caused a mild degree of consternation among the seals.

Two definite instances in which young seals appear actually to have eaten birds have been reported to us by Mr. S. D. E. Devlin of the Department of Agriculture and Fisheries for Scotland Marine Laboratory, Aberdeen. A well-grown young male Grey Seal weighing 49 lbs. shot on the shore at St. Cyrus, Angus, on 6 January, 1971 was found to be in good condition with remains of fish, cephalopods, crustacea, numerous parasitic worms and bird feathers in its stomach. The feathers came from the mantle of a gull, and the species was not identifiable with complete confidence, but seemed most likely to be a Kittiwake.

## IMPROVING GUILLEMOT LEDGES

P. Corkhill

In an account of the Bird Bazaars of Novaya Zemlya (Canadian Wildlife Service Translations of Russian Game Reports, Vol. 4, 1958) the Russian author S. M. Uspenski describes an experiment at Gribovaya Bay which increased the density of nesting Common and Brunnich's Guillemots from 19 birds per square metre in 1948 to 28 birds per square metre by 1950. This was achieved by removing quantities of loose scree and boulders from the nesting ledges during the autumn of 1949, while the birds were absent.

Another small experiment in 1950 showed that in some cases a nesting colony of Guillemots may also be transferred to the flat top of a cliff or island. Under protection from excessive commercial exploitation the birds nesting in the northern Bezymyammaya bazaars began to approach the maximum possible density, and during the pre-nesting period in 1950 flocks were seen flying along the coast and unusually far inland, and trying to settle on small projections or even grass-covered flat surfaces of the upper terraces of unoccupied parts of the cliffs. Uspenski cleared the soil and vegetation from the summit of a cliff where, up to that time, only two pairs of Glaucous Gulls had nested, and within three days about twenty Guillemots were seen sitting on the cleared patch and nine eggs had been laid. L. O. Belopolski obtained similar results in the Seven Islands on the Murman Coast.

There is little chance that in the depleted British auk colonies a shortage of nesting sites would be so strong a driving force, but many of our Guillemots lay eggs in situations which are hardly ideal for their future survival and that of the chicks. Many eggs are lost because the ledges are too narrow, or slope too steeply. Some hold pools of water in wet weather which drown the embryos, or become covered with soil and vegetation outside the breeding season. The extreme porosity of Guillemot eggs then makes the damp, soil-covered substrate unsuitable for breeding.

During the autumn of 1968 I devised a small experiment to test Guillemot reactions to interference with their ledges outside the breeding season. I chose a small, isolated group of five to seven pairs of Guillemots nesting in a narrow chimney on Skomer Island, for which the breeding success for 1967 and 1968 was known. The two small ledges occupied by the birds were cleared of fringing soil and vegetation, and their area increased by removing several large rocks, which were then jammed into the chimney at the edge of the ledge to provide an alighting platform and parapet to prevent loss of the eggs. The floor of the ledge was further improved by paving it with flat stones, angled to improve drainage.

Early in the 1969 season I made several brief visits to the colony to count the adults, and was pleased to see that they were in no way discouraged by my alterations. The table shows that their breeding success has definitely improved since 1968. As far as I can tell, this is directly due to reduced egg loss, rather than any fluctuation in the number and age of breeding pairs present each year.

Because most Guillemot colonies on Skomer are highly inaccessible, it is unlikely any further trials will be carried out here. More work clearly needs to be done in this field before general conclusions can be drawn, but the possibility of improving the breeding success of our present stock of Guillemots is not one which should be neglected in view of the decline in breeding numbers now visible, and the growing adult mortality from pollution.

**Table**

<i>Year</i>	<i>Breeding success</i>
1967	2 chicks fledged
1968	1 chick fledged
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ledge improved	
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1969	3 chicks fledged
1970	3 chicks fledged
1971	4 chicks, 1 egg on 3 July.

## AUKS DROWNED IN FISH-NETS

C. J. Bibby

During the summer of 1971 two independent fishermen in Co. Mayo, western Ireland, reported that birds were being killed in fishing-nets, though they could only provide scanty information. The local salmon-fishing operation involves setting lines of drift-nets along the coast in the late afternoon, and emptying them the following day. The nets are usually set fairly close inshore. The birds caught were apparently all auks, and the numbers were described as 'small', though the fish catches were also small for one night. I gathered the impression that the overall catch must have been at least one bird for every half dozen fish, but the number of birds caught was reported to be very variable. Most were caught at night and in the summer, but the salmon-fishing season only lasts from April to August in any case. Both men found the slaughter distasteful as well as a hindrance to them in their work, and implied that they tried to avoid siting the nets where they were liable to catch birds. A similar situation has also been reported in Co. Donegal in the past.

J. C. Bacon reported to the Scottish Office of the Royal Society for the Protection of Birds that when he visited St. Abb's Head, Berwickshire, in June 1971, he found two nets each containing at least 25 Guillemots. In the one examined closely many more could be seen below the surface, and at least six were still alive, which suggests that they were caught during daylight, since the visit occurred during the afternoon. Two more nets could be seen further round the bay, too far away to see if they had also caught any birds. A team of skin-divers present in the area said that they had not seen anyone tending the nets for several days, and it was heard later that choppy seas had prevented this. The owner of the salmon-fishing rights reported that it was usual to catch birds, and that it distressed him, but that little could be done except to release any birds that were still alive. A similar report has also been received this summer from G. Bittern concerning Gamrie Bay in Banffshire, so it appears that the trouble may be as widespread on the east coast of Scotland as it is in the north-west of Ireland.

The discovery that birds are killed in fish nets is by no means new. Holgersen (1961) reported that eight to ten thousand auks were caught in fishing nets in a single season on the grounds off Hammerfest, north Norway. Two to three thousand were brought ashore in a month near Sandnessjoen, and no less than about 900 were caught in nets at a depth of 70 fathoms (420 ft) in Tjongsfjord, Co. Nordland, on 12 January 1960. He considered that some Russian and north Norwegian populations were seriously threatened, and Brun (1971) also mentions increased mortality from fishing as one of the factors which may help to explain a decrease of Norwegian Razorbill, Guillemot and Puffin populations between 1963 and 1970. In Greenland it has been estimated that as many as a quarter of a million Brünnich's Guillemots may have perished in a single season as a result of the recent development of salmon netting along the west coast (Anon, 1969). This figure is based on extrapolation from one catch of 36 tons of salmon and 7,000 birds in three and a half months in 1965, but further investigations by Messrs. Germain, May and Tull (in litt.) suggest that if anything it is an underestimate. The serious view taken of the situation in a resolution passed by the International Council for Bird Preservation (1971) is reinforced by another recent report by Salomonsen (1970) that the birds are being shot on a vast scale as well.

In British waters the toll can hardly be as great, but C. J. Mead (1971 and in prep.) reports that at least 5% of all auk ringing recoveries, including 5·5% of the Razorbills, 4·7% of the Guillemots, and 2·4% of the Puffins, come from nets, while in many cases the cause of death is not stated so the true figures must be higher. The Guillemots were reported from the Irish Sea, south and east England, Scandinavia, the English Channel and the Bay of Biscay, while the worst areas for the more migratory Razorbills were the Bay of Biscay and western Mediterranean.

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[It would be useful to have more observations, either direct, or from fishermen, of the extent and nature of this problem. It would be useful to know where, when, under what conditions, and in what numbers, the birds are caught, the species involved, the relation between the number of birds caught and the number of fish, from which it might be possible to estimate the total number of birds caught, and the extent to which birds are caught at different depths and in different kinds of nets. It would also be useful if specimens can be obtained, in order to determine what bird populations and age-groups are involved and what the birds have been eating. Observations of excessive bird mortality should be reported at once to the Royal Society for the Protection of Birds (Sandy 80551 or Edinburgh 556 5624) or the Seabird Group (Aberdeen 40241 ext. 6435) who will arrange for further investigations and the collection of specimens. Ed.]

rehabilitated birds is unlikely to be successful, and it may be wiser to try and get them back to sea as soon as possible instead, though perhaps preferably in an area with a better food-supply than appears to have been available to Torrey Canyon birds liberated along the south coast of England in the autumn, where many of them soon came to grief.

It is also surprising to observe that the report of the occurrence of Guillemots with degenerate plumage lacking unusually large amounts of fluorine on pages 18-19 of the third Report makes no reference to the preceding lengthy discussion of these birds in "British Birds" (63: 34-36; 64: 229-230, 236; 65: 85-87), where it was pointed out that the phenomenon has been known for half a century and occurs in other species and areas as well; one of these birds did not contain much organochlorine, either.

**W.R.P.B.**

### **Conservation in Kent**

The Nature Conservancy, 1971. Wildlife conservation in the North Kent Marshes: a report of a working party. Mimeographed, pp.85, 6 plates, 3 maps.

Harrison, J. (1972?). Wildfowl of the North Kent Marshes. pp.100, numerous plates. Obtainable from the Wildfowling Association of Great Britain and Ireland, Grosvenor House, 104 Watergate Street, Chester, CH1 2LF. 50p.

Harrison, J., Humphries, J. N. and Graves, G. (1973?). Breeding birds of the Medway Estuary. pp.32, numerous plates. Obtainable from WAGBI (address above) and the Kent Ornithological Society, 11 Nursery Close, Sevenoaks, Kent. 54p.

Although most of our more interesting low-lying coasts are now threatened with development, and some are receiving careful study in consequence, the information available about them is often scattered and hard to come by, and local ornithologists have seldom shown much capacity for directing attention to it. North Kent is a conspicuous exception; not only have the Harrison clan been writing about it for many decades, E. H. Gillham and R. C. Homes' "Birds of the North Kent marshes" (Collins, London, 1950) provided a model early account of the area in the days before threats to our coast received much attention, and recently local naturalists have shown an exceptional capacity for expounding the virtues of their territory and the problems affecting it.

Of the studies listed above, that by the Nature Conservancy is a model exposition of the area and its natural communities, the problems affecting them and possible ways of dealing with them. As is usual with that body, the ornithology is rather weak, with a bias towards waders and especially wildfowl. Jeffery Harrison's study of the wildfowl makes it clear why they receive most attention, though mainly of interest from our point of view for its bibliography, but the special report on the breeding birds of the Medway is of considerable interest for the data on seabirds. In point of fact it consists of four parts—the results of the fifth census of breeding birds of the Medway and Swale islands in 1972, accounts of the breeding birds of Kingsnorth Power Station and Chetney Marsh, and an assessment of the importance of the Medway for waterfowl and wading birds.

If we enquire how seabirds are doing, the results of the Medway and Swale censuses are summarised in table 1. It will be noticed that the numbers of Black-headed Gulls have tended to fluctuate (notably on the Medway in the two successive years 1966-67), but show an increase, whereas both the terns have declined steadily, as they have done in a good many of our estuaries. Several possible reasons are suggested for the last phenomenon. It is pointed out that while the growing number of gulls might be molesting the terns, the

Common Terns at least deliberately go and nest with the gulls, so this seems unlikely. On the other hand, the gulleries are apparently attracting a good many rats, which may be preying on the terns as well, as is demonstrated by a picture of one killed by a rat at its nest. The nesting site used by the Little Terns on the Medway has also become overgrown with herbage which they dislike. It is finally suggested that the terns may be affected by a food-failure, though no suggestion is made as to its possible cause; one wonders whether the gulls may be competing with them for food on the one hand, or whether it may be affected by pollution on the other. In any case, as with many other estuaries, it seems time the welfare of the terns received more attention, perhaps as suggested by the Conservancy working-party by creating new protected artificial breeding-sites for them.

One would also like to know why the Nature Conservancy were unable to produce a similar report on an area where the need for it was even more urgent, south Essex.

**W.R.P.B.**

Table 1: Gulls and terns nesting on the Medway and Swale islands.

Year	Herring Gull Medway	Black-headed Medway	Gull Swale	Common Medway	Tern Swale	Little Tern Medway
1955	2	1,545	350	683	213	44
1961	2	2,398	1,612	331	152	23
1966	—	1,929	2,000	104	200	17
1967	2	1,052	?	143	?	3
1972	—	4,964	1,593	87	11	7

## SIXTH REPORT OF THE SEABIRD GROUP, 1970-1971

The sixth year of the Seabird Group has been occupied with a review of progress, preparation of the report on the national census of breeding sea-birds, and the formulation of proposals for new research in the future. Stanley Cramp has continued as Chairman and Representative of the British Ornithologists' Union on the Executive Committee, C. M. Perrins represented the British Trust for Ornithology and David Lea the Royal Society for the Protection of Birds, W. R. P. Bourne served as Secretary, Editor, and Director of Research, John Crudass as Treasurer, and T. R. E. Devlin, G. M. Dunnett and Oscar Merne as elected members of the Executive Committee. R. G. Pettitt resigned in August after completing a review of the results of sea-watching, and the Committee have co-opted J. L. F. Parslow in his place until the Annual General Meeting. We owe a great debt of gratitude to Garth Pettitt for the enthusiasm, energy, and initiative that he has shown in promoting sea-watching activities, which played such a large part in the early development of the Group. We wish to place on record our appreciation of the amount of trouble which he has taken under the most trying personal circumstances to canvass opinion on the most suitable way to develop these studies in future since his return from abroad. We are greatly indebted to him.

The Secretary was joined at the Research Unit at Aberdeen in January by Tim Dixon, long a member of "Oil Pollution South-east Kent," who keep watch on the Straits of Dover. Between them they have now made nine voyages of varying length around the entire coastline of Scotland and north to the Faroes at all seasons of the year in the Fishery Cruisers and Research Ships belonging to the Department of Agriculture and Fisheries for Scotland. Through the good offices of the R.A.F. Ornithological Society Bill Bourne was also able to accompany two training flights by R.A.F. Shackleton around the coast of



## THE EXTENT OF AUK MORTALITY FROM SHOOTING IN SOUTHERN NORWAY

T. J. Dixon

Considerable numbers of the larger auks ringed elsewhere in Europe have been shot in the second half of the year around the coast of southern Norway in the past. In early September 1971, I visited this area in order to investigate what occurs there. I left Newcastle on the afternoon of 4 September and made a short transect from the ferry thirty to forty miles south-west of Stavanger between 0600-0630 hours next morning before heavy rain put an end to the observations, but I only saw one Gannet, four Fulmars, and three Herring Gulls. Later in the day after the weather cleared and returning to Stavanger the following day I only saw a few Eider and Herring and Lesser Black-backed Gulls in the inner fjords between Stavanger and Bergen. I therefore travelled by train to Egersund on the south coast, which appeared to be near the centre of the area where the auks are recovered.

I met several people there who explained that there are hunters' clubs in most towns on this coast, whose members shoot auks and sea ducks, especially scoter, from boats. According to the local regulations the open season lasts from 21 August to 28 February, though the birds can only be shot at sea after 15 October. The birds are hunted for food since both Scoter and Eider and also Puffins, Razorbills and Guillemots are regarded locally as a delicacy, though there is no extensive trade in them. No statistics of the numbers of birds shot were kept by the local club, but they were thought to be low, the number of Eider, for example, amounting to possibly 200 a year. All hunting is controlled by licensing, but it proved impossible to discover how many were issued locally. It was thought that the number of birds obtained was decreasing.

On 8 September I moved on to Flekkefjord further along the coast, and met several people in the habit of shooting in the mouth of the fjord and its approaches. They were also unable to say how many birds were shot, but they also thought the number was declining, and one of them said he had only seen three or four auks during the whole season in 1970. They reported that the main shooting season starts towards the end of September and lasts until the end of January, when the birds appear to leave for the breeding colonies. There are a few colonies of a few thousand of the larger auks in the area, but the birds are not taken at the colonies, but after they leave them, when they are at their fattest during and after the moult. They are then frozen, and one informant had eaten his last bird from the previous season only the week before. It was reported that the birds are shot in this way all round the Norwegian coast, but more in the north, where the numbers are larger.

Two hours looking out to sea at Egersund only revealed Herring Gulls. An attempt to get out to sea in a boat at Flekkefjord was likewise unsuccessful. It appears that the number of auks occurring on this coast is now seriously reduced and that if they were ever hunted on a large scale, this is no longer possible. From experience in Scotland, it seems likely to be very easy to shoot the birds on the water in the late summer, especially when they are in moult, and this may help explain why there is now only a small auk breeding population in southern Norway (E. Brun, *Sterna* 10: 35-56), but it seems doubtful whether the number of birds being killed there now will explain any more widespread decline.

This survey was financed by a grant made to Professor G. M. Dunnet of the Zoology Department, Aberdeen University, by the Natural Environment Research Council for the study of the ecology of birds at sea, and was carried out on the way to participate in an investigation of oil pollution in south Sweden on behalf of the Advisory Committee on Oil Pollution of the Sea, also financed by the John Lewis Trust for the Advancement of Natural Sciences and Sir Douglas Busk.

# NOTE OF THE OCCURRENCE OF AVIAN POX IN AUKS, WITH AN APPEAL FOR THE COLLECTION OF SICK SEABIRDS AND THEIR PARASITES

W. R. P. Bourne, T. J. Dixon and R. Yule

In the course of investigations of flightless moulting auks and ducks at sea off the east coast of Aberdeenshire in August 1971, it was noticed that a number of the auks appeared unwell, and either held their bills pointed upwards, or dabbled in the water with them. An adult Razorbill collected under licence on 17 August was still in very worn summer plumage and only weighed 500g, whereas a healthy adult collected with it had already shed all its flight feathers and begun to renew its body plumage and weighed 800g, and even a bird of the year already weighed 700g. Since the sick bird appeared to have yellow growths inside its mouth, it was referred to Mr. J. W. Macdonald at the Ministry of Agriculture, Fisheries and Food Veterinary Laboratory at Lasswade for further investigation. He reported that it was a male in poor condition with inactive testes, with firm yellow pus on the mucous membrane of the hard palate and around the tongue, where the lesions showed the microscopic characters of avian pox. He reported that they had also encountered several isolated cases in Puffins in recent years, but until now no epidemics. It may be noted that in addition to the Razorbills, some Guillemots also appeared to be infected at sea off Aberdeenshire.

Avian pox is a somewhat obscure virus disease which is found sporadically in wild birds and sometimes causes severe mortality in domestic ones. It produces cutaneous lesions around the soft parts, which may become secondarily infected with other organisms. In domestic birds it is apparently highly infective and may be spread by contact, but it is uncertain how it is spread among wild ones, and possibly biting insects might play some role here. It develops at a variable rate but sometimes rather slowly, though the cases which attract attention tend to be fatal in the end; it does not seem clear to what extent wild birds may recover from it. It is difficult to understand how it could spread among auks at sea, but easy to believe that it would spread rapidly among them at the colonies, and it seems likely that the sick birds seen at sea off Aberdeenshire in August 1971 must have become infected there before they left them to go to sea a month before, and that the disease only developed afterwards. There is little evidence as to the amount of mortality that the disease caused at sea, but since no bodies at all were reported along the adjacent beaches it is possible that it was small, since while some bodies might have drifted away out to sea with west winds, it seems unlikely that none would have been noticed if the mortality was large.

It would appear that avian pox must now be added to the growing list of virus diseases liable to cause epidemics among seabirds, including ornithosis, puffinosis, influenza, Newcastle disease, and various arthropod-borne infections (arboviruses). They need to be treated with considerable respect, because the parrot strain of ornithosis (psittacosis) caused numerous deaths among the human population when it infected the Fulmars of the Faroes before the last war, and some of the arboviruses can cause encephalitis in man, while the myxoviruses influenza and Newcastle disease are collectively responsible for fowl pest in poultry, the current outbreak being due to Newcastle disease. Viruses are often difficult to isolate, and it seems likely

that epidemics may have been responsible for many unexplained seabird wrecks in the past. It is desirable where this is possible to attempt to isolate them from affected birds while they are still alive, and if numbers of sick birds are encountered it may be useful to consult Mr. Macdonald (Tel. Lasswade 2025) about the possibility of getting live birds tested. Otherwise specimens should be sent as soon as possible to the M.A.F.F. Veterinary Laboratory, Lasswade, Midlothian.

Dr. M. G. R. Varma, of the Department of Entomology, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, is also anxious to investigate the ticks infesting seabirds to discover whether they are carrying arboviruses, recently detected in ticks infesting Guillemots in the North Pacific and others infesting boobies and cormorants in the tropics. They may be found in the nest material or surrounding crevices at seabird nest-sites, and should be sent straight to him. Professor G. M. Dunnet would also be interested to see any fleas discovered in the process, which should be sent to him at Culterty Field Station, Newburgh, Aberdeenshire.

## ORGANOCHLORINE RESIDUES IN A BRITISH STORM-PETREL

W. R. P. Bourne

During three nights in August 1971. Andrew Ramsay ringed 567 'new' British Storm-petrels on Auskerry in the Orkney Islands and recaptured nine 'controls'. One of these birds, ring no. 2123695, ringed on 18 August, was brought in to the Zoology Department at Aberdeen University in a mutilated state on 11 September after being found dead on the beach nearby. It has been submitted to Dr. J. Bogan of the Veterinary School, Glasgow University, for estimation of its organochlorine residues, since these have been found raised in other storm-petrels collected along both coasts of the Americas. It weighed 20g compared to an average weight of 26.1g (range 22-30g) for 33 caught in northern Scotland by P. G. H. Evans this summer, and 0.62g of liver contained 0.5 ppm pp' DDE, 0.03 ppm Dieldrin, and 2.25 ppm PCBs, while the levels in 1.25g of muscle were approximately ten times as high. The high level in muscle is somewhat surprising, and some fat may have been included, or the body may have been somewhat dehydrated. The amount of PCB is roughly the same as in California, though the DDT/PCB ratio is very much higher there (R. W. Riseborough et al., Nature 220: 1098-1102). Investigations are continuing.

## GENERAL FUND

### Income and Expenditure Account for the year ended 31st October, 1970.

1969	£	£	INCOME	£	£
161			Subscriptions—Current year ... ..	128	
13			Previous year ... ..	20	
4			In advance ... ..	1	
		178			149
		7	Donations ... ..		7
		13	Sales of Bulletin ... ..		4
		20	Grants ... ..		25
		6	Deposit Account Interest ... ..		9
		—	Influenza Grant ... ..		209
		<u>224</u>			<u>403</u>
			EXPENDITURE		
			Administration Expenses—		
16			Postage ... ..	10	
2			Telephone ... ..	10	
32			Printing and Stationery ... ..	7	
—			Sundry Expenses ... ..	6	
26			Audit and Accountancy ... ..	—	
				<u>33</u>	
76			Costs of Bulletin ... ..	—	
43			Committee Travelling Expenses ... ..	8	
7			Influenza Research ... ..	132	
		<u>126</u>			<u>173</u>
		<u>£98</u>	EXCESS OF INCOME OVER EXPENDITURE		<u>£230</u>

## CENSUS FUND

### Income and Expenditure Account for the year ended 31st October, 1970.

1969	£	£	INCOME	£	£
2,300			Grants—World Life Fund ... ..	2,300	
—			Scottish Ornithologists' ... ..	100	
—			British Ornithologists' Union ... ..	100	
—			British Trust for Ornithology ... ..	25	
50		2,350	West Wales Naturalist Trust ... ..		2,525
		50	Donations ... ..		—
		72	Deposit Account Interest ... ..		50
		<u>2,472</u>			<u>2,575</u>
			EXPENDITURE		
1,276			Organiser's Fee ... ..	1,318	
367			Travel and Subsistence ... ..	238	
550			Grants paid out ... ..	304	
			Administration Expenses—		
69			Postage ... ..	44	
47			Telephone ... ..	33	
264			Printing and Stationery ... ..	136	
—			Audit and Accountancy ... ..	26	
47		2,620	Sundry ... ..	30	2,129
		<u>(148)</u>	EXCESS OF INCOME OVER EXPENDITURE		<u>£446</u>
			(DEFICIT) ... ..		

We have examined the accounts set out on pages 59 to 60 and have compared them with the relevant books and vouchers, and certify them to be correct and in accordance therewith.

28 Ely Place, LONDON, E.C.1.

TANSLEY WITT, MILLER PRIDEAUX  
Chartered Accountants.

# Balance Sheet as at 31st October, 1971.

1970	£	GENERAL FUND	£	£
		Income and Expenditure Account—		
258		Balance 1st November, 1970 ... ..	488	
230		Surplus (Deficit) for year ... ..	(85)	
	488			403
		CENSUS FUND		
		Income and Expenditure Account—		
1,443		Balance 1st November, 1970 ... ..	1,889	
446		Surplus (Deficit) for year ... ..	(1,189)	
	1,889			700
	<u>£2,377</u>			<u>£1,103</u>
		Represented by:—		
		GENERAL FUND		
		Current Assets—		
410		Balance at Bank—Current Account ...	3	
244		Deposit Account ...	261	
—		Amount due from Census Fund ...	249	
			<u>£513</u>	
£554				
		Less:		
		Current Liabilities—		
84		Creditors ... ..	110	
82		Amount due to Census Fund ...	—	
			<u>£110</u>	
166				403
	488			
		CENSUS FUND		
		Current Assets—		
—		Balance at Bank—Current Account ...	308	
1,830		Deposit Account ...	639	
87		Cash in Hand ... ..	2	
82		Amount due from General Fund ...	—	
			<u>£949</u>	
£1,999				
		Less:		
		Current Liabilities—		
110		Bank Overdraft ... ..	—	
—		Amount due to General Fund ...	249	
	1,889			700
	<u>£2,377</u>			<u>£1,103</u>

## GENERAL FUND

### Income and Expenditure Account for the year ended 31st October, 1971.

1970	£	INCOME					
128		Subscriptions—Current year	...	...	111		
20		Previous year	...	...	1		
1		In advance	...	...	28		
	149						140
7		Donations	...	...	3		
4		Sales of Bulletin	...	...	15		
25		Grants	...	...	125		
9		Deposit Account Interest	...	...	17		
209	254	Influenza Grant	...	...	—		160
							300
	403						
		EXPENDITURE					
		Administration Expenses—					
10		Postage	...	...	17		
10		Telephone	...	...	—		
7		Printing and Stationery	...	...	26		
6		Sundry Expenses	...	...	16		
							59
33		Cost of Bulletin	...	...	285		
8		Committee Travelling Expenses	...	...	41		
132	173	Influenza Research	...	...	—		£85
	£230	EXCESS OF INCOME OVER EXPENDITURE					
		(DEFICIT)	...	...			£(85)

## CENSUS FUND

### Income and Expenditure Account for the year ended 31st October, 1971.

1970	£	INCOME		£	£
2,300		Grants—World Wild Life Fund	...	—	
100		Scottish Ornithologists' Club	...	—	
100		British Ornithologists' Club	...	—	
25		British Trust for Ornithology	...	—	
		Irish Wildlife Conservancy	...	100	
	2,525				100
	50	Deposit Account Interest	...		49
	2,575				149
		EXPENDITURE			
1,138		Organiser's Fee	...	955	
238		Travel and Subsistence	...	120	
304		Grants paid out	...	155	
		Administration Expenses	...		
44		Postage	...	26	
33		Telephone	...	13	
136		Printing and Stationery	...	39	
26		Audit and Accountancy	...	26	
30		Sundry	...	3	
		Bank Charges	...	2	
	2,129				1,338
		EXCESS OF INCOME OVER EXPENDITURE			
	£446	(DEFICIT)	...		£(1,189)

We have examined the accounts set out on pages 61 to 62 and have compared them with the relevant books and vouchers, and certify them to be correct and in accordance therewith.

28 Ely Place, LONDON, E.C.1.

TANSLEY WITT, MILLER PRIDEAUX  
Chartered Accountants.



## OBITUARY

### 'Fish-hawk': Lt.-Col. David Knightley Wolfe Murray

'Fish-hawk' was an established part of the background for naturalists who grew up around the period of the last war as a result of his illustrations and broadcasts, but probably few of the present generation realise his interesting history. He was the son of the late Commander and Mrs. Wolfe Murray of Tain, Easter Ross, a wonderful area which was always one of his favourite haunts, and was educated like Charles Darwin at Shrewsbury. He passed into the 'Shop', Woolwich, during the first World War, and later served in the Royal Artillery in Egypt, Mesopotamia and India before he resigned in 1922. After an intensive course in first aid he then spent most of fifteen years at sea on the hospital ship of the Royal National Mission to Deep Sea Fishermen which accompanied the fishing fleets in the North Sea. He left this in 1938 to join the television service of the B.B.C. as public relations officer, but was called up on the Regular Army Reserve the following year, although he returned to the B.B.C. a year after the war was over until he retired.

He wrote and illustrated two books of his own, 'Studies of British birds' (1937) and 'Birds through the year' (1938), and provided the illustrations for the four volumes of James Fisher's Penguin series 'Bird Recognition', the last of which although it was completed was never published (the whole series in fact deserves to be reissued). He made important original observations on bird migration at sea during his time with the trawlers, some of which he described in *British Birds* (21: 252-5, 24: 114-20, 25: 6-11), and others for us in the *Seabird Bulletin* (2: 41-42). I was rather startled to discover he was also noting things like flushes of plankton which affected the birds at the same time (*Fish. Invest.*, Series 2, Vol. XV, 1:3). He also corresponded with other ornithologists—notably T. A. Coward, with whom he compared notes on a great fall of migrants seen at sea and along the north Norfolk coast in September 1930—and Coward later visited Tain. He collected a number of birds while he was at sea, which he presented to the British Museum (Natural History), and also kept careful notes of those he saw, and we are grateful to Mrs. Wolfe Murray for presenting us with a copy of them for our records. He was one of the earliest supporters of the Seabird Group, and we shall miss him.

W.R.P.B.

## REVIEWS

Murton, R. K., 1971. *Man and Birds*. Pp. 364. London, Collins. £2.50

Bird-watchers have a bad image with most of the human race, and the scientists in particular. They are regarded as incurably frivolous and mainly divisible into two phases, the elderly and sentimental, enthusing myopically over fratricidal strife between robins on their bird-tables, and the young and active, energetically laying waste the countryside in pursuit of improbable rarities. It is quite a change to find someone attempting to restore our reputation by returning as close to the proper study of mankind as it is possible to get while still mentioning birds, and in the process explaining why the rest of humanity should also take birds seriously.

There are two themes to the present book. The first is a necessary consideration of the impact of human activity on birds, and its overwhelming influence on their welfare through the ages. The second is the practical importance of the activities of birds for man. The second theme surely deserves much more attention than it usually gets as the main practical justification for ornithology, and indeed I do not remember any other recent work reviewing it in quite this way, if one excludes such works as the Proceedings of the Institute of Biology's 'Birds as Pests' symposium of 1967, which Ron Murton also helped to edit. All serious-minded ornithologists should study it, if they wish to equip themselves to defend their interests against the onslaughts of the philistines.

From our own point of view, most of the main battles between seabirds and men—human predation upon birds, the effects of pollution, the effects of changing agricultural and fishing methods in promoting the increase of such birds as gulls, birds preying upon fish, birds getting in the way of aircraft and carrying disease, and the need for conservation of bird habitats—are covered representatively if not comprehensively. In most fields it is possible to spot a few extra references that might have been useful—to the use of birds as bait by fishermen, the habit of albatrosses of choking themselves with floating human artefacts, B. B. Rae's study of the eating habits of Cormorants and Shags, Harvey Fisher's critique of albatross control operations at Midway, the work on birds as carriers of arboviruses with its sinister CB warfare implications, and the need to provide seabirds with safe breeding sites. But I doubt whether any other living British ornithologist could have covered the whole field so fairly and thoroughly. The author is to be congratulated unreservedly.

It is perhaps regrettable that the text is quite such heavy going—a little levity and slightly less detail might have sugared the pill. I understand that it is not the author's fault that the book is already getting out of date in this rapidly developing field, since there were apparently undue delays in publication. The book is well illustrated, though some of the plates seem more relevant to the text than others, and handsomely produced. Personally I would prefer to see all the references gathered together in a single bibliography, rather than separated for each chapter; I am entirely at a loss to understand what benefit is derived from this, apart from sparing someone the task of arranging everything in alphabetical order, and it makes individual items much harder to find. But this is a small price to pay for the provision of such a solid justification for our existence.

W.R.P.B.

*The British Ornithologists' Union 1971. The status of birds in Britain and Ireland. Oxford, London and Edinburgh. Blackwell Scientific Publications. £3.*

This is a tragic publication, the product of the invited labour of a vast number of unsuspecting people for which the highest hopes were originally held, but which regrettably instead marks the end of a great tradition as it falls disastrously between several stools. The B.O.U. Check-lists of the Birds of Britain and Ireland were originally intended to represent an agreed standard usage for taxonomy, nomenclature and sequence which could be adopted by other publications. It was hoped that the present one might also serve as a useful summary of the status of our birds as well. Unfortunately, owing to the stubbornness of a majority on the B.O.U. Council in ignoring the unanimous opinion at two successive National Editor's Conferences that they did not wish to change established usage until an internationally agreed alternative was available, this list no longer serves the first function, and anyone who wants an alternative that does can obtain it much more cheaply from the British Trust for Ornithology, who have agreed to produce a simple list of species in the currently accepted order instead. Owing to the delays which have resulted from the dispute over usage the information on distribution at home is now seriously out of date as a result of the recent comprehensive breeding surveys which have been taking place since the closing date for the acceptance of information at the end of 1968. It has always seemed doubtful whether this was a suitable place to summarise distribution abroad in any case, since this is already covered much more comprehensively in a growing number of other works.

The book is produced neatly, with the information on each species set out under the headings 'World Distribution', 'Distribution of subspecies relevant to Britain and Ireland', and 'Status in Britain and Ireland'. The previous habit of numbering each species consecutively, which has been rendered ridiculous by the number of additions to the list in recent years, has been replaced by one of referring them to one of four alphabetical categories instead, according to whether they have appeared naturally within the last fifty years, or only before then, or have been introduced, or there is doubt about the manner that they got here; and the last group are relegated to an appendix, which I feel myself is unfortunate since this means they tend to be overlooked. Three other appendices summarise with references a small number of changes of sequence from that used in 'Peters' Birds of the World' (as being completed by various other authors) and the nomenclature of Vaurie's 'Birds of the Palearctic fauna', recent news in the manner to which we have become accustomed at the end of 'British Birds', and the status of all species. The text is diversified as one has come to expect by attractive drawings by Robert Gillmor.

Since I was one of the people quoted as supplying some of the original information before I realised the use to which it was to be put, I would like to place on record that I did not see the later stages of the production of the list and am not responsible for any errors in the accounts of the status of seabirds that may be found there. Among the points spotted during a rapid survey as we go to press, which readers may care to note, the geographical variation of the Fulmar was reviewed by Finn Salomonsen in 1965 (Auk 82: 327-355), who recognises two North Atlantic races, and refers our birds to a large-billed southern one *F.g.auduboni*, though the small-billed nominate form breeding in the Arctic also sometimes occurs in Britain in the winter. It seems very doubtful if any race or ally of Leach's Storm-petrel breeds in the Indian Ocean. It is uncertain whether Grey Phalaropes winter there or Red-necked Phalaropes off West Africa. Northern

Great Skuas have now been shown by ringing to occur well south of the Tropic of Cancer, while it seems doubtful if any Arctic Skuas winter north of the equator. The supposed British and Irish records of Kumlien's Gull now seem likely to be hybrids between Glaucous and Herring Gulls, and the distribution quoted for the races of auks is seriously astray. It is probably wiser not to use this list as a work of reference.

W.R.P.B.

## FIFTH REPORT OF THE SEABIRD GROUP, 1969-1970

The fifth year of the Seabird Group has seen the first steps towards the establishment of a permanent base and staff. The management has continued much as before, with the co-option of some past members back on to an enlarged committee on their return from abroad. Stanley Cramp has continued as Chairman and representative of the British Ornithologists' Union on the Executive Committee, W. R. P. Bourne as Secretary, and T. R. E. Devlin as Treasurer until the Annual General Meeting, when John Cradass took over. He also produced the first number of the new printed annual Seabird Report, which will in future be edited by the Secretary. C. M. Perrins represented the British Trust for Ornithology and David Lea the Royal Society for the Protection of Birds, and George Dunnet, Oscar Merne and Garth Pettitt as elected members on to the Executive Committee.

The most important development during the year has been the allocation of a grant by the Natural Environment Research Council to George Dunnet for a two-year study of the feasibility of investigations of 'the seasonal patterns of distribution and abundance of different species, populations and age categories of seabirds at sea, their feeding habits and food, to relate these observations to other relevant oceanographical and biological observations made concurrently in the same area'. The work will be supervised by an advisory committee composed of members of the group and marine biologists, and carried out by W. R. P. Bourne, who will become Director of Research as well as Secretary of the Group, with the help of an assistant. They will be based at the Zoology Department, Aberdeen University, and will make regular excursions on the marine research vessels belonging to the Department of Agriculture and Fisheries for Scotland working out of their Torry Marine Research Laboratory.

The national census of breeding seabirds, 'Operation Seafarer', is now drawing to a successful conclusion, with the completion during the summer of surveys of the few important areas missed last year. Repeat censuses of the large auks of the Irish Sea area to discover whether the mortality during the autumn of 1969 had a serious effect on them, unfortunately indicate a very marked decline of Guillemots and a rather smaller one of Razorbills; other reports also indicate a further decline of Little Terns in south-east Britain. The Organiser, David Saunders, is now preparing the full results of the enquiry for early publication. The generally satisfactory report which it is now possible to make about the outcome of this enquiry is only marred by the tragic loss of the Chairman of the Census Committee, James Fisher, in a road accident.

The Beached Bird Survey has continued to develop, and provided invaluable background information for the official report on the birdkill in the Irish Sea in the autumn of 1969 now being prepared by the Natural Environment Research Council. It was agreed during the year that the R.S.P.B. would appoint a special member of staff to co-ordinate such future investigations. Further arrangements for co-ordination of the work with similar enquiries elsewhere in north-west Europe were made at the XVth International Ornithological Congress in Holland during the autumn (where the Secretary was again also appointed Secretary of the Seabird Committee). It now seems increasingly clear this survey is not only yielding information on mortality due to oil pollution but also on the occurrence of other more subtle forms of pollution with such substances as pesticides, industrial chemicals such as polychlorbiphenyls, and heavy metals, so that it seems likely to acquire increasing importance as a general measure of pollution of the sea.

Other activities during the year include a review of the results of sea-watching with a view to reorganising this enquiry; further presentation of evidence regarding the importance of Foulness as a nature reserve to the Commission on the Third London Airport, assistance with investigations of birds as hazards to aircraft, and a search for evidence for infections of seabirds with influenza for the World Health Organisation. We are as usual indebted to the National Ornithological Societies and vast array of other bodies and individuals for assistance with these and other enquiries, to the B.T.O. for assistance with the cost of securing the attendance of the Irish member at committee meetings, the R.S.P.B., R.S.P.C.A. and World Wildlife Fund for further support from their Torrey Canyon Appeal for the administration of 'Operation Seafarer', and the B.O.U., Scottish Ornithologists' Club, and Royal Irish Academy for grants towards the expense of the final surveys.

W. R. P. BOURNE,  
*Honorary Secretary*

## THE FIFTH ANNUAL GENERAL MEETING OF THE SEABIRD GROUP

The fifth Annual General Meeting of the Seabird Group was held at the Conference Centre, Swanwick, Derbyshire, at 6 p.m. on 9 January 1971, during the course of the Ringing and Migration Conference. Mr. Stanley Cramp took the chair and 26 Members were present.

1. The Minutes of the fourth Annual General Meeting held on 3 January 1970, which had been circulated in Seabird Report 1:50, were approved on a motion proposed by Mr. R. A. O. Hickling and seconded by Mr. C. Holt.
2. The Hon. Secretary commented briefly on the Report for 1969-1970, previously circulated (and published in Bird Study 18: 59-60). He apologised because his growing commitments as full-time Director of Research engaged on a feasibility study of methods of studying birds at sea had resulted in a temporary reduction in the flow of communications to members, but hoped that it would lead to proposals for more research in which they could take part in the future. The meeting would note with regret the recent tragic death of the Chairman of the Census Committee, James Fisher. Acceptance of the Report was proposed by Mr. C. Headlam, seconded by Mr. R. Eades, and agreed unanimously.
3. Acceptance of the accounts for 1968 and 1969, published in Seabird Report 1: 52-57, was proposed by Mr. R. Hansford and Mr. M. Ogilvie, and agreed unanimously. The Treasurer presented an outline of the accounts for 1970 and reported that the remainder of the Seafarer Organiser's fee and a margin for further expeditions was still in hand, that a small balance remained from the World Health Organisation grant for research into influenza in birds, and that the accounts were with the auditors.
4. In the absence of alternative nominations for election to the Executive Committee, the election of the nominations put forward by the Committee, Messrs. W. R. P. Bourne, J. Crudass, T. R. E. Devlin, G. M. Dunnet, O. J. Merne and R. G. Pettitt, was proposed from the Chair and agreed unanimously.

Other activities during the year include a review of the results of sea-watching with a view to reorganising this enquiry; further presentation of evidence regarding the importance of Foulness as a nature reserve to the Commission on the Third London Airport, assistance with investigations of birds as hazards to aircraft, and a search for evidence for infections of seabirds with influenza for the World Health Organisation. We are as usual indebted to the National Ornithological Societies and vast array of other bodies and individuals for assistance with these and other enquiries, to the B.T.O. for assistance with the cost of securing the attendance of the Irish member at committee meetings, the R.S.P.B., R.S.P.C.A. and World Wildlife Fund for further support from their Torrey Canyon Appeal for the administration of 'Operation Seafarer', and the B.O.U., Scottish Ornithologists' Club, and Royal Irish Academy for grants towards the expense of the final surveys.

W. R. P. BOURNE,  
Honorary Secretary

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5. Other business. Mr. R. G. Pettitt made a statement of the present position of sea-watching. It had been carefully reviewed, as it was felt that it was no longer developing as it had in earlier years. It had been decided not to suspend this activity, but to cease promoting special enquiries. Any records available would still be collected and filed in the Bird Room at the British Museum (Natural History), where they would be cared for by Mr. M. Walters, and copies would be deposited at the Research Unit at Aberdeen and three made available on loan, for the use of anyone who wished to analyse it. The sea-watch committee would be disbanded. Mr. C. Holt expressed regret that so few people were participating in this discussion, and Mr. R. O'Connor suggested that it was now time to consider new activities to take up when 'Operation Seafarer' was completed. It was remarked that this was one object of the Research Unit. Mr. R. Eades suggested that members could well pay more attention to possible sources of pollution affecting birds, and circulated an article from the 'Observer' of the previous November describing how numerous ships were dumping wastes containing among other things polychlorinated biphenyls in the Irish Sea. He himself knew of two ships of 500 tons which continually dumped industrial wastes and three which dumped sewage off Liverpool. The Chairman commented that there had been a number of scientific reports on the situation and that there was also growing concern about it in America.

The official business was preceded by short talks by Mr. David Saunders on 'Operation Seafarer', Messrs. Michael Brooke and David Steventon on the Cambridge Expedition to the Shiant Islands, Mr. Peter Evans on the exploration of the south-west Irish islands, and Dr. W. R. P. Bourne on research on birds at sea off the west of Scotland.



## THE SEABIRD GROUP

The Seabird Group was founded in 1966 in order to circulate news of work in progress on seabirds and promote cooperative research upon them. It is run by an Executive Committee composed of three members nominated by the British National Ornithological Societies, the British Ornithologists' Union, the British Trust for Ornithology, and the Royal Society for the Protection of Birds, and six elected annually by the membership. Its activities may be classified under the following headings:—

### **Work at the Breeding Stations**

This includes a national census of breeding seabirds, 'Operation Seafarer', in 1969, the results of which will be reported shortly in a book; continuing annual sample censuses at representative sites; repeated surveys of the status of our most seriously threatened seabird, the Little Tern; and individual investigations at the breeding places.

### **Investigations of the Distribution of Birds at Sea**

These include observations of passing birds from the coast ('sea-watching'), enquiries into invasions of such species as the Great Shearwater, in the past a series of trial voyages to investigate bird distribution at sea, and currently a feasibility study of methods of investigating the ecology of birds at sea supported by the Natural Environment Research Council and based at Aberdeen University. It is hoped that this will lead to a further programme of cooperative investigations of the life of birds at sea.

### **Surveys of Evidence of Bird Mortality on Beaches**

Since bird bodies float and are comparatively durable, their appearance on beaches provides good evidence of the character of hazards affecting birds at sea. The Group has cooperated with the Royal Society for the Protection of Birds in the development of systematic surveys to record oil pollution and bird mortality along the shore, which now cover most of the coasts of Britain and Ireland simultaneously with other observations along the continental coasts. These surveys provided the main ornithological evidence for the extent of bird mortality during the Torrey Canyon oil pollution disaster, the mysterious birdkill in the Irish Sea in the autumn of 1969, and a number of lesser events. Together with the breeding censuses, this enquiry provides a constant measure of the productivity, mortality and change in numbers of our seabirds.

The work of the Group was originally reported in cyclostyled Seabird Bulletins, of which there were eventually seven, and is now recorded in a single printed annual report, while circulars are also sent to members at intervals. The Annual General Meeting is normally held at the British Trust for Ornithology's Ringing and Migration Conference in January, and is accompanied by a series of talks by members. Membership is open, and the full subscription is £1 per annum, full-time students half price. The Secretary will always be interested to hear of problems affecting seabirds and pleased to answer enquiries; address: Zoology Department, Tillydrone Avenue, Aberdeen AB9 2TN (Tel. Aberdeen 40241 ext. 6435).

## SCIENTIFIC NAMES

In general, the nomenclature used for seabirds is that of the second (1955) edition of W. B. Alexander's 'Birds of the Oceans' (London, Putnam), with allowance for some recent changes in usage listed in 'Sea Swallow' 21: 42-44. The main variation from current British usage is for the vernacular names of the Hydrobatidae, all of which are referred to collectively as storm-petrels, and *Hydrobates pelagicus* as the British Storm-petrel, as discussed in 'British Birds' 54: 405-408.

Fulmar <i>Fulmarus glacialis</i>	Arctic Skua
Black-winged Petrel	<i>Stercorarius parasiticus</i>
<i>Pterodroma nigripennis</i>	Long-tailed Skua
Cory's Shearwater	<i>Stercorarius longicaudus</i>
<i>Calonectris diomedea</i>	Great Black-backed Gull
Great Shearwater <i>Puffinus gravis</i>	<i>Larus marinus</i>
Sooty Shearwater <i>Puffinus griseus</i>	Lesser Black-backed Gull
Manx Shearwater <i>Puffinus puffinus</i>	<i>Larus fuscus</i>
Little Shearwater <i>Puffinus assimilis</i>	Herring Gull <i>Larus argentatus</i>
British Storm-petrel	Kumlien's Gull
<i>Hydrobates pelagicus</i>	<i>Larus leucopterus kumlieni</i>
Leach's Storm-petrel	Common Gull <i>Larus canus</i>
<i>Oceanodroma leucorhoa</i>	Black-headed Gull <i>Larus ridibundus</i>
Brown Pelican <i>Pelecanus occidentalis</i>	Little Gull <i>Larus minutus</i>
Gannet <i>Sula bassana</i>	Sabine's Gull <i>Larus sabini</i>
Brown Booby <i>Sula leucogaster</i>	Kittiwake <i>Rissa tridactyla</i>
Cormorant <i>Phalacrocorax carbo</i>	Black Tern <i>Chlidonias nigra</i>
Shag <i>Phalacrocorax aristotelis</i>	Gull-billed Tern <i>Gelochelidon nilotica</i>
Velvet Scoter <i>Melanitta fusca</i>	Common Tern <i>Sterna hirundo</i>
Common Scoter <i>Melanitta nigra</i>	Arctic Tern <i>Sterna paradisaea</i>
Eider <i>Somateria mollissima</i>	Roseate Tern <i>Sterna dougalli</i>
Brent Goose <i>Branta bernicla</i>	Little Tern <i>Sterna albifrons</i>
Black Kite <i>Milvus migrans</i>	Sandwich Tern
Peregrine <i>Falco peregrinus</i>	<i>Thalasseus sandvicensis</i>
Kestrel <i>Falco tinnunculus</i>	Royal Tern <i>Thalasseus maximus</i>
Oystercatcher <i>Haematopus ostralegus</i>	Razorbill <i>Alca torda</i>
Little Ringed Plover <i>Charadrius dubius</i>	Brunnich's Guillemot <i>Uria lomvia</i>
Turnstone <i>Arenaria interpres</i>	Common Guillemot <i>Uria aalge</i>
Curlew <i>Numenius arquata</i>	Puffin <i>Fratercula arctica</i>
Whimbrel <i>Numenius phaeopus</i>	Little Auk <i>Alle alle</i>
Common Sandpiper <i>Actitis hypoleucos</i>	Swift <i>Apus apus</i>
Redshank <i>Tringa totanus</i>	Swallow <i>Hirundo domestica</i>
Dunlin <i>Calidris alpina</i>	Carriion Crow <i>Corvus corone</i>
Grey Phalarope <i>Phalaropus fulicarius</i>	Hooded Crow <i>Corvus (corone) cornix</i>
Red-necked Phalarope	Blackbird <i>Turdus merula</i>
<i>Phalaropus lobatus</i>	Meadow Pipit <i>Anthus pratensis</i>
Great Skua <i>Catharacta skua</i>	Rock Pipit <i>Anthus spinoletta</i>
Pomarine Skua	Starling <i>Sturnus vulgaris</i>
<i>Stercorarius pomarinus</i>	