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THE JOURNAL OF THE  
SCOTTISH ORNITHOLOGISTS' CLUB

Volume 11 No. 2

SUMMER 1980

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# SCOTTISH BIRDS

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Edited by D. J. Bates

## Golden Eagles on Rhum

P. CORKHILL

(Plates 6-7)

*Rhum is one of the few places where Golden Eagles feed to any extent on seabirds. This study indicates that, as with coastal breeding Peregrines, toxic chemicals from the marine food chain are depressing breeding success years after the performance of inland pairs has returned nearly to normal. The results are of even greater interest in view of the current attempt to reintroduce Sea Eagles to the area.*

The island of Rhum lies 24 km west of Mallaig (Inverness-shire). Most of its 10,000 ha are mountainous, reaching an altitude of 800 m. Prior to its establishment as a nature reserve in 1957 the island had been managed as a sporting estate. Evans and Flower (1967) recorded that until 1886 at least five pairs of Golden Eagles bred but thereafter persecution was heavy and possibly none nested successfully until the early 1950s. Thereafter persecution was reduced and at least three pairs were reported to rear an eaglet each year prior to 1957. Since 1957 wardens on Rhum have kept an annual check on the breeding population. In view of the Nature Conservancy Council's current project to reintroduce the White-tailed or Sea Eagle it is important to document the existing status of Golden Eagles. For security reasons details of breeding localities are not included.

### Nest sites

It is well known that Golden Eagles normally have several eyrie sites within the breeding territory, only one of which is used in any given year. On Rhum 20 nest sites are known from four breeding territories and the variation within each territory may be from a few metres to 3 km apart. All nest sites are on rocky mountain ledges or sea cliffs and vary greatly in their aspect, altitude and accessibility. At least one

Table 1. Breeding success in four territories in four five-year periods 1957-76

|                    | No. of<br>years<br>territory<br>occupied | No. of<br>years<br>breeding<br>attempt<br>recorded | No. of<br>years<br>failed | Total<br>young<br>reared | Young per<br>breeding<br>attempt | Young per<br>occupied<br>territory<br>per year |
|--------------------|--|--|---------------------------|--------------------------|----------------------------------|--|
| <b>Territory A</b> |  |  |                           |                          |                                  |  |
| 1957-61            | 4  | 4  | 3                         | 1                        | 0.25                             | 0.25   |
| 1962-6             | 5  | 5  | 5                         | 0                        | 0                                | 0  |
| 1967-71            | 4  | 3  | 2                         | 1                        | 0.33                             | 0.25   |
| 1972-6             | 5  | 5  | 3                         | 2                        | 0.4                              | 0.4  |
| Average            |  |  |                           |                          | 0.24                             | 0.22   |
| <b>Territory B</b> |  |  |                           |                          |                                  |  |
| 1957-61            | 5  | 4  | 2                         | 2                        | 0.5                              | 0.4  |
| 1962-6             | 3  | 2  | 0                         | 2                        | 1.0                              | 0.66   |
| 1967-71            | 5  | 3  | 0                         | 3                        | 1.0                              | 0.6  |
| 1972-6             | 5  | 5  | 4                         | 1                        | 0.2                              | 0.2  |
| Average            |  |  |                           |                          | 0.57                             | 0.44   |
| <b>Territory C</b> |  |  |                           |                          |                                  |  |
| 1957-61            | 3  | 2  | 2                         | 0                        | 0                                | 0  |
| 1962-6             | 4  | 3  | 2                         | 1                        | 0.33                             | 0.25   |
| 1967-71            | 3  | 1  | 1                         | 0                        | 0                                | 0  |
| 1972-6             | 5  | 4  | 4                         | 0                        | 0                                | 0  |
| Average            |  |  |                           |                          | 0.1                              | 0.06   |
| <b>Territory D</b> |  |  |                           |                          |                                  |  |
| 1957-61            | 5  | 4  | 1                         | 3                        | 0.75                             | 0.6  |
| 1962-6             | 3  | 2  | 1                         | 1                        | 0.5                              | 0.33   |
| 1967-71            | 5  | 4  | 2                         | 2                        | 0.5                              | 0.4  |
| 1972-6             | 4  | 3  | 2                         | 1                        | 0.33                             | 0.25   |
| Average            |  |  |                           |                          | 0.54                             | 0.41   |
| Total              | 68                                       | 54   | 34                        | 20                       | 0.37                             | 0.29   |

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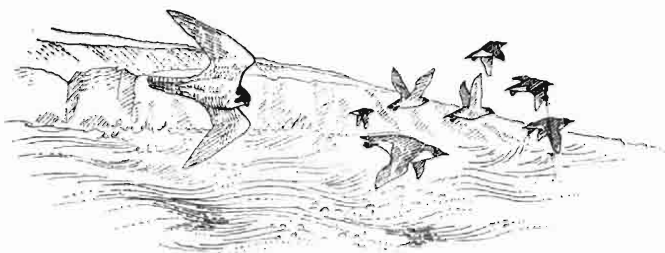
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by Ian Newton

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is known to have been formerly occupied by Sea Eagles and other sites on the sea cliffs would seem to be suitable for either species.

### Breeding success

Initially each season one or two visits were made to each site to determine which nests were in use and whether incubation was in progress. These nests were visited later, when the chicks would be growing, to record progress and ring any eaglets in accessible sites. A further visit was sometimes made after fledging to search for food remains. With this level of surveillance some breeding attempts that failed at an early stage may have escaped detection, but it is unlikely that any successful breeding went undetected.

Throughout the 20 year period three or four pairs were present each breeding season but it was sometimes difficult to decide if a territory was occupied by non-breeding birds since it is not clear to what extent vacant hunting ground, perches and roosts may be used by birds from adjacent territories. For the purpose of this paper I have recorded an occupied territory following the regular sighting of one or more adults during the breeding season, nest building activity, or the presence of regularly used roosts as indicated by droppings and pellets.

Table 1 details the breeding success in the four territories (A, B, C, and D) over the 20 years 1957-76, subdivided into four five-year periods. Information is available for 68 territory-years, including 54 breeding attempts when a nest was built or an existing nest repaired. The average number of chicks produced per breeding attempt was 0.37 per year (0.29 per occupied territory per year).

Comparative information on the breeding success of Golden Eagles elsewhere in Scotland during this period is available in Everett (1971), in Lockie & Ratcliffe (1964) and in Lockie *et al.* (1969). Everett's data are directly comparable and show that breeding success on Rhum was poor when related to an average breeding success of 0.58 young per breeding pair (0.47 per occupied territory) for seven areas in Scotland during the period 1964-8. In fact only Galloway (0.19 young per breeding pair), fairly recently colonized by Golden Eagles and suffering a high level of human disturbance, had poorer success.

More information about the causes of failure is available for 28 attempts (table 2). Most nests containing broken eggs were found in the early 1960s and of these one clutch was discovered half eaten, apparently by the eagles themselves. Addled eggs that were subsequently deserted were a regular

**Table 2. Causes of failure in 28 breeding attempts for which information is available**

| Nest prepared but no eggs produced | Eggs broken in nest | Eggs added and later deserted | Chick died |
|------------------------------------|---------------------|-------------------------------|------------|
| 5                                  | 9                   | 12                            | 2          |

feature of breeding failure and were collected whenever possible for toxic chemical analysis. Four possible explanations for the poor reproductive performance of Golden Eagles on Rhum present themselves for consideration: (1) human disturbance, (2) a senile population, (3) an inadequate food supply, (4) contamination by toxic chemicals.

### Human disturbance

Human disturbance is not considered to have been a contributory factor to breeding failure on Rhum. In general, nest sites are not well known and are in areas little frequented by the general public. Visitor pressures on the reserve have not been excessive and on two occasions when a pair did nest in a relatively busy locality they were successful. A possible exception to this general rule was territory C in some seasons.

### Senility

The explanation that the Rhum Golden Eagle population consists of old individuals resident since the relaxation of persecution also seems unlikely. There is evidence of population turnover in the past 20 years: the corpses of four adults have been found, another distinctive female has disappeared from the population, and in another territory a paired bird showed traces of immature plumage. The decline in breeding success has not been progressive (table 3) as might be expected in a population becoming senile, and senility as a factor limiting breeding performance has not emerged in studies of other long-lived birds.

**Table 3. Breeding success in four five-yearly periods 1957-78**

|                                   | 1957-61 | 1962-6 | 1967-71 | 1972-6 |
|-----------------------------------|---------|--------|---------|--------|
| No. of breeding attempts          | 14      | 12     | 11      | 17     |
| No. of young reared               | 6       | 4      | 6       | 4      |
| Young reared per breeding attempt | 0.43    | 0.33   | 0.54    | 0.23   |

### Food supply

The question of whether the available food supply on Rhum is adequate to maintain an active breeding population of

Golden Eagles is one that demands careful consideration and two factors are especially relevant. A considerable flock of sheep was held on the island prior to its purchase by the Nature Conservancy, with numbers fluctuating from 1,500 to over 5,000, and some small mammal species usually preyed upon by eagles in Scotland, especially lagomorphs, are not present on the island.

Information on the food available to eagles on Rhum is documented in published accounts and the reserve records. Lockie & Ratcliffe (1964) noted that over large areas of western Scotland where other prey are deficient eagles survive by eating the calves of Red Deer *Cervus elaphus* and deer carrion. The pre-1957 food supply on Rhum was augmented by a substantial sheep flock and latterly Red Deer numbers were similar to today, having been reintroduced to the island after the crofting era. During the period 1957-76 the Red Deer population fluctuated around 1,200-1,600 as recorded by the annual spring census.

Management has been directed towards maintaining a stable population of c.1,500 and in most seasons 150-200 adults are culled, their entrails, which are readily eaten by the eagles, providing a regular source of carrion from early August to late December when natural deer mortality is normally low (Lowe 1969). It has been normal management practice, when resources allow, to search in spring for deer corpses. Lowe showed that most mortality occurred in late winter and early spring and that the severity of winter weather is important. He calculated annual mortality rates of 3.5% for hinds and 3.2% for stags resulting in 50 corpses in an average year due to natural mortality.

In spite of a healthy population of Ravens and Hooded Crows a great deal of this carrion remains on the hill uneaten (pers. obs.). Deer carcasses are found well scattered around the seaward fringes of the island and in late winter and early spring the flesh stays fresh and palatable to the eagles for as long as two to three weeks. The period when newborn deer calves are available to the eagles extends from late May to July but most calves are normally born in June (F. Guinness pers. comm.).

A thriving population of feral goats frequents the western sea cliffs and management has been directed towards maintaining a population of c.100, thus confining them to their traditional grazings. This has normally entailed an annual cull of 10-20 individuals, the carcasses being available to the eagles during the autumn and winter. Goat kids are usually born during January to March on Rhum, when severe weather must

Table 4. Diet in four territories in winter and summer 1957-76

|  | A       |    | B       |      | C       |      | D       |      | Total<br>W | Total<br>S | Total<br>year |
|--|---------|----|---------|------|---------|------|---------|------|------------|------------|---------------|
|  | W       | S  | W       | S    | W       | S    | W       | S    |            |            |               |
| Red Deer                               |         |    |         |      |         |      |         |      |            |            |               |
| adult                                  | 22(21)  | -  | 11(10)  | 1(1) | 21(19)  | 1(1) | 20(18)  | 4(1) | 74         | 6          | 80(22.3%)     |
| calf                                   | -       | 3  | -       | 1    | -       | 4    | -       | 3    | -          | 11         | 11 (3.6%)     |
| Goat                                   | 3(3)    | -  | 4(4)    | -    | 18(17)  | 3    | 5(4)    | 1    | 30         | 4          | 34 (9.4%)     |
| Common Rat                             | 12(12)  | 1  | 4(4)    | -    | 14(13)  | -    | 6(4)    | 2    | 36         | 3          | 39(10.8%)     |
| Rabbit                                 | -       | -  | -       | 2    | -       | -    | -       | -    | -          | 2          | 2 (0.6%)      |
| Fulmar                                 | 3(2)    | 6  | 1(1)    | 1(1) | 24(21)  | 30   | 2       | 3(2) | 30         | 40         | 70(19.4%)     |
| Gulls                                  | 2(2)    | 15 | 1(1)    | 7(2) | 3(1)    | 2    | 1(1)    | 5    | 7          | 29         | 36(10%)       |
| Manx Shearwater                        | 1(1)    | 3  | -       | -    | -       | 5    | 7(1)    | 20   | 8          | 28         | 36(10%)       |
| Kittiwake                              | -       | 4  | -       | -    | -       | 1    | -       | 3    | -          | 8          | 8 (2.2%)      |
| Red Grouse                             | 1(1)    | 12 | 3(3)    | -    | -       | -    | 2(2)    | 1    | 6          | 13         | 19 (5.3%)     |
| Hooded Crow                            | 1(1)    | 4  | -       | -    | -       | -    | -       | -    | 1          | 4          | 5 (1.3%)      |
| Other birds                            | 7       | 3  | 3       | 2    | 2       | 2    | -       | 1    | 12         | 8          | 20 (5.5%)     |
| Total                                  |         |    |         |      |         |      |         |      |            |            |               |
| mammals                                | 41(40%) |    | 23(56%) |      | 61(47%) |      | 41(48%) |      | 140(69%)   | 26(17%)    | 166(46.5%)    |
| birds                                  | 62(60%) |    | 18(44%) |      | 69(53%) |      | 45(52%) |      | 64(31%)    | 130(83%)   | 194(53.5%)    |
| Total                                  |         |    |         |      |         |      |         |      | 204        | 156        |               |
| Total seabirds<br>(% total food items) | 34(33%) |    | 10(24%) |      | 65(50%) |      | 41(48%) |      |            |            |               |

**Notes** Includes observations of feeding birds, items found in nests, at plucking posts and occurrence in pellets. The recording of any prey item in any of the above circumstances scores one point on the diet table, figures in parenthesis show the number of times a particular prey species was recorded in pellet form. 144 pellets were analysed of which 40 contained remains from more than one species.

A, B, C, D=territories; W=winter months October-March; S=summer period April-September.

Common Rat=*Rattus norvegicus*.

affect survival rates. A small number are also born during the summer.

Rhum is also well known as a breeding centre for seabirds with large sea cliff colonies of auks, Kittiwake, Fulmar and gulls. In addition the mountain tops contain a huge colony of Manx Shearwaters. Moorland populations of Golden Plover and Red Grouse are also available as prey.

Elsewhere in the Small Isles and within easy flying distance, sheep carrion and Rabbits *Oryctolagus cuniculus* are available, although the islands of Eigg and Canna also have resident eagles.

Information on the diet of the Rhum eagles was obtained from pellet analysis, observations on feeding birds and by searching plucking posts and nest sites for food remains. The data are presented in table 4 which contains all recorded observations over the 20 year period. Pellets were much easier to find during the winter when it was presumed the birds spent much more time at roosting sites. To detect any seasonal change in diet the year has been divided into two six-monthly periods. Records from different breeding territories are also presented separately to bring out any peculiarities resulting from differences in availability of a particular food item or preferences of individual birds. No attempt has been made to evaluate the importance of individual prey species using a weighting system of prey units because of the difficulties involved in trying to compare prey of vastly different weights (e.g. deer and Fulmar) when larger prey are often only partly consumed.

Table 4 shows that diet changed with the seasons and included a far greater proportion of mammal prey during the winter. This reflects both an increase in the amount of carrion available and the general scarcity of avian prey, since the large seabird colonies are empty for most of the winter. It is perhaps surprising that deer calves did not figure more prominently during the summer, either as carrion or as prey. Eagles are capable of killing young deer but risk attack by the hind. It seems probable that in the absence of pressures from a general food shortage the eagles prefer avian prey during the summer, usually seabirds.

It is notable that, with the exception of the Rabbit kills in territory B, all prey was available on Rhum itself. I feel sure that had the Rhum eagles been hunting elsewhere regularly then sheep carrion would have figured in the diet (see Newton 1972).

It is my opinion therefore that the poor breeding success of the Rhum eagles was not the result of deficient food supply for the following reasons.

(a) Most breeding failures (see table 2) occurred at a time of year when there was an abundance of food, as reflected by the presence of uneaten carrion on the hills and the arrival back at the breeding colonies of large numbers of seabirds.

(b) The summer crop of Red Deer calves represented an under utilized food resource indicating the eagles found it easy to provision themselves and any young at this time of year from the preferred food supply, seabirds.

(c) It is to be expected that a food shortage within the immediate breeding territory would persuade the birds to hunt further afield. There is no evidence that this occurred regularly.

(d) Eggs that failed to hatch after the normal incubation period were a regular feature of breeding failure. In studies of other species that suffer food shortage during the breeding season (e.g. some tropical seabirds) eggs and young chicks were abandoned because of the parents' inability to provision themselves and care for their nests simultaneously.

(e) Birds entering the breeding season in poor physical condition resulting from food shortage might be expected to lay later in the season. Although detailed data were not available for comparison there were no general signs of a delayed start to the breeding season on Rhum.

(f) It was rare to see more than one eagle feeding at a time on a kill or deer corpse although mated pairs regularly hunted together outside the breeding season. Had food been in short supply one would have expected to encounter larger numbers of eagles attempting to feed from a single deer corpse, with fighting taking place. This behaviour was never noted.

### Toxic chemicals

Eleven eggs, mainly addled and from deserted nests, were collected under licence for analysis. The results of analyses for organochlorine insecticides in the first five eggs (in Lockie *et al.* 1969) showed an average total concentration of 3.06 micrograms per gram (mpg) wet weight, mainly consisting of DDE. These early analyses did not include searches for PCBs. The average total concentrations for 44 other eggs from Scottish Golden Eagles analysed at the same time was, however, only 1.61 ppm. PCBs were recorded in a single egg in 1971 but the recorded level of 3.0 mpg could possibly have resulted from a cracked shell allowing evaporation and concentration of the contents.

In 1975 two eggs, including one freshly laid from a clutch of two in territory C, were analysed by Dr Bogan at the University of Glasgow Veterinary School. The results showed

the usual levels of DDE for Rhum eggs (2.32 and 2.69 mpg wet weight) and the presence of PCBs (12.4 and 13.4 mpg in lipid) at noticeably higher levels than inland localities (Bogan in prep.). These levels of PCBs are not high compared to some found in seabirds but the sensitivity of Golden Eagles to PCBs is unknown.

### Conclusions

The evidence, both circumstantial and analytical, suggests that the poor reproductive performance is the result of contamination by toxic chemical residues. The limited hunting ranges of the Rhum eagles in the clean environment of the nature reserve indicates that seabirds provided the only possible pathway to contamination. The fact that territory C produced the fewest chicks (see table 1) and consumed the highest percentage of seabirds, especially Fulmars (see table 4), is unlikely to be just a chance effect, especially as territory B produced the most chicks and consumed the lowest percentage of seabirds. Adult seabirds were taken as the main prey during the breeding season and therefore the eagles received their annual dose of contamination after they had already produced their own clutches. If the bulk of toxic chemical residues are being carried in the bodies of eagles during the breeding season then analysis of unhatched eggs is unlikely to provide insight into the true level of contamination. The poor reproductive performance observed may well be the result of a combination of the effects of toxic chemical contamination, affecting both the hatchability of eggs and subtle changes in the metabolism and behaviour of the eagles themselves.

Ratcliffe (1972) concluded that the lack of improvement in the breeding success of coastal Peregrines is attributable to their exposure, through seabird prey, to multiple contamination present in marine food chains. It is also interesting to note that the presence of broken eggs in nests and the consumption of their contents by the parent birds, both noted by Ratcliffe to be symptoms of toxic chemical contamination in Peregrines, have been recorded in respect of the Rhum eagles.

Elsewhere in the Small Isles the situation is similar. Swann & Ramsay (1978) have commented upon the poor breeding performance of Golden Eagles on Canna and recorded that many Fulmars are taken as prey. On Eigg, where two pairs of eagles normally attempt to breed, success has been mixed. One pair which take substantial numbers of Fulmars have had poor success in recent years (D. Ferguson pers. comm.) but the second pair recorded as taking Rabbits and sheep carrion have been more successful and probably reared two young

in 1976. There are no substantial seabird colonies within the territory of the latter pair.

It is difficult to ascertain whether the present rate of reproduction by eagles on Rhum is sufficient to maintain the population when so little is known about adult and juvenile survival rates. Everett (1971) tentatively suggested that an annual reproductive rate of 0.5 young per pair may be adequate to maintain a viable adult population. If this figure is correct the rate on Rhum of 0.37 young per breeding pair/0.29 per occupied territory is insufficient to maintain the population without immigration from areas where breeding success is higher.

### Acknowledgments

I wish to thank P. Wormell for allowing me to use unpublished information, G. MacNaughton for showing me eagle breeding sites, past and present, and Dr J. A. Bogan of the University of Glasgow Veterinary School for allowing me to use unpublished data. Many people, especially J. Love, provided field observations. Thanks are also due to Dr C. M. Perrins and T. Greer of the Edward Grey Institute for helpful comments on the first draft of this paper.

### Summary

Breeding success and feeding habits of the three or four pairs of resident Golden Eagles on Rhum have been recorded for 20 years. Breeding success has been generally poor and an examination of the possible causes for this strongly suggests that contamination by toxic chemicals through marine food chains and seabird prey is depressing reproductive performance.

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GOLDEN EAGLE  
AND MANK  
SHEARWATERS  
J. A. LOU.



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## The impact of an oilspill in the Firth of Forth on Great Crested Grebes

LENNOX CAMPBELL

(Plate 5)

*Oil and troubled waters again. A small leak caused nearly 1,400 casualties including at least two thirds of 300-350 Great Crested Grebes in the Forth. Scotland's breeding population is only 150 pairs and the Forth is a major wintering area. How much damage had been done?*

In February 1978 a small spillage of oil at Leith Docks (Midlothian) affected more than 1,387 birds of 27 species. Most severely hit were Scaup (220), Pochard (244), Eider (179), Guillemot (100) and 241 Great Crested Grebes (subsequently referred to simply as grebes) of which at least 200 died. Full details have been given by Campbell *et al.* (1978). Whilst the overall impact of this incident was unlikely to be great, considerable alarm was expressed at its possible effects on the small Scottish breeding population of Great Crested Grebes, which Smith (1974) estimated to be about 150 pairs in 1973.

Accordingly the SOC rapidly organized a survey of the breeding population during 1978, the results of which are summarized in this paper. Data on the wintering population within the Firth of Forth (mainly collected by the author since 1974) are included to enable the impact of the incident to be viewed in a wider perspective.

### The wintering population in the Firth of Forth

Flocks have been regularly recorded at Seafield (Leith) and scattered 10 km east to Cockenzie (East Lothian) since at least 1960, with peaks over 500 in several winters since 1964. However, it is only recently that it has become clear that large numbers may be present for several months each winter, not only at Seafield but also 5-10 km west at Silverknowes (Midlothian), between Cramond and Granton. For much of the day feeding grebes are widely dispersed but tend to concentrate into relatively dense groups in late afternoon when they are most easily counted and when peak numbers are invariably recorded.

Peak counts since 1974/5 are shown in table 1. Numbers from Seafield eastwards have remained similar in recent years but there are firm indications that Silverknowes has been increasingly important. Peak numbers tend to be recorded at Seafield and eastwards in December or January but at Silverknowes the peak is usually not before February. Although insufficient detailed data are available the two flocks are obviously closely inter-related and do not constitute discrete groups.

Table 1. Peak counts of Great Crested Grebes each winter

|                    | 1974/5 | 1975/6 | 1976/7 | 1977/8 | 1978/9  |
|--------------------|--------|--------|--------|--------|---------|
| Silverknowes       | 109(F) | 113(M) | 385(F) | 204(D) | 545(F)  |
| Seafield-Cockenzie | 427(D) | 405(J) | 583(D) | 474(D) | 508(J)* |

\*Count by P. A. Hockey; all others by L. H. Campbell. Month of peak in brackets (December-March).

It is not known whether the same individuals remain within the Forth throughout the winter, but there are indications that there may be a regular turnover. Generally numbers tend to fall in January and early February before a second, late winter peak. That this second peak may represent an influx of new birds was clearly demonstrated by events after the 1978 oil spillage. Following the death of at least 200 of an estimated 300-350 birds present in early February, numbers rose to 561 (435 Seafield eastwards, 126 Silverknowes) in late February, much as usual for the time of year. Although small numbers of grebes winter elsewhere in the Forth (e.g. Blackness, Bo'ness, Largo Bay) simple redistribution of these would not account for increased numbers at Silverknowes and Seafield. Indeed, numbers at these alternative sites also tend to rise in late winter. Thus although a large proportion of grebes present at the time of the incident were killed, this mortality

represented a considerably smaller proportion of total numbers visiting the estuary throughout the whole winter.

### The Scottish breeding population in 1978

Despite the short notice at which the survey was arranged, local recorders were able to organize reasonably comprehensive coverage and the results are shown by county in table 2.

Table 2. Breeding distribution of Great Crested Grebes

|                    | Number of pairs recorded on : |      |        |                                  |          |           |           |
|--------------------|-------------------------------|------|--------|----------------------------------|----------|-----------|-----------|
|                    | Lochs covered in both surveys |      |        | Lochs covered in one survey only |          |           |           |
|                    | Pairs in both years           |      | 1978   | Pairs in one year only           |          | 1973      | 1978      |
| 1973               | 1978                          | 1973 |        | 1978                             |          |           |           |
| Aberdeenshire      | 4                             | (2)  | 2      | 2(1)                             |          |           |           |
| Angus              | 6                             | (3)  | 5-6    |                                  |          | 6(3)      |           |
| Ayrshire           | 2-3                           | (2)  | 3      | 2(2)                             |          |           |           |
| Clackmannanshire   |                               |      |        |                                  |          | 3(1)      |           |
| Dumfriesshire      | 3                             | (1)  | 1      |                                  |          | 5(4)      |           |
| Fife               | 15                            | (4)  | 17     | 7(7)                             | 2(1)     |           |           |
| Kinross-shire      | 2-4                           | (1)  | 16     |                                  |          |           |           |
| Kirkcudbrightshire | 9-10                          | (5)  | 5+     |                                  |          | 1(1)      |           |
| Lanarkshire        |                               |      |        |                                  |          | 8(7)      |           |
| Midlothian         | 5                             | (5)  | 5      | 1(1)                             | 2(2)     |           |           |
| Peeblesshire       | 1                             | (1)  | 1      |                                  |          | 1(1)      |           |
| Perthshire         | 24                            | (9)  | 23     | 7(4)                             | 1-2(2)   | 7-8(3)    |           |
| Renfrewshire       | 10                            | (5)  | 7-10   | 1(1)                             |          | 6(4)      |           |
| Roxburghshire      | 2                             | (1)  | 1      |                                  |          | 1(1)      |           |
| Selkirkshire       | 2                             | (2)  | 2      |                                  | 4(4)     |           |           |
| Stirlingshire      | 5                             | (4)  | 6-7    | 1(1)                             |          | 2(1)      |           |
| West Lothian       | 4                             | (1)  | 3-5    |                                  |          |           |           |
| Wigtownshire       | 1                             | (1)  | 1      |                                  |          | 6(2)      |           |
| Totals             | 95-99                         | (47) | 98-105 | 21(17)                           | 9-10(10) | 37-38(24) | 24-26(19) |

Notes 1. The number of lochs on which pairs occurred are shown in parenthesis.

2. All dates for 1973 are taken direct from the table in Smith (1974).

Table 3. Summary of Great Crested Grebe censuses

|      |       | Lochs covered during : |                 | Total   |
|------|-------|------------------------|-----------------|---------|
|      |       | Both surveys           | One survey only |         |
| 1973 | Pairs | 116-120                | 37-38           | 153-158 |
|      | Lochs | 74                     | 24              | 98      |
| 1978 | Pairs | 107-115                | 24-26           | 131-141 |
|      | Lochs | 74                     | 19              | 93      |

Lochs known to have been visited during both surveys have been separated from those visited only once or where data for one year are uncertain. The results are summarized in table 3.

Two points should be borne in mind when comparing the results of the two surveys. Firstly, some lochs may have changed in their suitability as breeding areas. For instance, as a result of greatly increased disturbance one loch that held four pairs in 1973 held none in 1978. Conversely, one did not actually exist in 1973 and held two pairs in 1978. Secondly, because of the rushed nature of the more recent survey many of the 24 lochs visited only in 1973 probably held some pairs in 1978. However, it is less likely that many of the 19 lochs visited only in 1978 held pairs in the earlier survey.

With these points in mind it is suggested that the breeding populations in both surveys were similar, lying between 150 and 160 pairs. County by county there were no consistent trends. Declines in the two main strongholds, Perthshire and Fife, were offset by increases in other areas, such as Selkirkshire and Kinross-shire (Loch Leven). Data for intervening years supplied by some observers indicated that there may have been some localized increases in numbers and that 1978 levels were in fact lower than the immediately preceding years. For instance, there were between 20 and 30 pairs on Loch Leven in 1977 but only 16 in 1978 and up to four in 1973. However, there was nothing to suggest that such changes were general.

It is also evident that many lochs hold breeding pairs irregularly. At least 27 (probably more than 40) of the 117 lochs holding breeding pairs did so in one of the survey years only, which emphasizes the importance of comprehensive coverage in surveys of this species.

Several recorders reported low breeding success in 1978 but this was certainly not a general observation. For instance, four young were reared in Midlothian, the first for many years. In fact, in comparison with 1973, which was itself a poor year, 1978 was notably better (69 young recorded as opposed to 33 on lochs covered in both surveys). Similarly, despite the less comprehensive nature of the recent survey, more unmated birds were recorded in total (at least 40 compared with 30 in 1973).

### **Discussion**

The data above clearly show no evidence of any immediate effect on the Scottish population of grebes. Total breeding numbers, the numbers of non-breeding birds and the size of the winter population in 1978/9 were all similar to, or in excess of, levels prior to the oiling incident. However, three quarters of the corpses examined were first year birds (Camp-

bell *et al.* 1978) and since first breeding may be deferred until the second year (Cramp *et al.* 1977) the impact of the oiling might not be evident until several years after the incident.

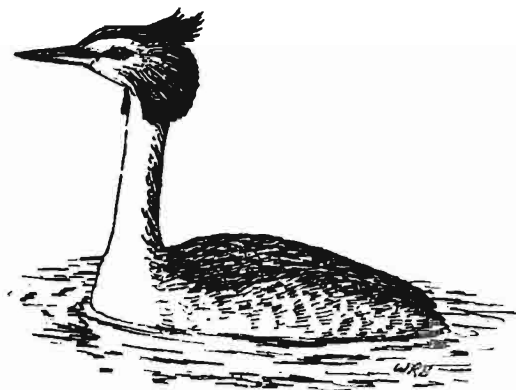
It is thought more likely that the majority of birds wintering in the Forth are immigrants and that Scottish breeders do not return until the second half of the winter. From mid February onwards increasing numbers of displaying birds in breeding plumage are present both on the sea and on some of the breeding lochs inland.

In the wider European context, the numbers killed in the incident must be considered of minor importance. For example, over 20,000 are believed to winter in Switzerland, 6,000 pairs breed in the Netherlands and Denmark (Cramp *et al.* 1977) and the British population is in excess of 2,000 pairs (Sharrock 1976).

However, the incident and subsequent survey work clearly illustrated three important points. Firstly, it highlighted the general lack of information on the origins of Scottish wintering species that are not easily caught for ringing studies. Secondly, it emphasized the importance of the role of the amateur ornithologist in enabling surveys to be carried out successfully at short notice. Finally, it showed how vulnerable bird populations may be to even very small localized spills if these occur where birds are concentrated.

### Acknowledgments

Particular thanks are due to the local recorders and individual observers, without whom this survey would have been impossible; also to R. W. J. Smith, organizer of the 1973 survey, for much helpful advice, to Dr C. J. Bibby who commented on the first draft of this paper, and to P. A. R. Hockey for the count data during 1978/9.



GREAT CRESTED GREBE W. R. Brackenridge

## Summary

As a result of oil pollution in the Firth of Forth in February 1978 200-241 Great Crested Grebes died. In a survey of the Scottish breeding population in 1978 150-160 pairs were estimated to be present, similar to 1973. There was no evidence that Scottish populations had been affected and it is suggested that most grebes wintering in the Forth are immigrants.

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## Birdwatching on Rhum

J. A. LOVE

Rhum became a National Nature Reserve in 1957. It is a large and mountainous island of predominantly wet heath with grassland only in the glen bottoms near the coast. Since it was cleared of its indigenous population in 1826 the only cultivation is around Kinloch on the east coast. Most of the island is cliff-bound with occasional small boulder beaches. The woodland at Kinloch was planted at the turn of the century, but in recent decades the NCC has undertaken a programme of reforestation of native trees. There are numerous freshwater lochs from which radiate a complex of burns and small rivers. The main mountain mass—the root of a Tertiary volcano—rises to 800m in several peaks. The island merits nature reserve status on geological grounds alone, but also possesses much of biological interest. Access, by prior arrangement with the resident chief warden, is by steamer from Mallaig.

The outstanding ornithological interest of Rhum lies in its extensive mountain-top colonies of Manx Shearwaters, estimated at over 100,000 pairs, and in the reintroduction of the Sea Eagle which has been going on since 1975. The Rhum hills have a long history of occupation by shearwaters and the peak of Trollaval doubtless derives its name thus. A night in the colony is a ghostly and unforgettable experience and it is not



PLATE 5. Great Crested Grebe on nest (Kirkcudbrightshire, July 1979).

*B. S. Turner*

Following heavy casualties from an oilspill in the Firth of Forth, the SOC organized a breeding census in 1978 to assess the impact on Scotland's breeding population (see p. 43).



PLATES 6-7. Golden Eagle studies.

PLATE 6 (a) Adult with chick, calling to mate circling above.

(b) Another adult at nest with chick.

*B. S. Turner*

*C. E. Palmar*







PLATE 7. Golden Eagles on Rhum.

*J. A. Love*

(a) Portrait of first year Golden Eagle. It was released on Rhum in 1977 having been taken illegally on the mainland for falconry.

(b) Chick in nest amid Manx Shearwater remains, June 1976. Toxic chemicals in seabirds may be limiting Golden Eagle breeding success on Rhum (see p. 33).





PLATE 8. Storm Petrel ringed on Ailsa Craig (Firth of Clyde) 1 July 1979.

Luring Storm Petrels into mistnets with tape recordings at night has revealed their presence, at least as non-breeders, in areas where they had previously been unsuspected (see p. 51).

*B. Zonfrillo*

difficult to perceive how the Vikings attributed the nocturnal activities of shearwaters to trolls. In the sixteenth century Dean Monro recorded how the young were harvested each summer to supplement the diet of the islanders. There is much speculation as to why the Manx Shearwaters of Rhum should excavate their nest burrows above the 650m contour. It is too easy to assume that by doing so they avoid predation by rats, for these rodents will ascend even in winter to feed upon unhatched eggs and dead chicks. Over much of the island the rainfall may exceed 25cm per annum and my own view is that the prolonged run-off and constant waterlogging of the coastal slopes renders them unsuitable for burrow nesters. It is true that the greatest precipitation occurs on the mountain tops which are frequently in mist, but their coarse, porous soil drains very rapidly. Other coastal burrow nesters such as Puffins and small petrels are scarce or absent.

Last century it was claimed that both Leach's and Storm Petrels once bred on Rhum but this has never been confirmed. In 1975 Storm Petrels were caught ashore using tape lures and they may also be seen at sea from the steamer. The sandstone cliffs in the southeast support several small colonies of Guillemots, Razorbills, Fulmars and Kittiwakes. Unfortunately these are almost impossible to view from the land, and the annual census has to be done by boat. Herring and Lesser Black-backed Gulls, Shags, Eiders and Black Guillemots breed all around the coast.

Red-throated Divers feed mostly at sea but about a dozen pairs nest inland on the freshwater lochs. Some of these also support a pair or two of Mallard or Teal or Common Sandpiper. This wader also breeds on the coast together with Ringed Plover and Oystercatcher. The tidal sand and mud at Kinloch and Kilmory attract small flocks of migrant waders such as Dunlin, Sanderling, Redshank and one or two Greenshank or Whimbrel. Turnstone and Purple Sandpiper are surprisingly infrequent and it is also curious that neither Greenshank nor Dunlin should nest on the moors. A few pairs of Curlew nest while Golden Plover and Snipe are the only common breeding waders. Flocks of 50-100 plovers winter on the coast.

Ring Ouzel, Dipper and Stonechat are welcome if infrequent encounters in the extensive, boggy and seemingly barren interior, which is otherwise attractive only to Snipe, Meadow Pipits and Red Grouse. Excessive burning and overgrazing in the past has resulted in a poor heather cover so that the estate had to release many captive-bred grouse to achieve respectable game bags. Early last century Ptarmigan still bred but have now disappeared. Small flocks of Snow Bunting turn up on passage, and in 1979 one bird remained on the tops well into May.

Harvie-Brown referred to five pairs of eagles on Rhum, in all likelihood meaning both White-tailed and Golden Eagles. The last pair of Ernes bred in 1907 while the Golden Eagles too succumbed to persistent persecution by keepers. An attempt is in progress on the island to reintroduce White-tailed Eagles. Golden Eagles have long since returned naturally and four pairs breed. However, their success is poor, with on average only one chick being reared per annum. High concentrations of DDE and PCBs have been detected in eagle eggs from Rhum, and seem to derive from the Fulmars, gulls and shearwaters often taken as prey. Pesticides accumulated through the marine food chain seem also to have been responsible for the disappearance about ten years ago of the Peregrine on Rhum, but in recent years this spectacular falcon has been more in evidence, while in 1977 a fifth pair of Golden Eagles took up residence. In that year also a record total of three eaglets were fledged and thus, encouragingly, the pesticide problem could be showing indications of easing—particularly important to the White-tailed Eagle reintroduction.

Since Rhum lacks Rabbits, hares and voles it is deficient in other raptors. Buzzards have nested on only one or two occasions, and any which remain to overwinter seem to rely more on bird prey, especially, it seems, migrant thrushes. Buzzards are frequent on Eigg and Canna, both of which have Rabbits. About six pairs of Kestrel (feeding upon insects, lizards and mice) and a similar number of Merlin (specializing in small birds such as pipits) breed on the island. In some years a single pair of Sparrowhawks may nest in the Kinloch Woods.

At the turn of the century some 30 ha of mixed woodland were planted around Loch Scresort, and these Kinloch Woods now form an important reservoir from which small birds can colonize the more recently established plantations. Their bird community is typical of any west Highland mixed wood, with



*MERLIN Donald Watson*

Chaffinch, Robin, Blackbird and Willow Warbler, and lesser numbers of Goldcrest, Wren, Song Thrush, Dunnock, Woodpigeon and Coal Tit. A few pairs of Woodcock breed, while large numbers pass through each winter. As many as 300 were shot annually by the estate early this century. Pink-feet, Greylags, White-fronts, Barnacle Geese and Whooper Swans are regular each spring and autumn but rarely stop.

The island's indisputable asset is variety. Rhum is only 24 km from the mainland, it is large and possesses a wide variety of habitats. The weather is often inclement and the insect life is notorious in its thirst for human blood, but few islands could match such a diversity of breeding birds.

*John Love, Bayview, Isle of Rhum, Inverness-shire*

## Short Notes

### Status of Storm Petrel in Clyde and Forth

During 1978 experiments in the Clyde area revealed that Storm Petrels make regular nocturnal visits to the vicinity of the mainland and islands where breeding is not known to occur (Maguire 1978, Report on Storm Petrel ringing in Kintyre, *Copeland Bird Observatory Report for 1978*). They were lured by playing a tape of their churring song on a cassette recorder situated on the landward side of a mistnet parallel to the shore. This technique produced unprecedented results.

During 1978 and 1979 over 500 were trapped, mainly on the east coast of Kintyre (Argyll). Smaller numbers have also been caught in 1979 on Ailsa Craig (plate 8), Pladda and at two sites on the Ayrshire coast. The nearest known breeding site is the newly discovered one on Sanda (Maguire 1978).

Recent work by A. R. Mainwood on the Summer Isles (Wester Ross) has shown that wanderers are more readily attracted to the tape recorder than breeders (1978, *Ringers' Bulletin* 5: 33). My own experiments were carried out mainly between July and September in both years, a period coinciding with the peak wandering behaviour of non-breeders. Limiting dates of response by Storm Petrels to tape lures in Kintyre were 3rd June (1979) and 1st October (1978). Our results suggested that wandering Storm Petrels were perhaps more widespread in Scottish waters. I was especially interested in testing my theory on the east coast, where breeding colonies are unknown south of Orkney.

Around midnight on 18/19th August 1979 R. Morton and I tape lured and trapped a Storm Petrel at Fife Ness. A heavy swell was running which I am sure accounted for the paucity

of the catch. The bird had almost certainly been coasting along the tideline to have heard the recorder which was barely audible at 20m.

The Storm Petrel's habit of moving inshore at night can be taken advantage of using this technique. In fact, armed with a tape recorder, it is possible that ringers could change its known status on the east coast of Scotland (and England) virtually overnight!

EDWARD J. MAGUIRE

During the week of 4-10th August 1979 I. P. Gibson, A. Beck, R. and K. Gregory and I mistnetted 22 Storm Petrels at night at Pilgrims' Haven on the Isle of May, using a small cassette recorder as suggested by E. J. Maguire. Some had vascularized brood patches possibly indicating breeding, although a similar condition can be precipitated by other factors and is of doubtful significance. On 7th August we controlled one ringed in the Summer Isles (Wester Ross) on 16th August 1978 but we did not retrap any of our birds.

Apart from old records at the lantern in late autumn there are only five other occurrences (8: 96) including a pair disturbed once from 'a cleft in the rock' in May 1922 (Rintoul & Baxter 1935, *A Vertebrate Fauna of Forth*) although nothing was found to suggest breeding. In 1904 a Storm Petrel was found on an egg on the Bass Rock, the only record of nesting anywhere in the Forth, and two summered off Inchkeith in 1913 (Rintoul & Baxter 1935).

Attempts at tape luring on the May by R. Morton and me in late October 1978 proved fruitless. However, it is now obvious that in summer Storm Petrels frequent the vicinity of the island, probably in fair numbers, but usually coming inshore only at night. One bird in 1979 was netted only three minutes after switching on the tapes. More ringing will have to be done to establish its true status (see Maguire 1980 [in press] *Breeding of the Storm Petrel and Manx Shearwater in Kintyre, Argyll, Western Naturalist*). With this in mind it would be worth examining all the Forth islands for breeding. They might breed on the Isle of May, although proving this could be difficult owing to the vast number of Rabbit and Puffin burrows. The Storm Petrel is virtually impossible to census accurately due to its small size and nocturnal habits, and many colonies must remain undiscovered around the Scottish coast.

B. ZONFRILLO

Whilst catching waders at Dalmeny (West Lothian, 3½ km east of the Forth Road Bridge) on 1st September 1979 we mistnetted a Storm Petrel at 21.30 GMT. A cassette recording

of Dunlin and Knot roost calls was playing behind a mistnet parallel to the water's edge, which was 3m away when the bird was caught. The batteries had become spent and the tape was playing much too slowly, emitting a sound resembling a rusty hinge.

HUGH CLARK, MICHAEL WILKINS

### **Shelduck killed in territorial dispute**

On 6th April 1979 on the Dornoch Firth at Spinningdale, Sutherland, D. Waterhouse observed two drake Shelducks have a fierce encounter a short distance out on the water while the two ducks were milling around. When the commotion stopped one drake joined the two females and all three flew away. The other drake was left floating on the water and shortly the incoming tide brought it ashore. It was dead but on examination no marks of injury could be found. Presumably the other drake had drowned it.

Although the literature refers to violent territorial encounters I cannot find any resulting in death. I thank M. W. Pienkowski for his comments.

D. MACDONALD

### **The 1978/9 survey of Corncrakes in Britain**

In spite of the problems of censusing a bird that is rarely seen and calls mainly at night, most of the present range of the species in Britain was covered by the joint BTO/SOC inquiry in 1978. This included the majority of the Hebridean islands, though Corncrakes on Tiree were censused in 1977 and 1979 and those on Iona in 1977. Orkney was partially covered in 1978 but a special survey of Corncrakes and Corn Buntings in the archipelago was organized in 1979. Confirmation of breeding is difficult to obtain but Corncrakes present in May but apparently not subsequently were treated as non-breeders. This note provides a summary of the results, full details of which will be published elsewhere.

Breeding was confirmed or considered probable in 160 10-km squares, which represents only 30% of the 528 squares in which they were recorded with a similar status in Britain during the 1968-72 Atlas survey. In Scotland the change was most marked in the east (88 squares reduced to ten, an 89% reduction) and southwest (from 67 squares to 20, a 70% reduction). If the Corncrake continues to withdraw westwards it may soon disappear as a regular breeder on the Scottish mainland, though two areas in west Sutherland still have fairly high densities. Only ten of the 160 squares in which Corncrakes were apparently breeding had more than 15 calling

|   | Number of calling Corncrakes   |              |
|---|--------------------------------|--------------|
|   | Confirmed/probable<br>breeders | Non-breeders |
| Shetland  | 3                              | 2            |
| Orkney (1979)   | 102-104 (15% total)            | 1            |
| Outer Hebrides  | 260 (37% total)                | 9            |
| Inner Hebrides (including<br>Iona 1977 & Tiree average<br>1977/9) | 233-240 (33% total)            | 1            |
| West Sutherland   | 38-40                          | -            |
| West (WesterRoss-Argyll)  | 17                             | -            |
| Northeast (Caithness-east<br>Inverness)                           | 9                              | -            |
| Perthshire & Stirlingshire  | 4                              | -            |
| Southwest (including Clyde<br>isles)                              | 19-20                          | 12           |
| Southeast   | 1-2                            | -            |
| Total Scotland  | 686-699                        | 25           |
| England   | 11                             | 4            |
| Isle of Man   | -                              | 3            |
| Wales   | 1                              | -            |
| Total Britain   | 698-711                        | 32           |

birds. Six of these were in the Uists and Benbecula (Outer Hebrides), two on Tiree and one each on Colonsay and Iona (Inner Hebrides). Three quarters of the squares held less than six calling birds.

Habitat was recorded for 183 Corncrakes in the Outer Hebrides, 190 in the Inner Hebrides, 74 in Orkney and 73 on the Scottish mainland. In the Outer Hebrides 48% of these were in the marshes, compared with 10% in the Inner Hebrides, 14% in Orkney and 23% on the mainland. Marshland and other semi-natural habitats adjoining farmland may be important as cover for Corncrakes when they first arrive and for broods after the hay has been cut. Much of such habitat has, however, disappeared from the more intensively farmed areas of Scotland. The cover provided by quick growing and tall sown grasses may attract Corncrakes, but such meadows are mown for silage or hay while the birds are still nesting or have small young which cannot escape from the large fields.

The 1978/9 survey has provided the first opportunity to obtain a fairly accurate figure for the population of Corncrakes in Britain. That this was possible is, however, a sad reflection of the seriously diminished numbers of this species and there can be little optimism for its long term future in western Europe. The Irish Wildbird Conservancy's survey in 1978 revealed that while Corncrakes were still widespread but local in northwest Ireland, they were very scarce in the southeast.



The organizer gratefully acknowledges the help received from the local recorders, regional representatives and the 214 contributors.

C. JAMES CADBURY

### **Starving Oystercatchers in Deeside after severe snowstorm**

In 1979 Oystercatchers had returned inland to Deeside (Aberdeenshire and Kincardineshire) by early February as usual. On 21st March 23 cm of snow fell on lower Deeside, and next day it melted only at springs and streams, roadsides under trees, and south-facing river banks. Conditions stayed like this for a week, with frost all day in the shade.

At Crathes most Oystercatchers were in flocks along the Dee, but on 22nd March 12 single birds were on roadsides under trees, already lethargic and with ruffled plumage, in the last stages of starvation. They allowed cars to within 2 m before moving, and two on the road had been run down. At Echt one rose in front of a dog from a watery ditch 2 m below field level, alongside a dry-stone dyke. It flew into a snowdrift and lay there apparently dead, with wings spread and head flopped. Only when about to be picked up did it fly away normally; the apparent feigning of death may have been anti-predation behaviour. Eight others at Echt probed singly at 1 m wide grassy patches beside springs, allowing a dog up to 9 m before flying, and one stood lethargic on the snow. By comparison I saw only three Lapwings along roadsides, again unwilling to fly, and only one had been killed by a car.

During 21st-25th March I found 33 Oystercatchers dead on or beside 50 km of roads; some disappeared later due to scavenging by Crows and Rooks. The birds lived on roadsides at night as well as day. Out of about 160 seen alive in daylight, all were probing for food, most had bills discolored by earth, and none was heard singing. On 24th March two flew over the Slug pass towards the coast, but most stayed inland. On 26th March three single birds still probed roadsides under trees at Crathes, and only on 28th March did the snow there and at Echt melt enough for the flocks to disperse more widely and probe through 2-5 cm of snow in the middle of some fields.

Surprisingly, conditions further up Deeside were better for the birds. Near Dinnet they were in loose flocks on 25th March, with many pairs, some of them displaying and singing. About half preened, slept, or bathed in a pool, and none had ruffled plumage. Drifting had been so strong that more than half the grassy ground was snow-free, the birds were getting many earthworms, and none was found dead on 30 km of roads.

Six cocks and six hens (none in their first winter) were found uninjured and freshly dead at Crathes and Echt between 22nd March and 2nd April. I judged their condition by feeling their breast muscles, using grades from 5 (breast flat with the sternum not projecting) through 4+, 4, 4-, etc. to 1 (emaciated, with sternum projecting). Only one cock and one hen had grade 2, one each grade 1+, and the rest grade 1. None had any fat even on the heart and gut. All the gizzards contained mud, two had remains of earthworms, and one a beetle wing. The cocks' mean weight was  $324 \text{ g} \pm$  standard error 8, range 287-344, and the hens'  $348 \pm 9$ , range 328-379. (These are similar to P. J. Dare's (1977, *Ibis* 119: 494-506) weights for six dead emaciated hens in cold weather (mean 315 g, range 270-350). He found that Oystercatchers normally grow heavier in winter, and in mid March reach maximum weight for the year, with much fat on the breast.) The heaviest hen had a 3 mm ovum in its ovary, but the others contained no developing ova.

Even in early April, after the thaw, Oystercatchers at Crathes and Echt were still not singing as often or as loudly as before the snow, and did not do so again till late April. Yet a hen Lapwing killed at Finzean on 4th April contained a fully pigmented egg about to be laid, weighed 296 g, and was plump with a body condition of grade 4.

After deep snow in January or February, Oystercatchers in Deeside return to the coast. Why did they not do so this time? Possibly it was because late March is so near the nesting season, and because deep snow in late March seldom lies so long. At any rate, Oystercatchers seem less well adapted to snow than Lapwings; of course, living inland is a more recent evolutionary change for the normally coastal Oystercatcher than for the Lapwing.

ADAM WATSON

### Food of Snowy Owls in Outer Hebrides

In the years 1972-4 Snowy Owls were frequently seen on the Isle of Lewis (Outer Hebrides). A pair first made their appearance on 18th May 1972 and remained in the same area until 1974, the female being last seen on 21st January and the male on 26th July. There were three different individuals seen at least once, on 3rd June 1972, and yet another bird must have been present subsequently for in February 1975 the skeleton was found of a Snowy Owl that had been ringed on Fair Isle as an adult male on 9th June 1972.

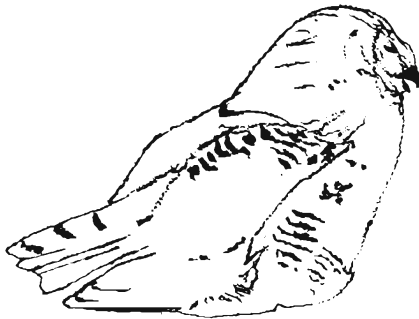
The owls spent most of the day roosting on moorland, usually perched on peat stacks, fence posts or a pile of stones and sometimes in sheltered hollows. Some pellets were found

at these perches in July 1972. Seven intact pellets averaged 77 x 31mm and these, together with five fragments, consisted of the remains of at least 13 juvenile Rabbits *Oryctolagus cuniculus*. There were traces of sand in all pellets, two strands of grass in one and Snowy Owl feathers in another two. The weight of Rabbits (estimated from the length of long bones) varied between 130 and 700gm with an average of 320gm. To judge from this sample the owls fed exclusively on Rabbits, less than half grown, which they probably caught on machair adjacent to the moor.

The Snowy Owls of Fetlar fed mainly on Rabbits but their diet also included nesting birds, particularly Oystercatchers and Arctic Skuas (Tulloch 1968, *British Birds* 61: 119-132). In the Arctic Snowy Owls often feed exclusively on lemmings (e.g. Watson 1957, *Ibis* 99: 419-462) but where these are less numerous the prey includes birds and mammals up to the size of Arctic Hare (Bannerman 1955, *The Birds of the British Isles* vol. 4). It is therefore not surprising that in Scotland, in the absence of lemmings, young Rabbits formed a major part of the summer diet.

It was strongly rumoured that at least two of the Lewis Snowy Owls succumbed to human persecution, a sad end to an otherwise promising situation. One could surely think of no bird more endearing to the crofters of Lewis than one that ate Rabbits.

M. MARQUISS, W. A. J. CUNNINGHAM



SNOWY OWL J. Busby

## Reviews

**RSPB Guide to Birdwatching** by Peter Conder. London, Hamlyn, 1978, 176 pp., 28 colour photographs, 50 plain photographs, drawings, diagrams and maps, 18½ x 12½ cm, £2.50.

Peter Conder has enthusiastically created a book that is a wealth of information and up to date. It is well finished with not an inch of space wasted, nearly every page having delightful line drawings or photographs. It leads the reader from the bare essentials of birdwatching through the intricacies of identification and counting to more applied aspects of amateur ornithology. The first half is perhaps the most useful to the person in the field, though the later chapters on geographical distribution, ecology and habitat, and conservation, to name a few, are of more general interest. Every chapter has its subject material dealt with very systematically though there is often little relation between the photographs and the text. Many experienced birdwatchers will learn much from this book and it will be especially useful for newcomers to the subject.

JAMES M. DICKSON

**The Birdwatcher's Guide to the Wetlands of Britain** by M. A. Ogilvie. London, Batsford, 1979, 189 pp., 20 plain photographs, 6 maps, 22 x 14 cm. £4.50.

This attractive book is further evidence of Malcolm Ogilvie's wide-ranging knowledge of British wildfowl, and of his apparently limitless energy. It is well constructed and effortless to read. The most important areas for wintering wildfowl and waders in Britain are described region by region. Unlike most guides, it gives an idea of the numbers of the various species likely to be seen. However, the selection of sites solely on the criterion of biomass does not necessarily serve the birdwatcher's interests. It results in relatively few localities being included. Tayside is afforded eight pages, while Strathclyde only warrants one page, and the Central Region is dismissed in 13 lines. Anyone looking for a comprehensive account of the wetlands and their birds will turn to the now ageing Stationery Office publication *Wildfowl in Great Britain*. Birdwatchers with less scientific requirements are probably looking for information about smaller, less obvious waters, where the odd rarity might turn up, rather than an area that is a certainty for 1,000 Mallard. This revives the conflict between the need for information and that of security—a conflict that remains unresolved.

IVAN T. DRAPER

**A Guide to Shetland Birds** by Bobby Tulloch and Fred Hunter. Lerwick, Shetland Times Ltd. 3rd edition 1979, pp. v + 46, 16 pages of plain photographs, 22 x 15 cm. £1.50.

All bird watchers visiting Shetland will find this guide invaluable. There are 20 pages giving short accounts of the different areas and islands and general information, followed by 12 pages giving the status of all Shetland's breeding birds and regular visitors, and finally a species list of birds recorded in Shetland up to May 1978 which can be used as a tick list.

**The Birds of Gwent** by P. N. Ferns et al. Gwent Ornithological Society, 1977, pp. xii + 152, 11 full-page plain photographs, 21 x 14 cm. £3.50.

This nicely produced hard-cover book updates Humphrey's *Birds of Monmouthshire* of 1963, and Ingram & Salmon's work of 1937.

**The Herons of the World** by James Hancock and Hugh Elliott. London, London Editions Ltd, 1978, pp. 304, 63 colour plates, numerous pencil drawings, 29 distribution maps, 35 x 23 cm. £45.00.

This finely produced book stands alongside Ripley's *Rails of the World* and Forshaw & Cooper's *Parrots of the World*. It covers the 61 species of herons, egrets and bitterns in the world. Each is given a full page painting of superb quality, finely reproduced, by Robert Gillmor and Peter Hayman, while the 'Green' Heron which has races of widely different colouring from East Africa to America and the Galapagos, and the 'Great Blue' Heron in America which has a pure white race, are each given two plates.

The first 35 pages deal with the classification of the group, and short accounts of plumage and moult, breeding, feeding, migration and dispersal, and conservation. Each species is then described, with an average of three pages of text, covering distribution, migration, habitat, general appearance and identification, and behaviour. Distribution maps are grouped in an appendix, and there is a bibliography of roughly 1000 references.

Not as much detailed information is given for each species as is to be found in *Birds of the Western Palearctic* or in Palmer's *Handbook of North American Birds*, but these cover only a fraction of the species to be found in Hancock & Elliott (21 in BWP, 15 in Palmer). It is perhaps a defect in the book that distribution maps are given for only 29 of the 61 species. There are none, for example, for the Purple Heron, Little Bittern, Night Heron, or even for the Cattle Egret which has had such a remarkable range expansion in recent years. However in all cases distributions and movements are well described in the text.

The whole book is a model of clarity of writing and with its superb paintings makes a fine production. The price is not high for a book of this quality.

**Endangered Birds—Management Techniques for Preserving Threatened Species** edited by Stanley A. Temple. University of Wisconsin Press (published in London by Croom Helm) 1978, xxiii + 466 pp, 31 plain photographs, 23 x 15 cm. £8.95.

This book consists of 50 papers presented at a symposium held in Madison, Wisconsin, in August 1977, sponsored by, amongst others, the International Council for Bird Preservation and by the World Wildlife Fund. The majority of papers are by North American workers, covering a wide range of management techniques, but in the Old World the conservation of the Bald Ibis in Turkey and of White-tailed Sea Eagles in Sweden is described, and there is a paper on the work of our own Wildfowl Trust. The book concludes with an interesting critical summary by Ian Nisbet. Those with a serious interest in endangered birds will find the book a valuable source of material. Its cost is surprisingly low.

W. G HARPER

**Wild Geese** by M. A. Ogilvie, illustrated by Carol Ogilvie. Berkhamsted, T. & A. D. Poyser, 1978, 350pp, 16 colour plates, over 40 drawings, 40 maps, 24 x 16cm. £7.80.

This is an important book that should be acquired by everybody interested in geese. For the first time it gathers together all available information about all species (apart from the somewhat deviant Hawaiian Goose) under the headings of classification, identification, ecology (food and feeding), breeding, population changes (counting and ringing methods), distribution, migration, exploitation and conservation. As the majority of species are highly adaptable, and no doubt there will be consid-

erable changes in distribution and behaviour in the future, this information provides a reference against which changes can be measured. Fortunately geese cannot read and so there will be plenty of opportunity for readers of this book to note the many deviations from normal behaviour, e.g. roosting in fields by Pinkfeet in midwinter in hard weather, or to study behaviour not yet fully covered, e.g. initial breeding behaviour before departure from winter quarters.

We must all thank Malcolm Ogilvie for compiling this fine book, together with his wife Carol who has prepared the identification plates (to which, however, proper justice does not appear to have been done in some of the reproductions) and the many delightful black and white illustrations, and also all those who joined in providing the mass of information which the book so well draws together.

WILLIAM BROTHERSTON

**Waterfowl: Ducks, Geese and Swans of the World** by Frank S. Todd. Seaworld Press, San Diego, 1979, 399 pp, 776 colour photographs, 6 drawings, map, 2 tables, 28 x 28cm. £25.

The author appears to have had several aims in producing this book; a guide to the waterfowl of the world; a new review of their classification; and a simple guide to waterfowl aviculture. The most important aim however is to use this book as a vehicle for the publication of his marvellous and encyclopaedic collection of photographs. This is a coffee table book with a bit of meat to it. The species account is informative and readable and while it is not exhaustive there is more than enough for all but the most avid waterfowl enthusiast. One criticism of the text is with the treatment of all subspecies as distinctive entities. Some, like the Brent Goose populations, are certainly distinct, but others, like the Faeroese Eider, hardly deserve mention.

The fact that many of the photographs are of captive birds does not detract from their excellence. Almost every species and many subspecies are illustrated (albeit by mounted specimens in the case of extinct populations) and many of the plates have a nice feel to them, showing birds in their breeding habitats, against interesting backgrounds or exhibiting some point of behaviour. Another excellent feature is the full and descriptive captions accompanying each plate. Clearly any book with over 700 plates of the highest quality will be expensive but this is a welcome change from the usual coffee table books and could well be worth buying if you have £25 to spare.

R. D. MURRAY

#### Also received

**Some Funny Birds in the World of Man** by A. P. Norman. Bognor Regis, Tiercel Books, 1978, 64 pp, drawings, 30 x 21 cm. £4.95. 'Makes play with real bird names and an ornithological style of writing'.

**Upgrading of Natural Values in the central Netherlands** by I. G. Nijland & H. E. van de Veen. Foundation for Critical Wildlife Management, 1978, Stichting Kritisch Faunabeheer, Postbus 76, 's-Graveland, Netherlands. 16 pp, 29 x 21 cm. US\$3.50.

**The Observer's Book of Birds of Australia** by P. & P. Slater, London. Warne, 1979, 202 pp, many colour photos, also plain photos, drawings, 8 maps, 14 x 9 cm. £1.95. 'Includes 150... species and covers all families.'

**From the Edge of Extinction: Endangered Species in North America** by D. Stewart. London, Warne, 1979, 191 pp, drawings, 24 x 16 cm. £6.95.

**Current literature** Articles and reports on the status and distribution of birds in Scotland are listed here. Strictly biological studies such as ecology or behaviour are excluded, as are references from widely read journals such as *British Birds* and *Bird Study*. Most listed items and many others are in the club library and we are grateful to everyone who has made donations. The library also welcomes copies of ornithological work on any subject published outwith the main bird journals.

- Forth Naturalist and Historian* vol 3 1978. 1979. Includes papers on ringing recoveries, Stirling and Clackmannan bird report 1977, Register of Ornithological Sites, Gartfearn Wood heronry, Golden Eagle success and site tenure.
- ETO/SOC Cormorant Survey* 1978. C. J. Cadbury.
- The Breeding Bird Community of the Aber Bogs, Loch Lomondside, in* 1978. C. M. Waltho 1979. (NCC report.)
- Inchmoan—the ever changing bird island of Loch Lomond. J. Mitchell 1979. *West Dunbartonshire Naturalist Report* No 4: 2-9.
- Loch Lomond Bird Report No 7 for* 1978. J. Mitchell (comp) 1979. South West Region (Scot) Nature Conservancy Council.
- The Birds of Colonsay and Oransay* (sic). D. Alexander 1979. Glen Cottage, Colonsay.
- Nature Conservation Interests in the Clyde Estuary*. Symposium at Paisley College of Technology, 23 June 1978. Nature Conservancy Council, South West (Scotland) Region.
- Shetland Bird Report* 1978. B. Marshall et al. (comp) 1979. Shetland Bird Club.
- YOC Phone-in Report: Spring Migration* 1979.
- North-East Scotland Bird Report* 1978. A. G. Knox & M. V. Bell (eds) 1979. Aberdeen University Bird Club.
- Clyde Area Bird Report* 1977. I. P. Gibson (ed) 1979. Clyde-Muirshiel Regional Park.
- Highland Ringing Group: Report 3*. T. Mainwood, 13 Ben Bhraggle Drive, Golspie, Sutherland.
- Moulinging Eiders in Orkney and Shetland. P. Hope Jones & P. K. Kinnear 1979. *Wildjowl* 30: 109-113.
- Preliminary results of winter dye-marking on the Firth of Forth, Scotland. M. W. Pienkowski & H. Clark 1979. *Wader Study Group Bulletin* 7: 16-18.
- Islay Birds Check List*. C. G. Booth (1979). Islay Museums Trust.
- The Natural Environment of the Outer Hebrides. J. M. Boyd (ed.) 1979. *Proceedings of the Royal Society of Edinburgh* 77B. £15. (Symposium proceedings including avifaunal papers).
- A Report of the Expedition to the Island of Mingulay (Outer Hebrides) May 26th-June 1st* 1979. Huntington School, York.
- Survey of Shorebird Feeding Distribution and Movements on the Eden Estuary NE Fife, including a Study of the Invertebrate Food Source*. J. P. Johnston et al. 1979. Nature Conservancy Council.
- The Birds of Baddingsgill Reservoir, Tweeddale ( Peeblesshire)*. A. W. & L. M. Brown 1979.

## Notices

**Birds of the Endrick Mouth** John Mitchell (22 Muirpark Way, Drymen, by Glasgow, G63 0DX) would welcome unpublished notes for an annotated checklist of this area of Loch Lomond.

**Photographs for Scottish Birds** Photographers (that means most of you) are reminded that good pictures of birds, and sometimes their habitat, are always welcome, particularly if they accompany papers or short

notes submitted for publication. Whilst glossy black and white prints are preferable, colour transparencies can also be acceptable if the image is large, well contrasted and crisp. In addition, any photographers, amateur or professional, who would like their work featured in *Scottish Birds* should send a selection of unpublished black and white prints to the editor.

The symposium **Estimating Populations of Terrestrial Birds** will be held 26-31 October 1980 at Asilomar, near Monterey, California. The invited papers, given by authors from the United States, Canada, Europe, New Zealand, and Australia, will cover a wide range of subjects. The principal topics will be the problems, methods, and analyses of bird censusing. There will be a variety of field trips during and after the symposium to explore methods of censusing and habitats of coastal and interior California. The Asilomar conference grounds are located in a State Park on Monterey Bay and provide an attractive and stimulating setting. For further information write the organizers: Dr C. John Ralph and Dr J. Michael Scott, Bird Census Symposium, P.O. Box 43, Hawaii Volcanoes National Park, Hawaii 96718.

## The Scottish Ornithologists' Club

### ANNUAL CONFERENCE

The 33rd annual conference and 44th annual general meeting of the club will be held in the Marine Hotel, North Berwick, East Lothian, during the weekend 24-26 October 1980. The conference programme and booking form is enclosed with this number of the journal; the AGM agenda will be printed in the autumn number.

### BRANCH MEETINGS

Will members please note that the dates of the first meetings of branches next winter will be as follows:

- September** 22nd Aberdeen  
 23rd Edinburgh, Inverness and Wigtown  
 24th Ayr, Dumfries, St Andrews and Thurso  
 25th Dundee, New Galloway and Stirling
- October** 6th Glasgow (1980 AGM)

The venue and times of all meetings are unchanged; full details of all winter meetings will be published in the syllabus of lectures and sent to all members with the autumn number of the journal early in September.

## Branch News

**Aberdeen** On 14th January Aberdeen members welcomed club president Miss Valerie Thom to the branch. We thoroughly enjoyed her fine film on the life and work of the Fair Isle population during the 1950s. Many of the sequences shown are important records of the way of life on the island at that time, for while much was happening to affect the future of Fair Isle as a principal bird migration station, she had recorded the equally important pressures on the native crofting population.

Following her presentation invited guests and committee members joined Valerie at a reception in the Zoology Department Refectory. An excellent meal was preceded by the showing of a video recording of BBC



Nationwide's visit to the BP Forties Field which dealt with the activities of birdwatchers (in particular Alan Morley) on the platforms and the type of information being gathered on the movements, numbers and condition of migrants. I should like to thank the staff of BP at Dyce and in particular Mr Stan Howe for making the reception possible and for the assistance of Professor George Dunnet and his department.

BRIAN J. STEWART

## Current Notes

*These notes include unchecked reports and are not intended as a permanent record, nor will they be indexed. Please send reports via local recorders at the end of March, June, September and December.*

A generally mild winter was enlivened by Lapland Buntings and two tern species. Nearctic species continued to turn up. The first blizzards of spring were followed by a strong influx of migrants; Fair Isle had perhaps its best March ever.

### Winter

**Black-throated Diver** unusual records in Dec: Lindean resr (Selk); 5 birds in 4 Shetland localities. **Shag** 1500S/hr Rattray (Aber) 19 Jan. **Bittern** Newburgh (Aber) Jan, captured after collision with wires. **Whooper Swan** Shetland census 275 on 4 Nov, only 6% juvs; one killed by car on Whalsay in Dec had been resident for 20+ years; also 275 in Chinnan (Renf) Jan. **Bean Goose** Aberlady (E Loth) 28 Dec; 5 Kinross Feb. **Snow Goose** 4 wintered Ellon (Aber). **Brent Goose** only report: Virkie (Shet) 27 Jan. **Ring-necked Duck** Scatness (Shet) 8 Dec-7 Jan; Woodend Loch (Lan) 9 Jan-1 Feb, then Gadloch 24 Feb. **King Eider** as usual L Fleet (Suth) Apr; but none Shetland for second successive winter. **Surf Scoter** Southernness (Kirk) last seen 7 Feb; Kirkcaldy (Fife) 17-18 Feb; L Fleet Apr (regular 1974-7, now returned at last?). **Rough-legged Buzzard** Glen Dye (Kinc) 10 Feb. **Golden Eagle** Noss (Shet) Dec-Jan, possibly also at Voe. **Crane L Eye** (Ross) Dec-Jan; Glensaugh (Aber) 16 Feb. **Avocet** Aberlady 7th & 14 Feb; Ythan (Aber) 17 Feb. **Herring Gull** 10,000 large, dark, arctic birds stormbound Spiggie (Shet) 9-16 Dec. **Glaucous Gull** max 7 (guess where?) Fraserburgh (Aber) 19 Jan. **Ivory Gull** Sullom Voe (Shet) 29 Dec. **Sandwich Tern** Musselburgh (Midl)-Gosford (E Loth) in Jan; Ayr 20 Jan is a new winter area. **Arctic Tern** Stornoway (O Heb) 6 Feb is exceptional. Out of 177 dead, oiled birds on Shetland's E coast 13-19 Dec, 79 were **Little Auks**; a few gale-blown Lothians coast 20-23 Mar. **Little Owl** pairs at new sites in Dumf and E Loth. **Waxwing** only reports Kenmay (2) and Hillhead (Aber) Jan. **Brambling** 100 on tideline in snowstorm Aberlady 21 Mar, part of the spring hard weather movement. **Two-barred Crossbill** 2 New Galloway (Kirk) Feb/Mar. **Common Crossbill** max 25 Tynninghame (E Loth) Feb-Apr. **Hawfinch** Mid Yell (Shet) 2 Jan; Banchory (Kinc) 18 Jan. **Lapland Bunting** wintered Musselburgh (max 19) and Gregness (Kinc, max 8); Aberlady 2 Feb; 2 Cairnbulg (Aber) late Mar; Fair Isle 16 Mar.

### Spring migration

European **White-fronted Goose** nominate *albifrons* Stornoway 22 Mar. **Bufflehead** ♂ L Bee (S Uist, O Heb) 14-20 Mar—the first for Scotland, although there is a dubious 1870 record for nearby Eriskay. **Rough-legged Buzzard** Glen Tanar (Aber) 22 Mar. **Lapwing** 500 Fair Isle 26 Mar. **Woodcock** 40+ Fair Isle 28 Mar. **Lesser Yellowlegs** Cairnbulg mid Mar-5 Apr. **Sabine's Gull** Prestwick (Ayr) 29 Mar—spring records are excep-

tional. **Cuckoo** 1st Ardnamurchan (Inv) 29 Mar. **Swallow** 1st Barns Ness (E Loth) 30 Mar. **Duncock** 230 Fair Isle 28 Mar—a record. **Robin** 160 Fair Isle 27 Mar, 220 on 28th. **Black Redstart** St Andrews (Fife) 28 Mar; 3 Fair Isle 28 Mar; Barns Ness 29 Mar. **Wheatear** 1st Aberlady 25 Mar. **Blackbird** 200 Fair Isle 26 Mar, 420 on 27th, 570 on 28th. **Song Thrush** 75 Fair Isle 27 Mar. **Mistle Thrush** 14 Fair Isle 30 Mar. **Chiffchaff** 1st 2 Fair Isle 28 Mar. **Goldcrest** 35 Fair Isle 28 Mar; 50 St Abbs (Ber) 29 Mar. **Jackdaw** 20 Fair Isle 27 Mar. **Chaffinch** 560 Fair Isle 28 Mar. **Hawfinch** Fair Isle 28 Mar.

#### Late news

**Black-throated Diver** 30 Sinclair's Bay (Caith) 4 Apr. **Fulmar** 12,000+N Noss Head (Caith) 20 Apr, 8+ blue phase Noss and South Heads in Apr. **Sooty Shearwater** 3 Little Minch (Hebs) 7 Apr—they should still be in the Falkland Islands at this time. **Gannet** 2,063N/5 hrs Noss Head 20 Apr. **Great White Egret** Ruthwell (Dumf) 9-11 Apr, when seen leaving high to NW—5th Scottish record. **Purple Heron** 1W East Linton (E Loth) 17 Apr. **Steller's Eider** ♂ Peninerine (S Uist)—still there since 1972. **Arctic Skua** 1st Noss Head 8 Apr. **Great Skua** 1st Noss Head 29 Mar, 52N + 4S/6 hrs 20 Apr. **Mediterranean Gull** single adult nestbuilding in Black-headed gullery Apr (locality suppressed). **Little Tern** 1st 2 Aberlady 27 Apr. **Little Auk** 4 Little Minch 10 Apr. **Wryneck** Gosford (E Loth) 27 Apr. **Black Redstart** Wick (Caith) 28 Mar. **Wheatear** 1st Wick 24 Mar. **Chiffchaff** probable Siberian *tristis* Wick late Feb. Northern **Bullfinch** 2 nominate *pyrrhula* Wick Jan-Feb. **Hawfinch** Ackergill (Caith) 29 Mar. **Evening Grosbeak** ♂ Nethybridge (Inv) late Mar—only previous record St Kilda Mar 1969.

D. J. BATES

#### WITHOUT COMMENT

'Over the coming weeks all the summer visitors to Britain will be flying in—the martins, flucatchers, warblers...'

—*The Scotsman* 8 April 1980.

'20 Years Ago (From files of the "Strathspey Herald" of April 22, 1960)—Ospreys... have returned to their breeding ground near Loch Garten... The birds, a male and a female, are nesting in the same tree...'

—*Strathspey and Badenoch Herald* 25 April 1980.

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Tel. Papa Stour 234.

## A Hebridean Naturalist

by

PETER CUNNINGHAM

... extracts from the weekly diary of an all-round naturalist living in the Outer Hebrides, with illustrations by Andrew Miller Mundy. Flamingoes in Lewis, greylag geese in Uist, goldcrests in Barra—these are just some of the subjects dealt with in this book. Published by Acair Limited, it is available from them at Cromwell Street Quay, Stornoway, Isle of Lewis.

Price £3.40

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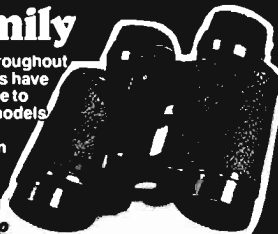
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