NATURE CONSERVANCY COUNCIL

The birds of North Rona and Sula Sgeir

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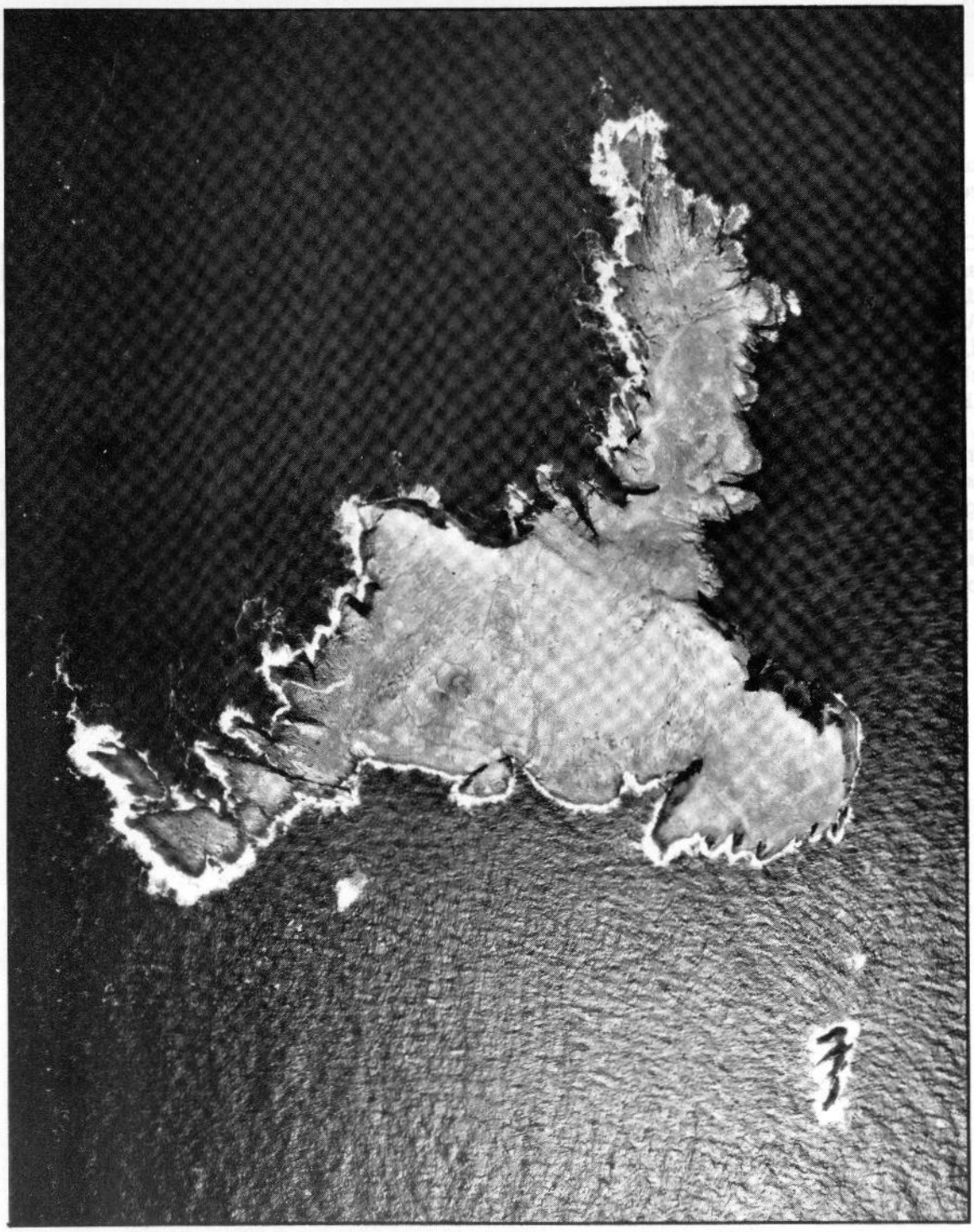


North Rona (reproduced from an Ordnance Survey aerial photograph with the permission of the Controller of Her Majesty's Stationery Office, (Crown copyright reserved)

Introduction

North Rona and Sula Sgeir, located at 59°08'N 05°50'W and 59°06'N 06°10'W respectively, are two of the remotest islands off north-west Britain. They form a National Nature Reserve, declared in March 1956 with the agreement of the owners, Barvas Estates. The primary interest at the time of declaration was the grey seal rookery on North Rona, which was then the largest in the world (since superseded by the Monach Islands off North Uist).

The name Rona derives from Norse, meaning either island of seals or rough or rocky island. North Rona is approximately triangular in shape and has an area of 120 hectares (Figure 1). The island is composed of hornblende gneiss interspersed with pegmatite veins, which are very thick in places. Over most of the island the rock is covered with soil or peat. The vegetation is heavily influenced by the peaty soil, salt spray and grazing by sheep (Gilbert *et al.* 1973). It has a central ridge which reaches a maximum height of

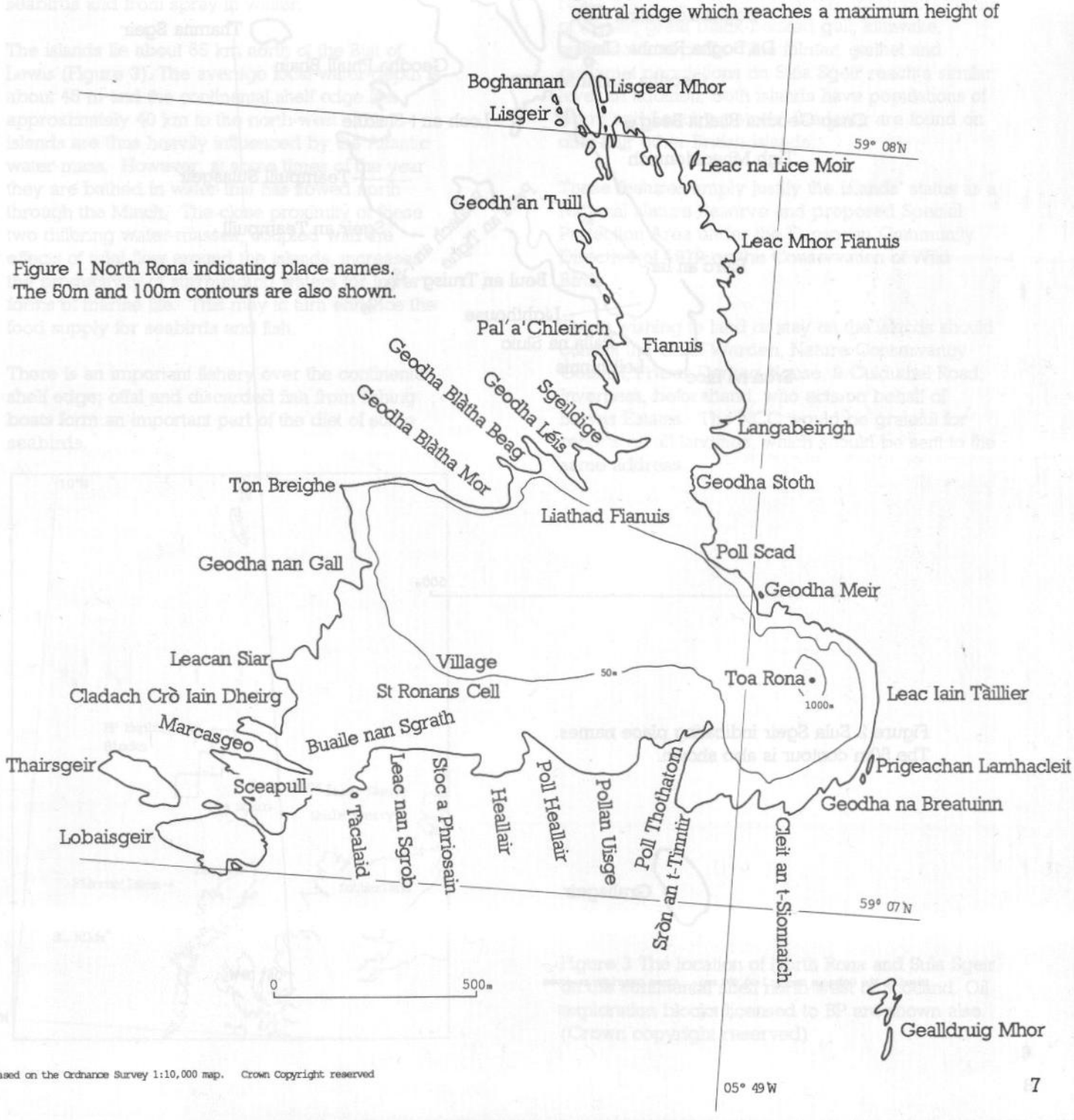


Figure 1 North Rona indicating place names. The 50m and 100m contours are also shown.

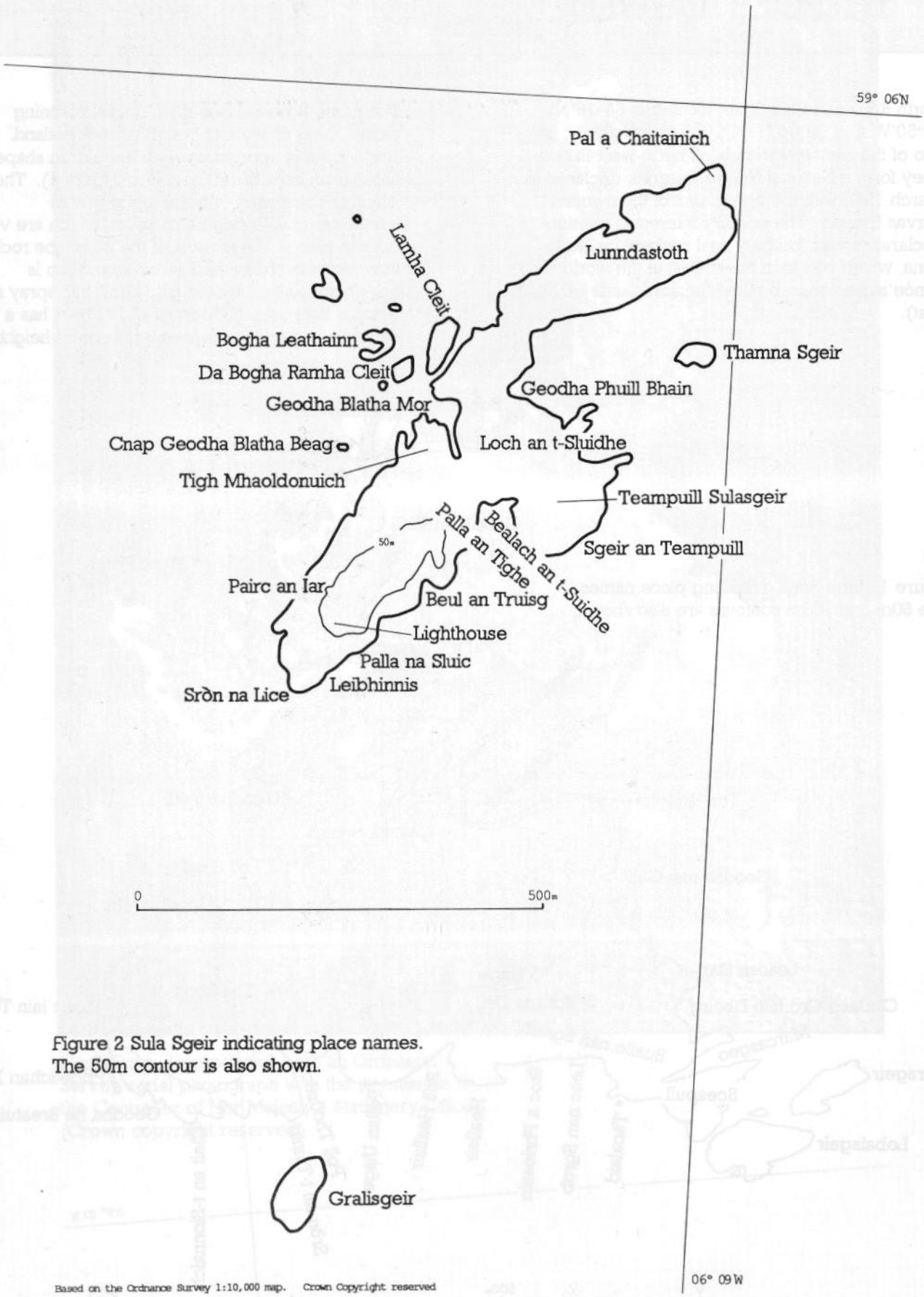


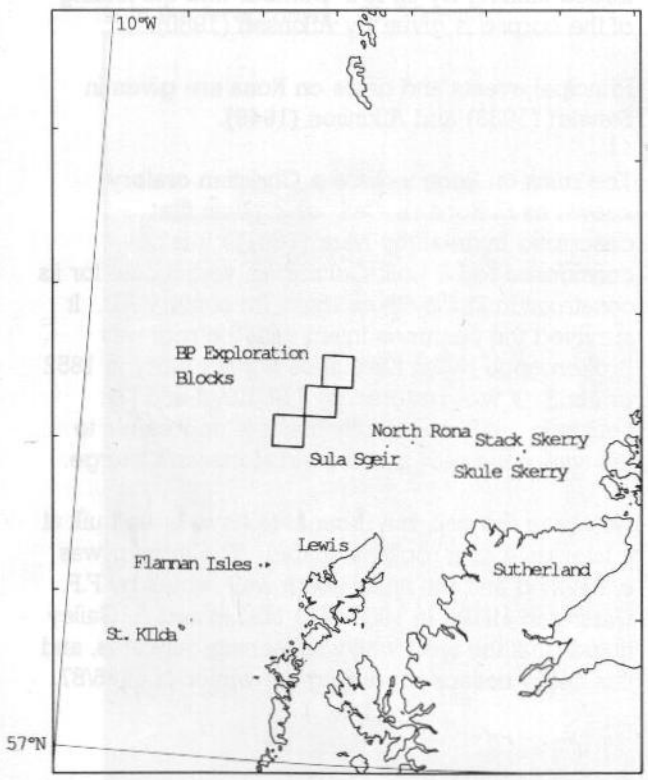
Figure 2 Sula Sgeir indicating place names.
The 50m contour is also shown.

107m at Toa Rona and which ends in cliffs. Two low promontories extend from this ridge, one to the north (Fianuis), the other to the south-west (Sceapull). Fianuis is the site of the largest part of the seal rookery, and its vegetation is greatly influenced by the impact of these animals; a storm beach is found at the top of the low cliffs on the west side. The north side of the central ridge is considerably steeper than the south side. This area slopes steadily to the sea and much of it used to be cultivated using the lazy bed or ridge and furrow technique.

Sula Sgeir translates as "gannet rock". It is a rocky ridge of hornblende gneiss about 1 km long running north-east to south-west (Figure 2) with a maximum breadth of about 200 m. There is very little soil and consequently little vegetation. The island is subject to heavy erosive pressure from seabirds and from spray in winter.

The islands lie about 65 km north of the Butt of Lewis (Figure 3). The average local water-depth is about 45 m and the continental shelf edge lies approximately 40 km to the north-west. The islands are thus heavily influenced by the Atlantic water-mass. However, at some times of the year they are bathed in water that has flowed north through the Minch. The close proximity of these two differing water-masses, coupled with the effects of tidal flow around the islands, increases the productivity of surrounding waters for lower forms of marine life. This may in turn enhance the food supply for seabirds and fish.

There is an important fishery over the continental shelf edge; offal and discarded fish from fishing boats form an important part of the diet of some seabirds.



In 1985, the Department of Energy issued a licence to BP to explore for oil in blocks 40-50 km to the north-west of North Rona (Figure 3). In 1986, as part of an environmental study before such exploration went ahead, BP commissioned the NCC to examine the seabird life of the area. The bulk of the work was conducted at sea, with observations made throughout the year from ships passing near the islands. A summary of this work, demonstrating the seasonal importance of the waters near the islands, forms part of this document. Benn *et al.* (1988) gave full results of the work at sea. In June 1986 a ship was chartered to work close around the islands, and the opportunity was taken to count the numbers of breeding birds. These counts are presented here, along with a compilation of previous counts of seabirds and an annotated list of records of other birds.

North Rona holds over 1% of the British populations of fulmar, great black-backed gull, kittiwake, guillemot and puffin. The fulmar, gannet and guillemot populations on Sula Sgeir reach a similar level. In addition, both islands have populations of storm and Leach's petrels: the latter are found on only four other British islands.

These features amply justify the islands' status as a National Nature Reserve and proposed Special Protection Area under the European Community Directive of 1979 on the Conservation of Wild Birds.

Those wishing to land or stay on the islands should consult the Chief Warden, Nature Conservancy Council, Fraser Darling House, 9 Culduthel Road, Inverness, beforehand, who acts on behalf of Barvas Estates. The NCC would be grateful for reports on all landings, which should be sent to the same address.

Figure 3 The location of North Rona and Sula Sgeir on the continental shelf north-west of Scotland. Oil exploration blocks licensed to BP are shown also. (Crown copyright reserved)

Human history of North Rona

The date when the island was first settled is unknown. Nisbet & Gailey (1962) found no evidence for the existence of a pre-Christian population. The first written account of life on North Rona is given by Monro (1774), who travelled through the Hebrides in 1549.

It seems likely that the island economy was well organised by the time of Monro and a limited self-sufficiency had evolved. He described the growing of barley and the export of a surplus as part of the rent to MacLeod of Lewis. Excess cattle and sheep were also sent off the island. Some years before Martin (1716) wrote, five families had tenanted the island and MacKenzie (c. 1682) stated that the population was self-regulating and that no more than 30 individuals were allowed to remain on the island.

The narrow margin of survival in such a remote community, relying on their own agricultural produce and with only a precarious annual link with Lewis, led to disaster about 1683. Martin (1716) wrote: "a swarm of rats, but none knows how, came in to Rona and in a short time eat up all the corn in the island. In a few months after, some seamen landed there, who robbed the poor people of their bull. These misfortunes and the wont of supply from Lewis for the space of a year occasioned the death of all that ancient race of people." Martin continued: "Some years after, the minister (to whom the island belongeth) sent a new colony to this island with suitable supplies. The following year a boat was sent to them with more supplies, and orders to receive the rents; but the boat being lost as it is supposed, I can give no further account of this late plantation."

After this second tragedy nothing is known of the island, with certainty, until 1764, when the population numbered nine (Walker 1812). They were probably a single family, tenants of the owner or a Ness tacksman. This was certainly the situation by the time of the first 'Statistical Account' (Sinclair 1797), with the tenant family paying annual dues in the form of "corn, butter, cheese, sheep, cattle, wildfowl and feathers".

MacCulloch (1824) gave a first-hand account of life for one such family, the MacCaigies. They were followed by various others acting as tenant shepherds. This period of permanent occupation ended in 1844, when the last shepherd, Donald MacLeod, and his family left the island after living there for a year.

Since then Rona has been rented by Lewis crofters, who pasture about 150 sheep on the island. Their regular visits to maintain the stock have become known as 'the Rona annual', an event described by, amongst others, Atkinson (1949).

From 1824 until at least the middle of the century, "several crews were fishing from the island" (MacDonald 1978). Little is known of this industry, but presumably it took place only during the summer months. There were also regular expeditions to kill seals in the late 19th century, but these had effectively ended by the early years of this century (Harvie-Brown 1887; Atkinson 1980).

In May 1884 two elderly Ness men took up residence on Rona, and they were found dead there in April 1885. Persistent rumours of foul play led to the exhumation of the bodies and a postmortem on the mainland. They were later reinterred on Rona.

In 1941 an RAF salvage team found the mummified remains of a human corpse in one of the ruined houses. The body was never removed, and by 1952 all that remained was a skull, which was buried in the graveyard. The story of the wartime forced landing by an RAF bomber and the finding of the corpse is given by Atkinson (1980).

Principal events and dates on Rona are given in Stewart (1933) and Atkinson (1949).

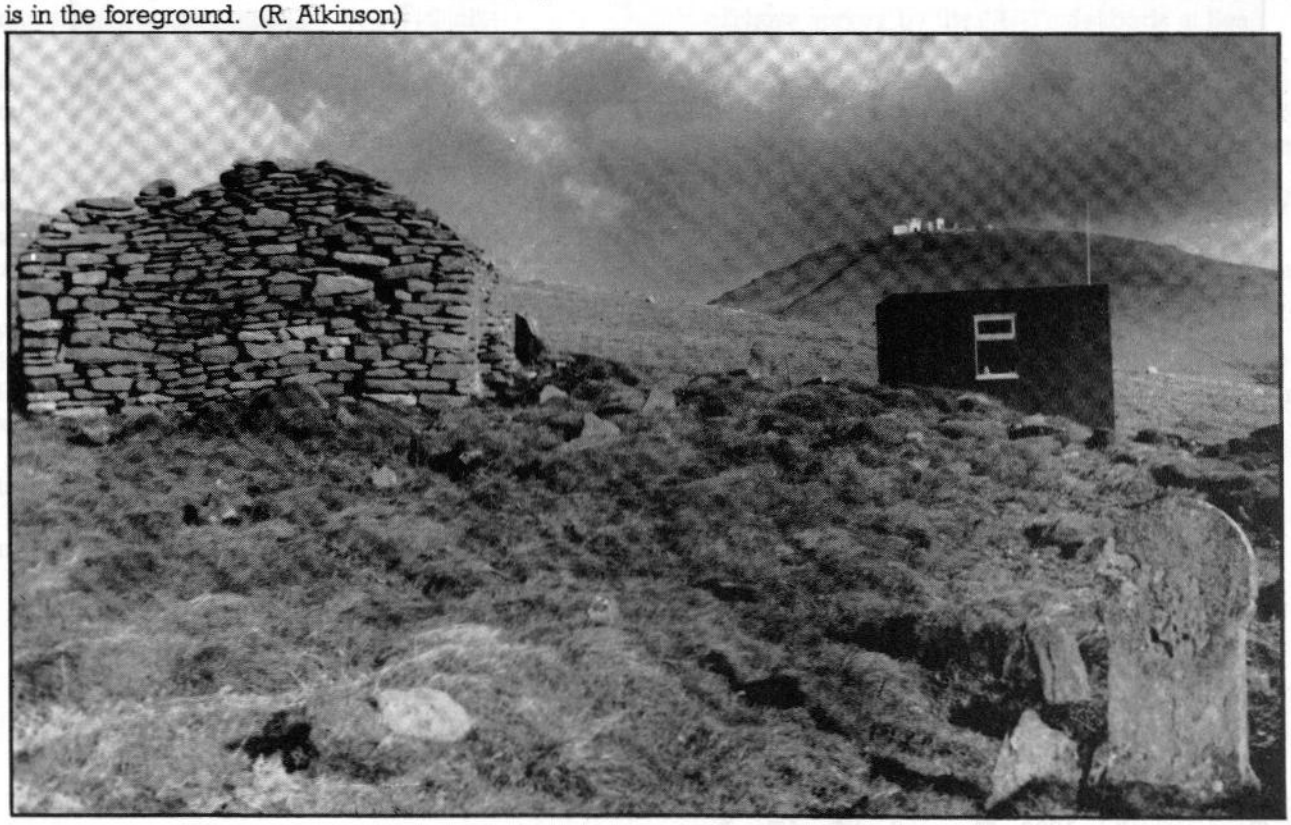
The ruins on Rona include a Christian oratory known as St Ronan's Cell, which was first described in detail by Muir (1861). It is considered to be post-Columban, with a date for its construction in the 8th or even 7th century AD. It survived the centuries intact until the roof was broken open by an Ordnance Survey party in 1852 or 1853. It was restored by J.M. Boyd and J.D. Lockie in 1959, so skilfully that it is impossible to tell where the new and the old stonework merge.

Adjoining the cell, but thought to have been built at a later date, is a roofless chapel. The interior was excavated and the fallen south wall rebuilt by F.F. Darling in 1939. In 1958 H.C. Nisbet and A. Gailey noted that the west wall was leaning outwards, and this finally collapsed during the winter of 1986/87.

The cell, chapel and graveyard are enclosed by a circular wall, beyond which lie three distinct groups of semi-underground dwellings, the whole complex surrounded by the well-defined ridges of lazy bed cultivation. Isolated bothies, ruined walls and enclosures are found across the island. Details of the antiquities, including a plan of the village area, are given in Nisbet & Gailey (1962). The most recent archaeological survey of the structures was undertaken by M. Harman in 1986.

There are two modern buildings on the island, one a temporary shelter used by the Sea Mammal Research Unit (SMRU) during their autumn seal work, the other an automatic lighthouse erected on the island's highest point, Toa Rona. Construction started in June 1981 and the light was commissioned on 28 March 1984.

North Rona in 1938; a view across the south slopes of the island towards Toa Rona, the ruined chapel is in the foreground. (R. Atkinson)



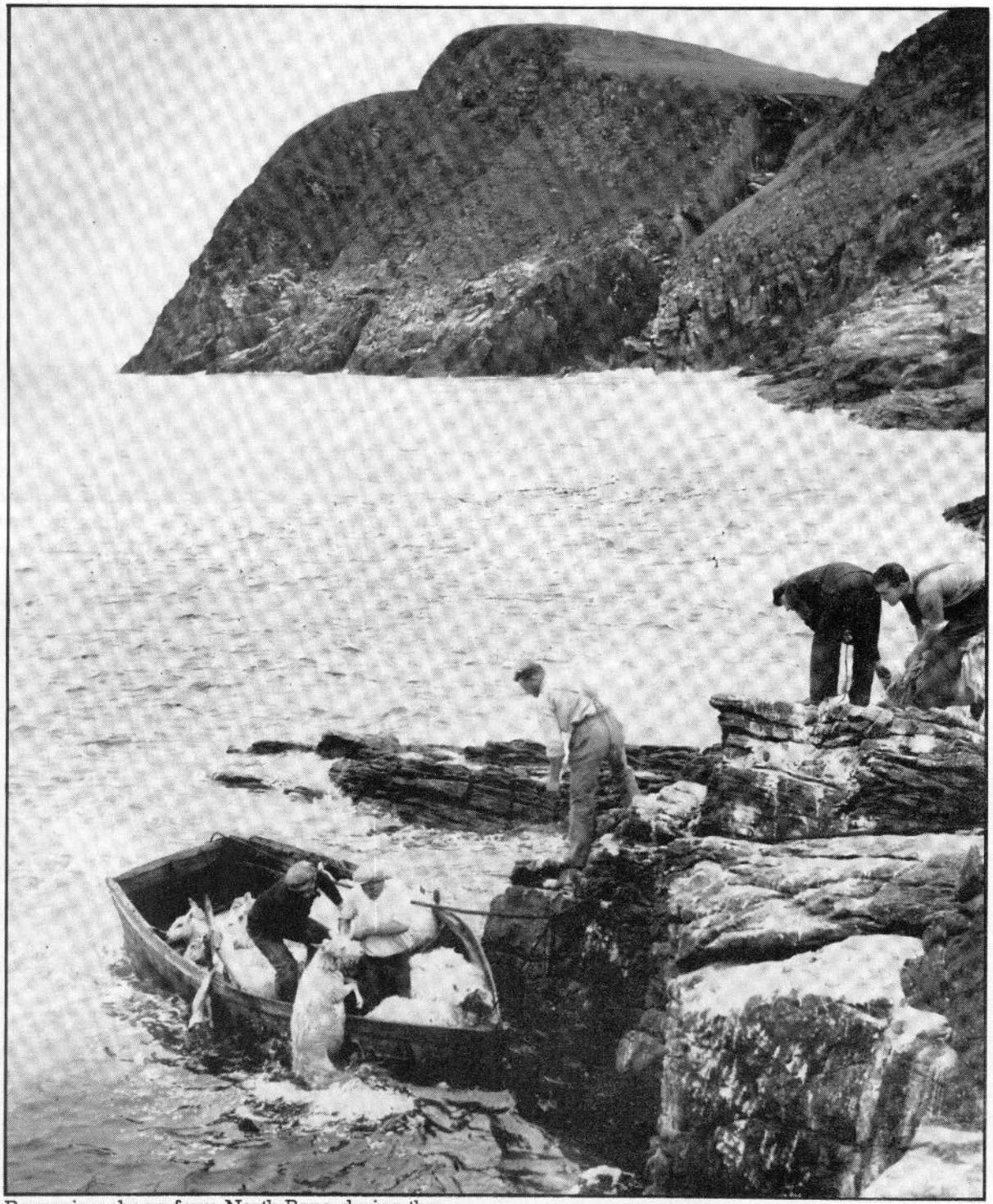
North Rona in 1981; note the addition of the hut and lighthouse since 1938. (S. Murray)

The future

At present, regular human contact with Rona stems from sheep husbandry by Lewis crofters, lighthouse maintenance by the Northern Lighthouse Board and monitoring of seabird and grey seal populations by the Nature Conservancy Council and the Sea Mammal Research Unit. This is unlikely to change in the foreseeable future, and these activities are not detrimental to the island or its fauna.

Tourism has increased greatly in the last ten years, with specialist holiday companies offering Rona as a destination and diving parties and yachtsmen visiting with increased frequency. However, the total number of visitors in any single year is still so low as to have little effect on the island or its wildlife.

Possible threats to seabirds might come from oil spills and industrial fishing. Licences have been granted for oil exploration in the seas to the north-west of Rona, and transport of oil occurs in shipping lanes near the island. Increased industrial fishing for sandeels and sprats could affect the food supply of auks, kittiwakes and great black-backed gulls, but at present there is no evidence of such an effect.



Removing sheep from North Rona during the 'Rona annual' in 1938. The north cliffs of Toa Rona are in the background. (R. Atkinson)

Ornithology on North Rona

Early published accounts contain general descriptions of the wildlife but little detail relating to species. The "swarm of rats" that appeared around 1683 failed to establish themselves; had they done so, it would have been catastrophic for the small petrels. Visits by ornithologists before 1968 are shown in Table 1; their activities are summarised briefly below.

Swinburne (1885) was the first naturalist to spend some time ashore, and, despite having only a few hours, he proved that Leach's petrels were nesting. In 1885 and 1886, Harvie-Brown and Barrington respectively visited the island to try to prove that fulmars were breeding. Both failed, and the first eggs were not found until Popham's visit in 1894. The Duchess of Bedford made four visits, the last in 1914. Ward (1919) visited the island with his brother for ten days in June 1914 "to observe the feeding habits of gulls uninfluenced by man".

D.M. Reid and M. Stewart spent a week ashore in 1930 and Stewart returned with T.H. Harrisson in 1931. The combined records of both visits and a review of the older records back to 1884 were published by Harrisson (1932). Ainslie & Atkinson (1937a,b,c) spent a month on the island in 1936 to assess the size of the Leach's petrel population. Darling (1939b, 1943) made two visits in 1938 and a short summer visit in 1939. Although his main interest was the grey seals, he documented the autumn and early winter birdlife on the island.

Atkinson (1949) was the first visitor after the Second World War. Subsequent visits were few and of short duration up to 1956, when the National Nature Reserve was declared. In June 1958 there were three visits, R.H. Dennis and W.E. Waters for a day, a Glasgow University Expedition and a Nature Conservancy team led by Boyd. This latter was the forerunner of the long-term research into grey seals, which continues up to the present. This work covered all or part of each October from 1959 to 1967, and in that period 116 bird species were identified (Dennis & Waters 1968).

Visits that produced bird records between 1968 and 1987 are summarised in Table 2. Three short autumn visits were made in the years between 1968 and 1971. In 1972 the Sea Mammal Research Unit of the Natural Environment Research Council was contracted to continue the seal work, and in that year the unit stayed on the island from 8 September to 3 December. Thereafter the unit was present on the island during October from 1977 to 1982 and again in 1985 and 1986. The priority of seal work and the absence of ornithologists led to few bird records in some years, but there was good coverage of the autumn migration period in 1972, 1979 and 1981 (Zoon pers. comm., S. Murray).

Robson (1968) was on the island for three weeks in 1966 and published a review of the breeding species.

In 1969, 'Operation Seafarer' attempted to count all Britain's seabirds. J. McGeoch and J. Wilson were responsible for the counts on Rona. Their time was very short and some sections of coast were not visited; however they made some estimates.

Love (1978) made fortnight-long visits in 1971, 1972 and 1974, to undertake detailed population studies of the small petrels by means of intensive ringing. Evans (1972, 1976b) carried out feeding studies on young auks and kittiwakes and conducted work on puffin populations in 1972 and 1976. Not until June 1986 were any further studies of seabirds undertaken, with a combined land and offshore survey by the NCC's Seabirds at Sea Team.

There are only 49 years since 1883 for which bird records are known. The winter months, December to March, have seen only 26 days coverage, all since 1938. The spring migration period is barely known, with one visit (offshore) in April and only brief visits in May in five years, all since 1959. The summer months (June to August) are well-documented. The main autumn migration period shows great contrasts, with only three years of full or partial coverage for September but 22 years for October since 1959. Short-term visits by tourists and NCC staff, mainly in June and July, have increased greatly in recent years, but not all have produced records or new information.

Table 1.

Visits to North Rona which produced ornithological records, 1883 to 1967 (from Robson 1968; Dennis and Waters 1968; NCC records) See Table 2 for later visits.

Year	Visitor(s)	Dates	Source
1883	J. Swinburne	20 June	Swinburne (1885)
1885	J.A. Harvie-Brown	16 June	Harvie-Brown (1888)
1886	R.M. Barrington	29 June-1 July	Harvie-Brown (1888)
1887	J.A. Harvie-Brown	18-19 June	Harvie-Brown (1888)
1894	H.L. Popham	29 June	Fisher (1952)
1907	Duchess of Bedford		Bedford (1910)
1910	Duchess of Bedford	19 July, 25 August	Bedford (1910)
1914	F. Ward	10 days, early June	Ward (1919)
1914	Duchess of Bedford	21 June	Bedford (1914)
1927	J. Wilson Dougal	29 July	Dougal (1927)
1930	D.M. Reid, M. Stewart	31 July-4 August	Reid (1931)
1931	T.H. Harrisson, M. Stewart	28 August-3 September	Harrisson (1932)
1936	J.A. Ainslie, R. Atkinson	16 July-12 August	Ainslie & Atkinson (1937a)
1936	M. Stewart	30 July	Stewart (1938a)
1937	R. Atkinson, A.A. MacGregor	28 July	Atkinson (1949)
1937	M. Stewart	1 August	Stewart (1938a)
1938	F.F. Darling	12 July-30 September	Darling (1939b)
		15 November-22 December	Darling (1940)
1939	F.F. Darling	18-29 June	Darling (1943)
1946	R. Atkinson	27-28 July	Atkinson (1949)
1949	I.D. Pennie	17 July	Fisher (1952)
1952	R. Studdy	July	Studdy (1953)
1954	R.W.J. Smith	3 August	Smith (1954)
1958	R.H. Dennis, W.E. Waters	June	NCC files
1958	J.M. Boyd, J. MacGeoch, D.N. McVean, D.A. Ratcliffe	3-5 June	Robson (1968)
1958	T.B. Bagenal, D.E. Baird, S. Donald	24 June-22 July	Bagenal & Baird (1959)
1959	K. Williamson, J. Boswell, W.J. Eggeling	10 May	Williamson et al. (1959)
1959	J.M. Boyd, H.R. Hewer, J.D. Lockie, J. MacGeoch	1-26 October	Boyd (1960)
1960	J.M. Boyd, M.J.W. Douglas, R.M. Laws, J. MacGeoch	16 October-7 November	Dennis & Waters (1968)
1961	J.M. Boyd, R.H. Dennis, A. Holmes	13-21 October	Dennis & Waters (1968)
1962	R. Balharry, J.M. Boyd, R.H. Dennis, W.E. Waters	5-20 October	Dennis & Waters (1968)
1963	R. Balharry, R.N. Campbell K. East, K.M. Wallace	25 October-4 November	Dennis & Waters (1968)
1964	R.N. Campbell, K. East, N. Picozzi, R. Tweddle	10-19 October	Dennis & Waters (1968)
1965	W.J. Eggeling	27 May	NCC files
1965	R. Balharry, R.N. Campbell R. Moss, G. Smith	21-27 October	Dennis & Waters (1968)
1966	M.J.H. Robson	28 July-19 August	Robson (1968)
1966	J.M. Boyd, A. Christie, R. Tweddle, P. Wormell	24-31 October	Dennis & Waters (1968)
1967	R. Balharry, R.N. Campbell, W.J. Eggeling, H.H. Kolb, D.R. Shelley	16-27 October	Dennis & Waters (1968)

Table 2.

Days per month when observations were made on North Rona, 1968-87

Year	J	F	M	A	M	J	J	A	S	O	N	D	Observers
1968										7			M.E. Ball, R. Moss
1969						1	5						J. McGeoch, D. Wilson, M.E. Ball, E.M. Matthew
1970										1			R.N. Campbell, N. Picozzi
1971						1	11			1			J.M. Boyd, J. Love, P.G.H. Evans, A. Currie
1972						5	10		30	31	30	3	P.G.H. Evans *et al.*, J. Love *et al.* RAF Orn.Soc., SMRU, NCC
1973										1			SMRU
1974							14						J. Love
1975													
1976						5	3						R.N. Campbell, A. Currie, S. Murray P.G.H. Evans *et al.*
1977					1					14			N. Picozzi, A. Allsop, SMRU
1978										24	2		SMRU
1979										25	7		SMRU
1980						4	2	1		29	3		S. Murray, M.P. Harris, M. Warren, H. Birley, R. Broad, SMRU
1981						1	1			30	1		P.& G. Sparks, N. Buxton, S. Murray, SMRU
1982										2			M.E. Ball, W.A.J. Cunningham, SMRU
1983							4	5					R.V. Collier, N. Buxton, A. Currie
1984							7	1					D. Budworth, A. Blackburn
1985					1			1		26			B. Jones, N. Buxton, SMRU
1986			1			12				30	1		NCC Seabirds Team, M.D. Crewe, SMRU, R. Collier
1987					2		13						C.J. Camphuysen, D.P. Hodson *et al.*

Human history of Sula Sgeir

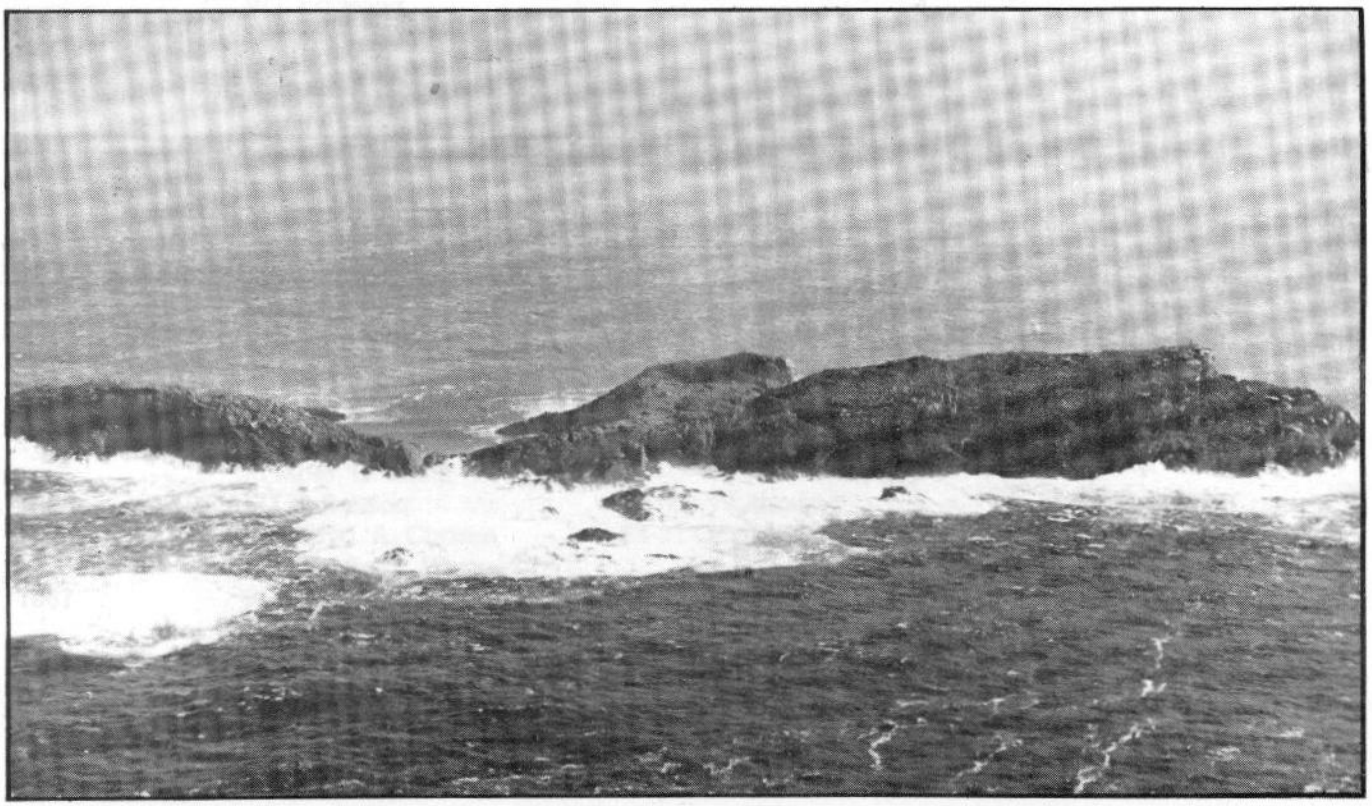
Sula Sgeir is too small to have had a resident human population, but it is the scene of a remarkable and centuries-old tradition - the "guga hunt" by the men of Ness, on Lewis. They have exercised their traditional right to kill the guga, or young gannet, since at least 1549. How regularly they were able to do so in the past centuries is unknown. In view of the hazards of sailing small open boats in Hebridean waters it is unlikely they were successful every year. McGeoch (in Bannerman 1959) stated that there were 19 hunts between 1919 and 1958, with an average annual kill of 2360 gugas. However, since 1949 the hunt has taken place annually, with up to 4000 gugas taken in some years (reports in Stornoway Gazette).

The Protection of Birds Act 1954 gave the gannet complete protection in Britain, but the Gannets on Sula Sgeir Order 1955 allowed the Ness men to continue the guga hunt. The Wildlife and Countryside Act 1981 requires the licensing of the hunters, the taking only of birds of the year and a quota set by the NCC. There is, however, no independent check on the numbers killed or disturbance caused.

Interpretation of counts of the gannetry before 1969 is difficult. However, comparison of the first photographic count, in 1969, with a similar survey in 1985 revealed only a small increase in numbers of occupied gannet sites on Sula Sgeir (Murray & Wanless 1986). This is in contrast to most other Scottish gannetries, where numbers increased at 2-3% p.a. over this period. Further discussion on the effects of the hunt on the gannet population is given by Nelson (1978).

The annual harvest occurs in late August and early September, at which time (apart from the gannets themselves) only fulmars will be disturbed. However, any effects cannot be too serious, as the numbers of fulmars have increased dramatically from less than 150 in 1932 to several thousands in 1986.

The only artefacts of historic interest on Sula Sgeir are connected with the guga hunt. These are stone bothies, built to shelter the hunters during their time ashore, which are possibly as old as the hunt itself. Puffins and Leach's and storm petrels breed in their walls. They were described in detail by Muir (1885), Stewart (1933), H.C. Nisbet in 1958 and M. Harman in 1986.



Sula Sgeir from the north-west (E.J. Hosking & J. Fisher)

The only other structure on the rock is an automatic light-beacon on the highest point. It was built in the winter of 1981/82 by the Northern Lighthouse Board and commissioned in December 1982. This will require service and maintenance, but with careful planning this can be achieved outside the seabird breeding season. However, a breakdown of the automatic equipment during the summer, requiring an emergency landing, could have serious effects on the large guillemot colony.

During the First World War the island was apparently used for target practice by the Royal Navy (Jellicoe 1919). Stewart (1938b) stated that "shell fire practice by warships made a large number of gannets desert Sula Sgeir", but he gave no details. In 1962, R. Atkinson instigated a search of Admiralty archives, but no corroborative evidence was found. There is currently no military involvement with the rock.

Several cruise ships have visited the island in high summer and have probably caused some disturbance. A notable example was the landing of 67 visitors from a National Trust for Scotland cruise in 1965.

Subaqua divers visited for the first time in 1980, and other groups in 1985 and 1986, and on each occasion they landed on the island. Landings by such groups pose a real threat to the seabirds, particularly if they occur between May and July, when the extremely high density of breeding birds makes moving around on the rock without causing the loss of eggs or chicks extremely difficult. Parties should avoid disturbing nesting seabirds if they make a landing on Sula Sgeir.

Sula Sgeir in 1972 (J.A. Love)

Sula Sgeir in 1986, following construction of the lighthouse and helicopter pad (M.L. Tasker)

Ornithology on Sula Sgeir

The ornithological history of Sula Sgeir is impoverished. Table 3 summarises all known dates when records of birds have been made. Undoubtedly there have been unrecorded visits and landings on the rock, particularly in the last 20 years. We know of landings made in 1969, 1975, 1980 and 1986, but no records or observations have been made on any of them.

The most regular visitors to the rock have been the Ness men, but their single-minded attention to gannets left them little time for the finer points of bird identification.

The record begins with Monro's (1774) brief account of the fowling activities of the Ness men in the 16th century. He referred only to "wild fowls", giving no indication of the seabird species involved. However, it seems unlikely they would have made such a hazardous journey for anything smaller than a gannet. His one bird description is that of the "colk", recognisably the female eider duck.

Martin (1716) confined his description of Sula Sgeir to a bird list, including gannet, guillemot, puffin and "several other sorts". Once again the "colk" was described, but in this instance it is the male eider. The antiquarian T.S. Muir landed in 1860 and gave a brief description of the birds he saw - "myriads of geese (to say nothing of fulmars, puffins and scarts)".

Swinburne's visit in 1883 was the first by a naturalist and he gave priority to the birds. He spent a few hours ashore, and his brief observations set the pattern for the next century of visitors. Harvie-Brown landed on the rock in 1887. The next records came from the geologist, J.W. Dougal who during four hours ashore in 1930 saw the only wren ever recorded.

The ensuing decade saw an increasing interest in the seabirds of the rock, especially the fulmar, small petrels and the gannet. Stewart (1933) mapped the limits of the gannetry and estimated numbers in 1932. He was the first ornithologist to spend a night ashore, and he proved breeding of the fulmar. He returned for a day in August 1937 and again counted and mapped the gannetry. Atkinson accompanied by Ainslie remained overnight on the rock in 1939 and mapped the limits of the gannetry and proved breeding of Leach's petrel (Atkinson 1949).

J. Fisher's and F.F. Darling's visits were in June 1939 and they had an accurate count of the gannetry as their priority. Fisher & Vevers (1943) produced a comprehensive account of the gannet colony, citing all published references up to 1939.

Visits by naturalists resumed in 1949, when I.D. Pennie counted the gannets and ringed a small number. In 1954, J. McGeoch was allowed to accompany the Ness men and to film the gannet hunt in its entirety. He ringed gannets and fulmars and also recorded migrants (McGeoch 1954). His stay of 19 days was by far the longest of any naturalist, and longer than any of his subsequent visits.

Sula Sgeir was declared a National Nature Reserve in 1956. Thereafter the number of visits by scientists increased. In 1958 the Glasgow University Expedition to North Rona landed six of their party on Sula Sgeir for 24 hours. Bird notes were made by Bagenal & Baird (1959) and they ringed both Leach's and storm petrels.

In 1959 R. Studdy and M. Smith spent five days ashore (Studdy 1960). There have been 13 subsequent visits by NCC staff and others; the most notable were by P.G.H. Evans, who counted the entire seabird population in 1972, S. Murray and M.P. Harris, who spent a night ashore in 1980, mainly to assess the puffin population, and the Seabirds at Sea Team of the NCC, who counted all the surface-nesting seabirds (with the exception of fulmar and gannet) in June 1986.

Aerial surveys of the gannets have also been made, with varying success. On 30 July 1947, Atkinson (1949) photographed a small section of the gannetry. On 8 July 1969 the RAF successfully flew a survey as part of 'Operation Seafarer'. On 15 July 1985 a series of colour slides was taken by S. Murray, which were good enough to count both gannets and fulmars.

Between 1884 and 1986 there have been 27 documented landings on the rock by naturalists. This represents less than 80 days of observation in the last 102 years. The majority of visits have been in June, and all known records are confined to the period from mid-May to early September.

Table 3.

Visits to Sula Sgeir which produced ornithological observations

Date	Visitor(s)	Time spent	Source
c.1549			Monro (1774)
c.1695			Martin (1716)
1860	T.S. Muir	11 July	Muir (1861)
1883	J. Swinburne	19 June	Swinburne (1885)
1887	J.A. Harvie-Brown, W. Norrie, R.F. Heddle	19-20 June	Harvie-Brown (1888)
1930	J.W. Dougal	September	Dougal (1937)
1932	M. Stewart	23-24 July	Stewart (1933)
1937	M. Stewart	5 August	Stewart (1938a,b)
1939	J. Fisher	4 June	Fisher and Vevers(1943)
1939	F.F. Darling	29 June	Darling (1943)
1939	R. Atkinson, J. Ainslie	3-4 August	Atkinson (1949)
1947	Aerial survey	30 July	Atkinson (1949)
1949	I.D. Pennie	17 July	Fisher (1952)
1954	J. McGeoch	21 August-9 September	McGeoch (1954)
1957	J. McGeoch	28 August-11 September	Bannerman (1959)
1958	T.B. Bagenal, D.E. Baird	29-30 June	Bagenal & Baird (1959)
1958	J. McGeoch	12 days, August/September	Bannerman (1959)
1959	R. Studdy, M. Smith	5 days, July	Studdy (1960)
1962	J.M. Boyd, T. Dow	21 May	NCC files
1962	W.E. Waters	20 October	NCC files
1965	W.J. Eggeling	27 May	NCC files
1968	J. McGeoch	23 August	NCC files
1969	Aerial survey	8 July	Cramp *et al.* (1974)
1969	E.M. Matthew, M.E. Ball	26 July	NCC files
1971	P.G.H. Evans, A.N. Osborn	17 June	Evans (1971)
1971	J.M. Boyd, R.V. Collier, G. McKay	23 June	NCC files
1972	P.G.H. Evans *et al.*	7 July	Evans (1972)
1980	S. Murray, M.P. Harris	23-24 June	NCC files
1980	H. Birley, R.A. Broad	2 August	NCC files
1985	B. Jones	14 May	NCC files
1985	S. Murray, R. Simpson	15 June	Murray & Wanless (1986)
1985	Aerial survey	15 July	Murray & Wanless (1986)
1985	N. Buxton	August	NCC files
1986	NCC Seabirds Team	16 June	NCC files
1986	NCC Seabirds Team	18 August	Burton *et al.* (1987)

Systematic lists

All species recorded on North Rona and Sula Sgeir are listed in the following sections. We have drawn records from the following sources.

1. All previously published work.
2. An unpublished list compiled by P.G.H. Evans in 1976.
3. Our own records since 1976.
4. Records on file in NCC offices at Inverness, Stornoway and Edinburgh.
5. Correpondence with people we knew had visited the islands but had not submitted reports.
6. Responses to requests in *Scottish Bird News* and *British Birds* for unpublished information.

All known records to the end of 1987 are included. We shall be glad to receive any records we have overlooked or any made in the future.

Coverage is very uneven and doubtless more species would be added to the list if observations were carried out more frequently. This is apparent when one considers that only about 156 species have been seen on North Rona and 40 on Sula Sgeir, in comparison to 209 on St Kilda (Harris & Murray 1978) and 221 on Foula (Furness 1983). The shortfall will be mainly migrants but there are also fewer recorded breeding birds (Table 4). In order to simplify and shorten the lists, observers are not generally cited. In most years only one party visited the islands; thus observers can normally be established by reference to Tables 1,2 and 3.

Methods of counting breeding seabirds

Methods for censuses of seabirds have varied. Meaningful comparisons between counts are often difficult to make and the following points should be borne in mind when attempting to discern trends.

Many of the visits were made in July, which is too late in the season for representative counts of many seabirds; for instance, by then many auks will have left the islands. Confusion has arisen also from the use of different counting units. For example, 460 guillemots can be reported as 460 pairs, 230 pairs or 460 individuals. This has been a particular problem for counts of auks and of gulls. Finally, most of the early naturalists gave only descriptive accounts of the numbers of birds without quantifying them, so the first population estimates for many species were made only in the 1930s.

In 1986, we used standard Seabird Colony Register counting techniques (Lloyd *et al.* in prep.). These count units differ between species. For example, 'apparently occupied nests' were used to count kittiwakes. Individual guillemots and razorbills were counted in the colonies. For brevity, the various units have been reduced to 'pairs' or 'individuals' in the text and tables. No satisfactory method has been found for estimating numbers of small petrels. On North Rona most counts were from land, with a few caves examined from the sea. Individual fulmar and gannet sites on Sula Sgeir were counted from aerial photographs taken in 1985. In 1986 these two species were not counted and other species were counted from land and sea. The gannetry on Sula Sgeir was not entered in 1986 in order to avoid excessive disturbance; auk numbers within the gannetry and on Sròn na Leis were therefore estimated.

Table 4.
Numbers of birds breeding regularly on four offshore Scottish islands

	Sula Sgeir	North Rona	St Kilda	Foula
Seabirds	11	13	16	18
Waders/waterfowl	0	2	4	6
Passerines	1	5	7	10
Total	12	20	26	34

North Rona

Red-throated diver *Gavia stellata*

One 6-15 October 1962.

Black-throated diver *Gavia arctica*

Singles 10 and 12 October 1959, two on 27 October 1960.

Great northern diver *Gavia immer*

Singles 31 October 1960, 19 October 1961, 29 October 1961 and 19 May 1987; two on 28 October 1960. A diver, probably of this species, was seen on 30 June 1972.

Slavonian grebe *Podiceps auritus*

One 11 October 1962.

Fulmar *Fulmarus glacialis*

Birds were first recorded in 1886 but not proved to breed until 1894, when an egg was found. A great expansion had obviously taken place by 1907 when the Duchess of Bedford found a great many breeding and by 1910 when inland nesting was first noted. There appeared to be little change in numbers from then until at least 1949. There was a steady increase between 1949 and 1972 but there has been little change since (Table 5). There were 3738 occupied sites in 1986. The rate of increase from colonisation to the present day is about 9% per annum which is comparable with that of north-western Scotland as a whole.

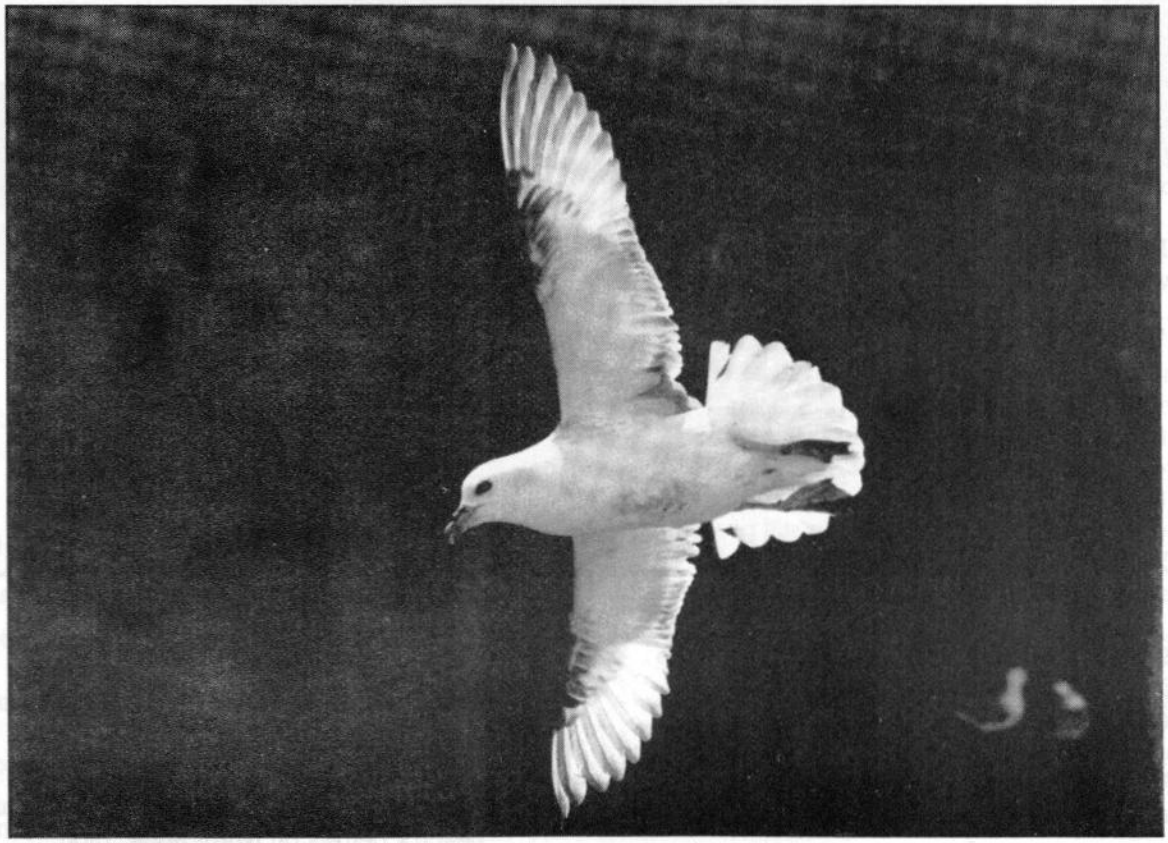
Large numbers are present intermittently throughout the winter. Blue phase birds have been noted on a number of occasions.

Sooty shearwater *Puffinus griseus*

Occasionally seen offshore in late summer/autumn.

Manx shearwater *Puffinus puffinus*

One long dead 21 June 1986 otherwise low numbers offshore between April and August. One seen from the island on 11 November 1972.



Fulmar in flight (S.M.D. Alexander)

North Rona

Table 5.

Estimated counts of seabirds on North Rona in June since 1958. These figures are a combination of actual counts with the addition of numbers estimated out of sight of counters. Note that variation in timing of counts in relation to the breeding season will affect numbers seen. Counts based on unsuitable units have not been included.

p = pairs, i = individuals, nc = no count, * = currently in excess of 1% of UK population, ? = uncertain, + = April count (see text).

Species	Unit	1958	1969	1972	1976	1986
Dates		24 June-22 July	14 June	23 June-7 July	25 June-3 July	11-24 June
Fulmar	p	2166	1386	4141	3960	3738
Storm petrel	p	nc	nc	1000	nc	nc
Leach's petrel*?	p	5000	nc	500	nc	nc
Shag	p	300	28			143
Great skua	p	0	2	3	3	14
Lesser black-backed gull	p	2	0	6	12	6
Herring gull	p	55	51	110	137	69
Great black-backed gull*	p	330	1700	1788	1796	733
Kittiwake	p	3388	1863	3572	3143	3972
Arctic tern	p	nc	80	0	1	0
Guillemot*	i	nc	6810	12118	10179	17802
Razorbill*	i	nc	334	2324	2166	1236
Black guillemot	i	35	23	13	11	56+
Puffin	p	nc	nc	6200	6120	4750

Sources: Bagenal & Baird (1959), Benn *et al.* (1987), Evans (1973), Evans (1976 and unpub. corrections), D. Wilson (unpub.).

Storm petrel *Hydrobates pelagicus*

Harvie-Brown discovered this species on the island when he dug out two birds from the village ruins in 1885 during his hunt for Leach's petrels. A large colony was discovered at the west end in 1886 and birds were found nesting in most parts of the island during the next half-century. Their distribution is much the same today (Figure 4) with the largest colony being on the storm beach on Fianuis though no population estimates are available. Some adults and young are still present in late October with one recorded on 26 November 1972.

Approximately 1600 birds have been ringed on the island since 1958. A number of inter-island movements have been recorded, probably reflecting the nomadic nature of non-breeding birds. A full-grown individual ringed in 1971 was recaptured in 1986.

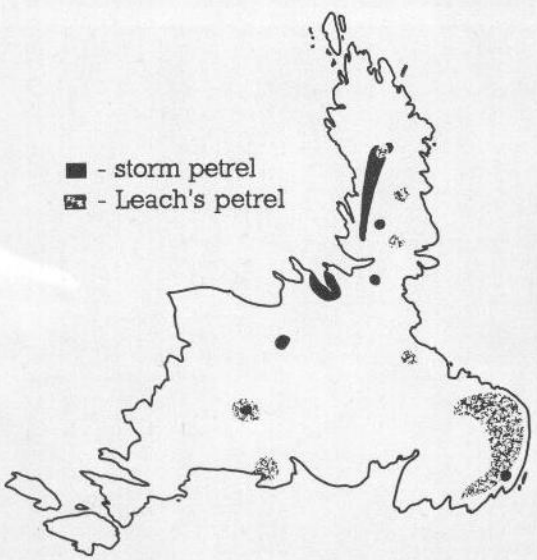


Figure 4 The location of breeding storm and Leach's petrels on North Rona, 1986. (Crown copyright reserved)

Leach's petrel *Oceanodroma leucorhoa*

Swinburne discovered the second British colony in 1883 when he dug out 23 nests from the village ruins. In 1885, Harvie-Brown dug out 24 more but in 1887 he, perhaps not surprisingly, found them more difficult to find. In 1930, Ainslie & Atkinson estimated 327 occupied burrows in the village (and about 50 elsewhere) but failed to take into account burrows having more than one entrance or one entrance leading into more than one burrow. Apart from an estimate in 1958, no attempt has been made to establish the colony's size. The distribution of burrows appears to be unchanged since 1930, with the village ruins still the main area (Figure 4). Birds are present until about mid-October.

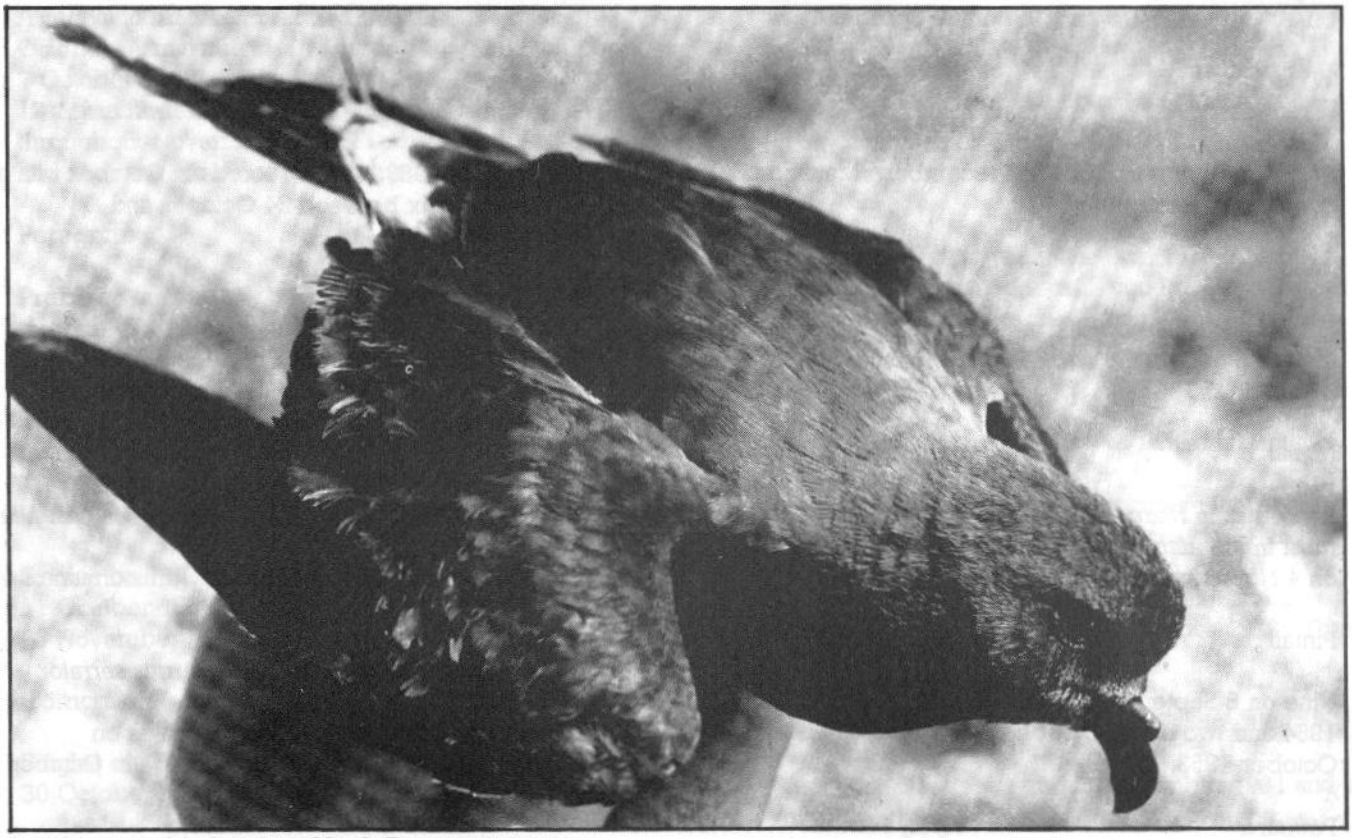
About 2500 birds have been ringed; the majority were caught in the village. Singles were retrapped on St Kilda and Foula. One ringed in 1958 was recaptured in 1974 and one ringed in 1971 was recaptured in 1987.

Shag *Phalacrocorax aristotelis*

Shags were first noted in 1883 by Swinburne and described as innumerable by Harvie-Brown in 1885. Since then all visitors have found them common but estimates of the population size vary from the 'thousands' seen by the Duchess of Bedford in 1910 to the 117 nests found in 1972. As the counting units vary it is difficult to comment on these variations but similar numbers of nests in 1972 and 1986 (143) and number of adults and young in four years between 1958 and 1984 suggest a currently stable population. Shags are present on the island throughout the year. Under 200 were present each October between 1959 and 1967 but 300 were seen on 27 October 1981.

Heron *Ardea cinerea*

Most regular in October but seen in all months July-October. Maximum of seven on 14 September 1972. One found dead on 19 May 1987.



Leach's petrel in hand on North Rona (J.A. Love)

Gannet *Sula bassana*

Regular offshore.

Cormorant *Phalacrocorax carbo*

Two immatures on 30 August with one on 2 September 1931. Singles on 27 May 1965, 14 June 1969 and 28 October 1979. Recorded as present on 10 June 1976.

Whooper swan *Cygnus cygnus*

Regular in October with the latest sighting in the year being on 23 November (1939). Maximum of over 50 on 29 and 30 October 1960.

North Rona

Pink-footed goose *Anser brachyrhynchus*

Occasional in spring with some staying to early July. Passage south in mid-October with maxima of 140 on 9 October 1962 and 120 on 13 October 1979.

White-fronted goose *Anser albifrons*

Singles of the Greenland race (*A. a. flavirostris*) in October 1961 and 1963.

Greylag goose *Anser anser*

Recorded in late spring/summer in 1938, 1969, 1977, 1986 and 1987. Seen most Octobers. Maximum of 200 on 7 October 1971. Thirty unidentified geese on 31 July 1984 were probably this species.

Barnacle goose *Branta leucopsis*

Regular in October and November. Maxima of 200 on 30 October 1979 and 150 on 20 October 1979.

Wigeon *Anas penelope*

Most regular in October but also seen in September, November and December. Maximum of 45 on 11 November 1972.

Teal *Anas crecca*

Recorded in all months from July to November though mostly in October. Peak of about 50 on 24 October 1981.

Mallard *Anas platyrhynchos*

Recorded in March and May to December with most in the autumn. The maximum count of 12 was on 4 November 1972.

Pintail *Anas acuta*

Nine on 8 September 1938, two on 11 October 1964 and two on 29 October 1966. Present also in October 1963.

Pochard *Aythya ferina*

Three on 6 November 1972.

Tufted duck *Aythya fuligula*

One 9 October 1959. A male and a female on 24 and 25 October 1981. A male on 29 May 1987.

Eider *Somateria mollissima*

Eiders appear to have been more common at the end of the 19th and the beginning of this century than they are now. They were described as 'very plentiful' by Swinburne in 1883 and common by Harvie-Brown in 1887. Harrisson estimated 60 pairs in 1931. Since then no more than 20 pairs have been recorded in any year but Evans (1976) suggested an annual population of 35-45 pairs. On 22 June 1986, 55 males, 31 females and 29 ducklings were counted around the coast. Only nine nests were found but no thorough search was made.

A moulting flock of 80-100 is present in July and August and up to 100 are still present in October. Most birds leave in the winter but some have been recorded in November and March.

Long-tailed duck *Clangula hyemalis*

Low numbers recorded most autumns between October and December. A maximum of five on 29 October 1979.

Common scoter *Melanitta nigra*

One 27 June 1980. A few records in October with a maximum of six between 24 October and 6 November 1960.

Velvet scoter *Melanitta fusca*

Nine on 3 August 1938, two on 2 September 1938, one on 28-29 and three on 30 October 1960 and a female ashore on 17 October 1981.

Goldeneye *Bucephala clangula*

A few in October and November. A maximum of 4 on 3 October 1959.

Red-breasted merganser *Mergus serrator*

A female on 4 July 1958 and two females on 29 August 1931. Otherwise all records in October with a peak of 18 on 4 October 1962.

Goosander *Merganser merganser*

One found dead 24 June 1958.

Black kite *Milvus migrans*

One on 26-28 June 1976.

North Rona

Hen harrier *Circus cyaneus*

Singles on 29 August to 3 September 1931, most of September 1938 and 9 October 1962.

Sparrowhawk *Accipiter nisus*

Two on 11 October 1979 with one remaining until 3 November.

Buzzard *Buteo buteo*

One September to December 1938 and one dead 7 October 1959.

Kestrel *Falco tinnunculus*

Seen all months between August and December with most sightings in October. Rarely more than one on the island at any time.

Merlin *Falco columbarius*

A regular autumn migrant with most records in October. A maximum of 15 birds seen on 7 October 1962. Recorded also on 12 September 1938 (and the days following) and throughout November 1972. Turnstone, blackbird and redwing were noted as prey items in 1968.

Peregrine *Falco peregrinus*

Probably once bred, but now an irregular autumn migrant. Pairs were present in the summers of 1883, 1887 and 1938. Darling noted that they were feeding on puffins. Fresh bird-kills found in May 1959 may also have been due to this species though no birds were seen.

Water rail *Rallus aquaticus*

Singles on 11 October 1959, 17 October 1961, 11 October 1962, 4 September 1972 and 23 November 1972.

Corncrake *Crex crex*

Singles on 17 October 1959 and 30 October 1960.

Oystercatcher *Haematopus ostralegus*

Bred numerously in the 1880's and many were seen by the Duchess of Bedford in 1910 and 1914. No more than 20 pairs have been recorded in any year since and from 1976 onwards less than 10. In 1986 only one nest was found, with another pair on territory but not breeding. Migrants are most common between May and August and only a few stragglers are left by November or, exceptionally, December.

Ringed plover *Charadrius hiaticula*

Possibly breeding on 16 June 1885 but there has been no evidence of nesting since then. Migrants have been recorded between May and November with a maximum of 14 on 2 September 1931.

Dotterel *Charadrius morinellus*

One on 30 August 1938.

Golden plover *Pluvialis dominica*

Regular from May to November. Maxima of 40 in May and 35 in October. Both the northern and southern races have been recorded.

Lapwing *Vanellus vanellus*

The only breeding record was in 1958 when two pairs were present, one with young. Up to 13 were present later that season. Recorded in June, July and October of most years with a maximum of 22 birds present in November 1938.

Knot *Calidris canutus*

One on 16 August 1938 and common thereafter until the end of September. Singles on 14 and 19 October 1959, 6-8 July 1980 and 19 November 1972. Between two and six birds between 13 October and 4 November 1972. Three on 26 July 1984.

Sanderling *Calidris alba*

Singles on 31 August and 2 September 1931 and in August and September 1938. Two in summer plumage 15 August 1966.

Little stint *Calidris minuta*

Ones or twos present between late July and November 1931, 1938, 1959, 1965 and 1972.

Purple sandpiper *Calidris maritima*

Recorded in all months between May and December. There has been a maximum of 13 in spring/summer and up to 200 in autumn/winter, but counts are usually of less than 80. Occasionally noted in summer plumage.

Dunlin *Calidris alpina*

Dunlins may have been nesting on 18 June 1887 and one adult in breeding plumage was alarm-calling on 26 June 1976, but no nests have been found. Low numbers between May and October generally peaking in late August/early September though 20 were present in November 1972.

Ruff *Philomachus pugnax*

Three females on 4 August 1980 and one female on 31 July 1984.

Jack snipe *Lymnocryptes minimus*

Recorded in low numbers from late September to mid-December with a maximum of 20 on 11-12 October 1959. Also singles on 29 July and 3 August 1966.

Snipe *Gallinago gallinago*

Few records between May and September. Most records are from October with maxima of 30 in most years.

Great snipe *Gallinago media*

Unsubstantiated records of singles on 19 December 1938 and 29 October to 4 November 1979.

Woodcock *Scolopax rusticola*

Regular in October. A maximum of ten on 20 December 1938 though most records involve singles. Recorded also in September and November.

Bar-tailed godwit *Limosa lapponica*

Singles on 22 October 1970, 15 and 18 September and 6 October 1972, and 20 October 1982.

Whimbrel *Numenius phaeopus*

Breeding was suspected but not proved on 16 June 1885. Recorded regularly in low numbers between May and August in most years and occasionally in October and November. Rarely more than four recorded at any one time.

Curlew *Numenius arquata*

Suspected of breeding in 1883 when five or six pairs were present and 1886 when a pair was present. A single on 12 March 1986 otherwise numbers build up from late June/early July peaking in August (up to 50) before tailing off in late autumn, with few records in November and none in December.

Spotted redshank *Tringa erythropus*

One 21-22 September 1938.

Redshank *Tringa totanus*

Low numbers present in the summer and autumn with maxima of 30 recorded in July and October. Few left by mid-November though 25 present at this time in 1972.

Greenshank *Tringa nebularia*

Singles 31 August and 2 September 1931, 17 August 1938 and 24 October 1965.

Green sandpiper *Tringa ochropus*

Singles 29 August 1931, 24 September 1938, 3 August 1954, 4 August 1980 and 24 and 29 October 1981.

Common sandpiper *Actitis hypoleucos*

First recorded in July and August 1936, two on 3-5 June 1958 and singles on 22 October 1966 and 30 June 1972. Present on 19 October 1971, 19 October 1972 and 14 August 1980.

Turnstone *Arenaria interpres*

Darling suspected this species to be breeding as he saw two adults and three young on 12 July 1938. However, small numbers have been seen throughout the summer months by other observers and all are probably migrants. Usually not more than 100 are present in autumn but 300 were on the island in October 1967.

North Rona

Red-necked phalarope *Phalaropus lobatus*

Singles 9 October 1962 and 26 and 28 June 1972.

Pomarine skua *Stercorarius pomarinus*

An adult on 2 September 1931.

Arctic skua *Stercorarius parasiticus*

Seen in several summers over the island since the first sighting in 1958 but has shown no signs of breeding.

Great skua *Catharacta skua*

First recorded during a gale on 17 August 1938 and then not again until 10 May 1959. Two nests were found in 1965. The number of breeding pairs has risen slowly since then with 14 pairs (seven of which had eggs in June) holding territories in 1986 (Figure 5). This increase has largely been since 1976. Recorded regularly up to October with the latest record on 4 November 1979.

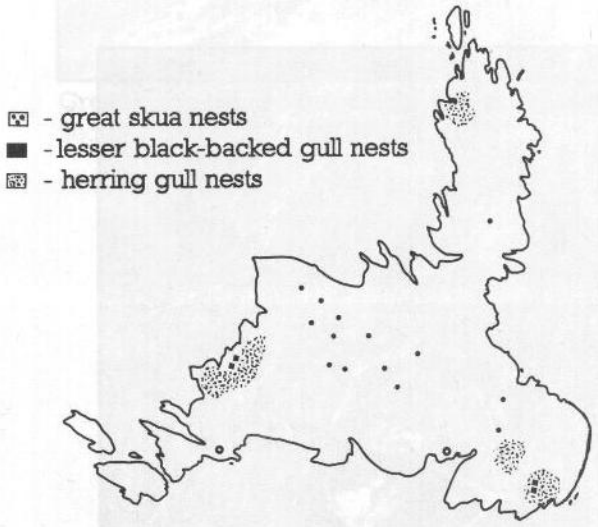


Figure 5 The distribution of great skua, lesser black-backed and herring gull nests on North Rona, 1986. (Crown copyright reserved)

Black-headed gull *Larus ridibundus*

All sightings have been in July or October except one in September 1938 and two adults on 23 June 1986. Maximum recorded was 17 on 29 July 1974, otherwise usually singles.

Common gull *Larus canus*

Singles in October 1961 and up to eight in October 1962. Since then three adults on 4 August 1980 and three adults and an immature on 31 July 1984.

Lesser black-backed gull *Larus fuscus*

The past status of this species is unclear and we suspect that it was confused with the great black-backed gull. They were plentiful in 1886 and the lower parts of the island were "thickly covered" with their nests in 1910 and 1914. However, Swinburne and Harvie-Brown found either few or none during their visits in the 1880's. None was seen in 1931 by Harrison or in 1966 by Robson and the maximum count since has been of just 12 pairs in 1976 and no more than six pairs in all other years. Four nests were present in 1986 with an estimated two extra pairs on territory (Figure 5). All leave the island by October.

Herring gull *Larus argentatus*

Numbers have fluctuated with high counts in 1887, 1972 and 1976 and particularly low numbers in 1883, 1885, 1910-1938 and 1980. A total of 58 apparently occupied territories was counted in 1986 with an additional 11 territories unconfirmed (Figure 5). Low numbers are present on and around the island throughout the year. The maximum count outside the breeding season is 200 on 14 October 1961.

Iceland gull *Larus glaucoides*

Immatures on 20 October 1967 and November 1972. A second-year bird 3-23 October 1981.

Glaucous gull *Larus hyperboreus*

Darling noted up to six including immatures on 14 and 18 December 1938 feeding on the carcasses of young seals. Two (an adult and a first-winter) on 22 October 1970. One long dead mid-June 1980 otherwise singles each October in 1961, 1962, 1967 and 1981 and a first-winter on 15 November 1972.

Great black-backed gull *Larus marinus*

Swinburne in 1883 mentioned a large colony at the south-west end and most visitors since have commented on their abundance. An accurate assessment of trends is difficult as most counts have been made too late in the breeding season and confusion has arisen from the different counting units used. In 1969, 1972 and 1976 counts exceeded 1500 pairs (Table 5). 733 apparently occupied territories were counted in 1986 (Figure 6).

This species was thought to have been a major predator of other birds on the island, but studies by Evans (1975) showed fish to be the most important component of their diet.

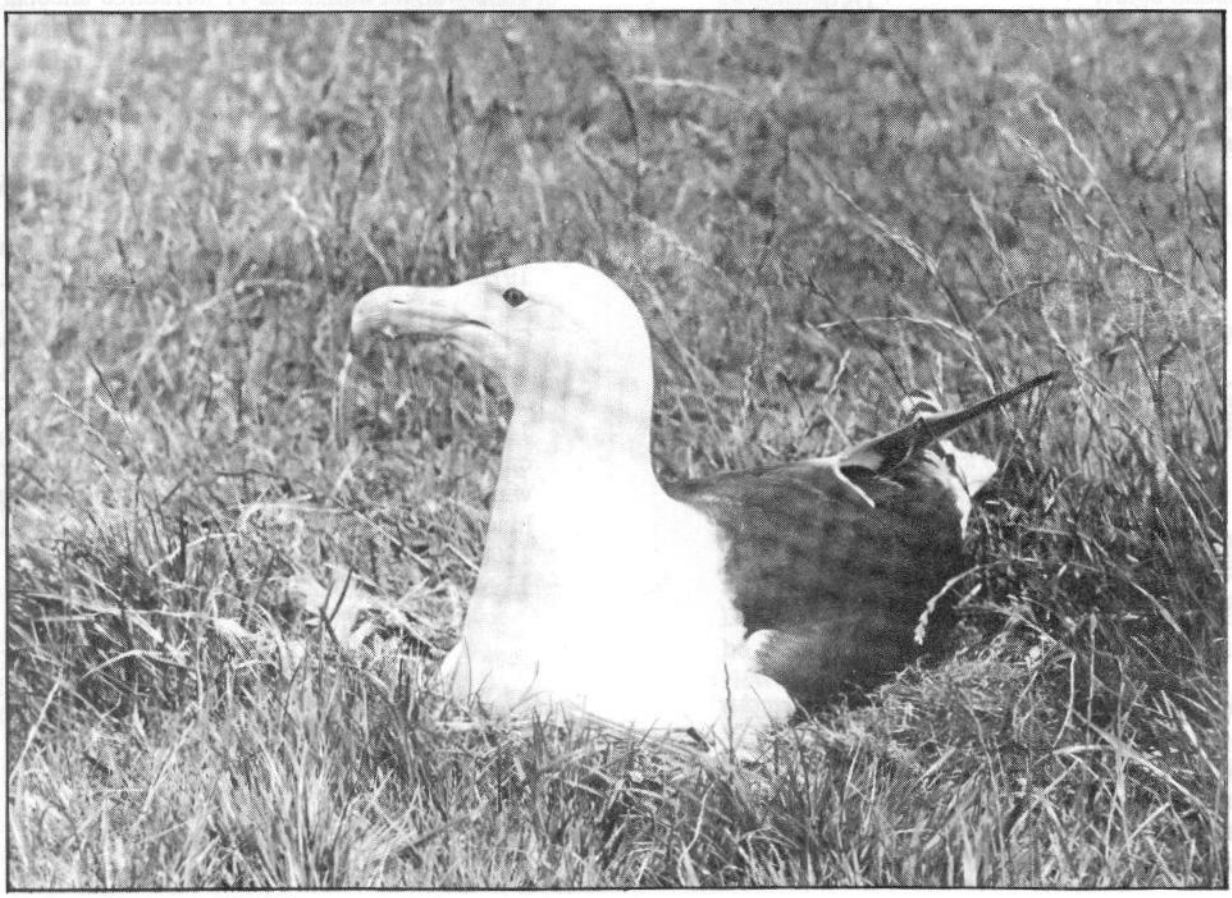
The numbers in the autumn are variable. It has been suggested that large numbers congregate then to take advantage of the pupping grey seals. However, in 1959 Boyd found that, despite the great amount of carrion littering the seal grounds, very little appeared to be accessible to the gulls. Some were killed or maimed by seals. More than 2000 were present in the vicinity of the seal colony in October 1981 but only 500 were there on 11 October 1959 and 16 October 1960.

Kittiwake *Rissa tridactyla*

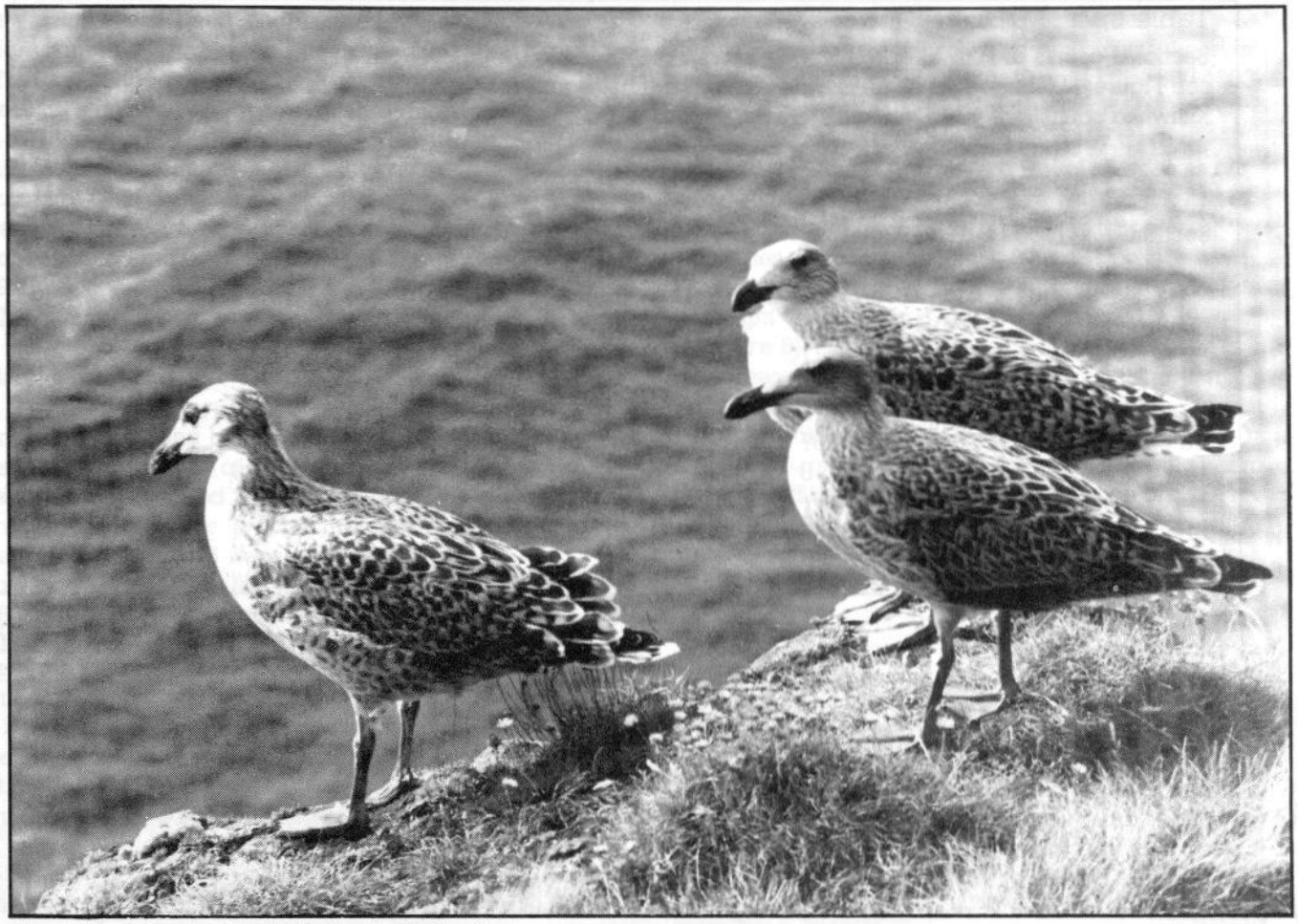
Large colonies were noted in the 1880's and counts of 1000 pairs were made in 1931 and 1936. An increase to 3385 pairs had taken place by 1958 and numbers are at much the same level today though there have been some fluctuations (Table 5). 3943 apparently occupied nests were counted in 1986 with a further 29 estimated out of sight. However, whilst the island population is little changed there appears to be some interchange between the colonies, as numbers have varied at some sites between years (Table 6).

Arctic tern *Sterna paradisaea*

Breeding occurred regularly from 1885-1958 on either Fianuis or Sceapull but only in 1969, 1976 and 1980 thereafter. However, many visits may be too late in the season to prove breeding as in some years when breeding was proven in June, none were seen in July. The maximum count was 200-300 pairs in 1938 and a large colony was mentioned in 1910 but other counts are much lower. None bred in 1986. Arctic terns are still noted in most summers.



Great black-backed gull on nest (G.F. Woods/ NHPA)



Great black-backed gull chicks, just prior to fledging on North Rona (J.A. Love)

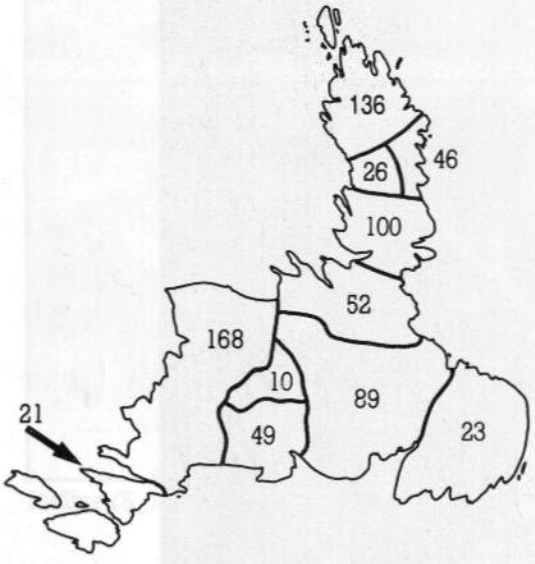


Figure 6 The distribution of great black-backed gull territories on North Rona, 1986.
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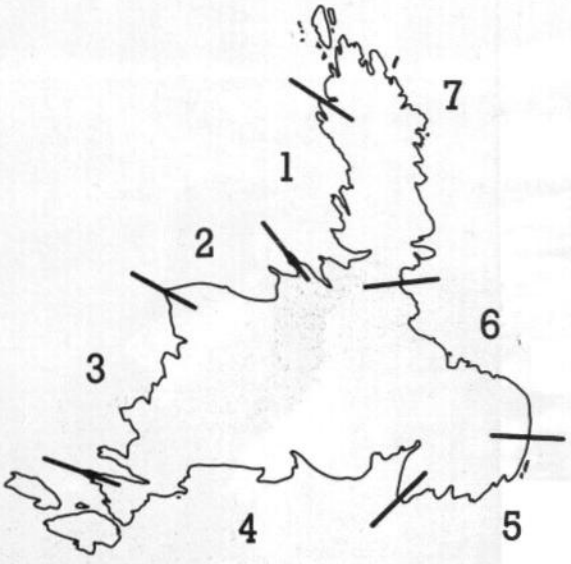


Figure 7 Division of the coastline of North Rona into 7 sections used for counts of kittiwakes, guillemots and razorbills (table 5).
(Crown copyright reserved)

Table 6.

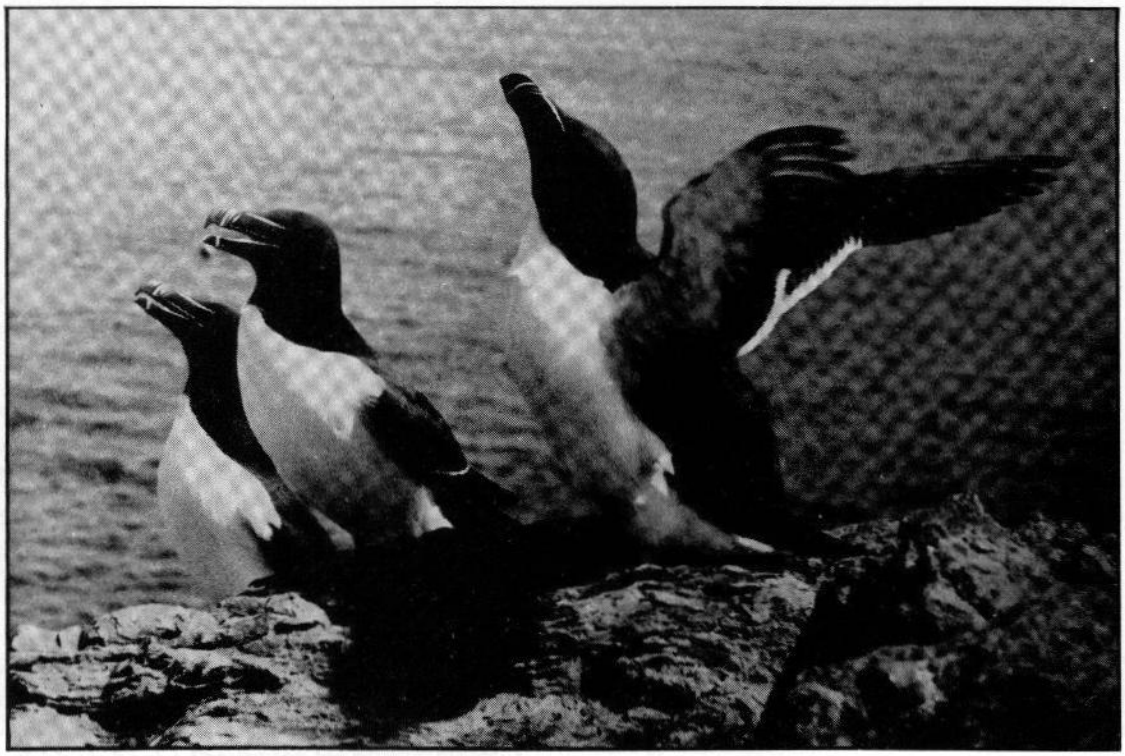
Sectional counts of kittiwakes, guillemots and razorbills made on North Rona in four years. For boundaries see Figure 7. These figures do not include any estimates and are thus different from those in Table 5. Kittiwake counts are pairs, the auks are individuals, nc = no count

	Kittiwake				Guillemot				Razorbill			
Section	1969	1972	1976	1986	1969	1972	1976	1986	1969	1972	1976	1986
1	184	338	428	480	121	1538	1440	3878	6	292	583	56
2	1124	2135	1497	2071	2830	4500	3316	7567	53	1020	525	417
3	37	36	39	11	136	291	324	83	4	50	20	18
4	nc	339	275	329	nc	412	181	335	nc	119	126	109
5	118	148	195	215	2453	656	449	511	235	352	255	125
6	410	773	709	837	1270	4721	4469	4780	36	458	647	322
7	0	0	0	0	0	0	0	0	0	1	10	6
Total	1873	3769	3143	3943	6810	12118	10179	17154	334	2292	2166	1053

Guillemot *Uria aalge*

Large numbers have been present since at least 1885. Recent counts have fluctuated (Tables 5, 6) but numbers of this species vary so much throughout the day and season that comparisons are difficult. However, the 1986 estimate of 17,802 birds is the highest ever obtained except for one of 25,000 birds in 1938. The latter total is probably an overestimate as it was derived by extrapolation from a sample count of 3000 birds in the northern geos which were considered to amount to about an eighth of the island's population. In most years the majority of birds leave the island by the first week of August. None was present on 4 November 1986 but over 100 were on the island on 3 December 1972.

The proportion of bridled birds has remained at about 13% since 1885.



Razorbills (J. Blossom/NHPA)

Razorbill *Alca torda*

Few counts have been made; the early naturalists did no more than describe them as "abundant", "fairly numerous" and in a "very fair colony". Recent estimates vary from over 2000 individuals in 1972 to 1236 individuals in 1986 (Table 5) but this species is notoriously difficult to count accurately and little can be made of the general trends. They vacate the island by early August; Robson noted parents abandoning late chicks in 1966. A single bird was present on 17 November 1972.

Black guillemot *Cepphus grylle*

Present in 1883 and breeding in the village in 1886. Estimates since 1931 of the breeding population have never exceeded 20 pairs. Ewins (1985) showed the best time to count this species is at dawn in April, and 56 were counted in a partial survey of the island at this time on 18 April 1986. Most birds appear to leave the island in winter.

Puffin *Fratercula arctica*

The population has declined over the last 100 years. Swinburne found them swarming wherever they could burrow in 1883 and noted that 500-1000 were taken for food each July by the Ness shepherds. Even as late as 1939 they were considered to be the commonest of all species on the island. Eight thousand pairs were estimated in June 1958 and the first map of the extent of the colonies was drawn later that year. Declines have continued to the present day and there are now thought to be about 4750 occupied burrows (Figure 8). The extent of most of the colonies has decreased since 1958 but there have also been some slight expansions. It has been suggested that great black-backed gulls caused this decline but this appears to be unlikely as only a few gulls seem to eat puffins. In contrast to the situation on Sula Sgeir, puffins do not appear to have caused major soil erosion. Most birds have left the island by mid-August.

Puffins (S. Dalton/NHPA)

Little auk *Alle alle*

Single dead birds on 6 November 1960 and mid-June 1980.

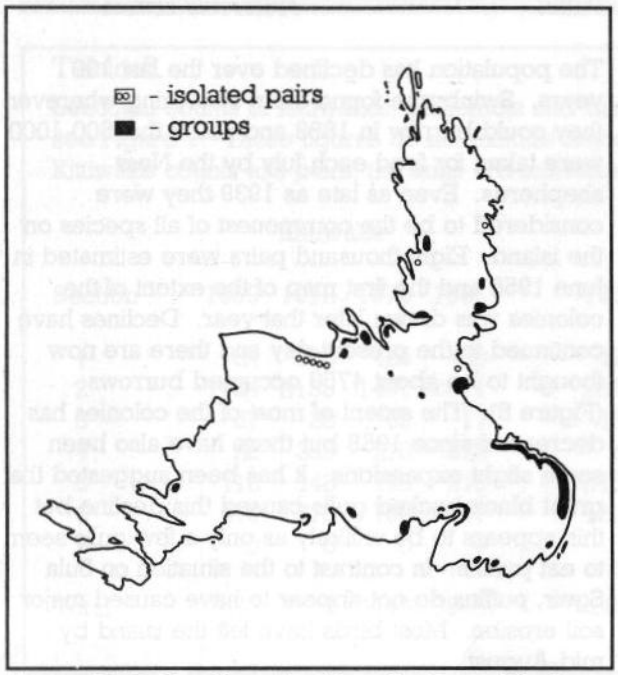


Figure 8 The location of puffin colonies on North Rona, 1986. (Crown copyright reserved)

Rock dove/feral pigeon *Columba livia*

Rock doves have never been proved to breed though a few are present in June in some years. Migratory rock doves used to arrive in October with only a few wintering. The autumn flock fell from 10-12 in the late 1950's to three or four in the early 1960's and then none in 1967. Feral or racing pigeons were first noted in 1967 and low numbers have been seen occasionally since then, mostly in summer and autumn.

Woodpigeon *Columba palumbus*

Singles on 13 October 1961, 9 October 1962, 2 July 1972, 24 June 1980 and 12-18 June 1986. Two on 19 May 1987.

Collared dove *Streptopelia decaocto*

One on 30 June and 1 July and two on 2 July 1972. One on 14 June and two on 15 June 1974. Singles on 27-29 June 1976 and 12-18 June 1986. Two mid-May 1985 and 14 on 28 May 1977.

Turtle dove *Streptopelia turtur*

Seen regularly between June and November. A maximum of four on 28 June 1972.

Cuckoo *Cuculus canorus*

A juvenile on 10 August 1966.

Long-eared owl *Asio otus*

Singles on 18 December 1938, 17 October 1964 and 24 October 1966.

Short-eared owl *Asio flammeus*

Recorded in August and October to 9 December, with most records in October. All singles except two on 27 October 1960 and 14 October 1962.

Swift *Apus apus*

Low numbers recorded between June and October. A maximum of six on 30 July 1971 and on 16 July 1987.

Great-spotted woodpecker *Dendrocopos major*

One on 11 October 1962 and a first-year bird on 20 October 1968.

Skylark *Alauda arvensis*

Up to 20 per day seen in the early 1960s during October. Since 1967 recorded only in five autumns with a maximum of at least 15 on 22 October 1970.

Shore lark *Eremophila alpestris*

Up to three, 9-24 October 1981.

Sand martin *Riparia riparia*

Two on 28 May 1977.

Swallow *Hirundo rustica*

Seen frequently in small numbers in May, June and July. A maxiumum of 11 on 15 June 1986. One seen 5 October 1962.

House martin *Delichon urbica*

Regular in small numbers during the summer with a maximum of 10 on 28 May 1977.

Tree pipit *Anthus trivialis*

One on 31 August, at least two on 2 September 1931, and one on 22 October 1965.

Meadow pipit *Anthus pratensis*

First recorded in small numbers in 1883 and by most visitors in the summer since. Breeding proved in 1931 (3-5 pairs), 1958 (10-12 pairs), 1972 (3 pairs) and 1984 (1 pair) but no resident birds seen in 1936 or 1976. Migrants recorded from early August onwards with maxima of "hundreds" on 25 August 1910, "at least 500" on 2-3 September 1931 and 500 on 16-18 October 1959.

Rock pipit *Anthus littoralis*

First breeding records in 1886, since then usually between 20 and 50 pairs but may have declined recently with 20 pairs on territories in 1972, 14 in 1976 and only six pairs in 1980. 20 pairs recorded on territory in 1987. They were "scarce" in 1887 but numerous in 1910. Migration has been observed in August, September and October. Generally less than 50 are involved but over 100 were present on 17 and 18 October 1960.

Yellow wagtail *Motacilla flava*

A female on 29 June 1886, three on 31 August 1931 and an immature on 18 October 1964.

Grey wagtail *Motacilla cinerea*

One on 9-10 October 1962 and one on 8 and 18 September 1972.

White wagtail *Motacilla alba*

A large passage occurs during August and September with up to 150 recorded in 1936. Regular but in low numbers in October. A few pied wagtails (*M. a. yarrelli*) have been recorded mostly in September and October.

Waxwing *Bombycilla garrulus*

About 20 on 24 October 1965 and one on 19 November 1972.

Wren *Troglodytes troglodytes*

Present each October and some Novembers in 1959, 1960, 1962, 1964 and 1965. The only records since then are of singles 22 October - 7 November 1979, 5 October - 1 November 1981 and 19 May 1987.

Robin *Erithacus rubecula*

Small numbers regular in most Octobers with a maximum of four in 1961.

Bluethroat *Luscinia svecica*

Single on 15-16 October 1981.

Black redstart *Phoenicurus ochruros*

One on 1 November 1963 and one 16 June 1986.

Redstart *Phoenicurus phoenicurus*

Regular in October from 1959 to 1967.

Whinchat *Saxicola rubetra*

Singles on 29 and 31 August 1931, 9 October 1962 and 10 October 1964. Two on 25 June 1972 with one to 1 July 1972.

Wheatear *Oenanthe oenanthe*

Nested or probably nested in 11 years since 1883 with generally under five pairs in any year. Migrants recorded May to October with numbers peaking from August onwards. Recorded maxima are "hundreds" on 25 August 1910 and 150 on 9 October 1962. Darling considered that birds seen after August were of the Greenland race, and Williamson and Boyd noted over 20 of the Greenland or Iceland race in May 1959.

Ring ouzel *Turdus torquatus*

Two on 10 and one on 12 and 14 October 1959. One on 18 and two on 22 October 1968. Singles on 9 October 1962, 28 May 1977 and 17 October 1981 (dead).

Blackbird *Turdus merula*

A regular autumn migrant with some staying as late as December. 500 on 2 November 1960 and "hundreds" recorded in 1965. Also present 10 and 26 June - 3 July 1976 and 15 June 1986.

Eye-browed thrush *Turdus obscurus*

One on 16 October 1964 was the third British record.

Fieldfare *Turdus pilaris*

Recorded each autumn, occasionally in large numbers. 500 were present between 17 October and 2 November 1959 and from 16 October to 2 November 1960. Also a single on 16 June 1974.

North Rona

Song thrush *Turdus philomelos*

Few recorded during some autumns with other thrushes. Maximum 20 on 20 October 1961.

Redwing *Turdus iliacus*

Recorded between September and December but numbers always highest in October when the species is the commonest migrant on the island. Generally up to about 500 are recorded on any one day but 1000 on 17 and 18 October 1959 and 9 October 1962.

Barred warbler *Sylvia nisoria*

Singles on 1 and 3 September 1931, August 1936 and 20 October 1961.

Lesser whitethroat *Sylvia curruca*

Singles on 3 September 1931 and 9 October 1962.

Whitethroat *Sylvia communis*

Two on 28 June 1981.

Garden warbler *Sylvia borin*

Recorded in October 1959 and occasionally in the early 1960s. Three on 9 October 1962. Since then one on 15-16 September 1972 and on 3 August 1980.

Blackcap *Sylvia atricapilla*

Regular most Octobers. Also one in mid-May 1985.

Yellow-browed warbler *Phylloscopus inornatus*

One on 18 October 1964.

Wood warbler *Phylloscopus sibilatrix*

Singles on 7, 8 and 20 October 1959, 22 June 1974 and 28 May 1977.

Chiffchaff *Phylloscopus collybita*

Singles on 1 and 3 September 1931 and 14 and 15 October 1961.

Willow warbler *Phylloscopus trochilus*

One on 2 and 5 on 3 September 1931. One on 7, 8 and 20 October 1959. One on 14 October 1961. Two on 17 and one on 18 October 1964. Two on 26 and one on 28 September 1972. One on 15 June 1986.

Willow warbler/ Chiffchaff *Phylloscopus trochilus/ P. collybita*

Singles on 20 October 1961, 22 October 1965, 23 October 1968, 25 September and 10 October 1972, 28 May 1977, 2 and 7 October 1981.

Goldcrest *Regulus regulus*

Regular in most Octobers, but numbers normally low. Maximum of 25 on 20 October 1961.

Spotted flycatcher *Muscicapa striata*

One on 6, 10 and 12 and two on 9 October 1962. One on 28 May 1977.

Red-breasted flycatcher *Ficedula parva*

Singles on 10-13 October 1959 and 18 October 1964.

Pied flycatcher *Ficedula hypoleuca*

One on 31 August 1931. Two on 6 and one on 14 and 15 October 1959. Singles on 9-20 October 1962 and 19 September 1972.

Golden oriole *Oriolus oriolus*

An immature male on 21-23 June 1986.

Red-backed shrike *Lanius collurio*

A female on 28 May 1977.

Great grey shrike *Lanius excubitor*

One on 11 October 1962.

Jackdaw *Corvus monedula*

Up to eight in late October 1960. One on 9 October 1962. Singles on 28 and 30 June and 5-9 July 1972.

Rook *Corvus frugilegus*

One on 20 October 1961.

North Rona

Hooded crow *Corvus corone cornix*

Recorded in summer/autumn in 1914, 1959-1963, 1968-1972 and 1976. Most records are of singles. There has been no evidence of nesting.

Raven *Corvus corax*

First recorded on 19 December 1938. Bred in 1958, 1977, 1980 and 1986 and perhaps in 1954, 1959, 1972 and 1987. Birds appear to be resident having been recorded up to 18 December but evidently do not nest every year.

Starling *Sturnus vulgaris*

Recorded as breeding, mainly in the village and on the storm beach, since 1914 but present since at least 1910. One hundred pairs were estimated in 1958 but counts in other years are much lower than this. There is a resident flock of 200-300 birds though over 400 have been seen on occasion. Passage was noted in mid-October 1961.

House sparrow *Passer domesticus*

Up to six daily 3-26 October 1959, a female on 13-14 October 1961 and one on 28 October 1972.

Tree sparrow *Passer montanus*

Five seen at the end of June 1886 when they were thought to be breeding. Recorded regularly in the early 1960's in October with a maximum of 12 in 1960.

Chaffinch *Fringilla coelebs*

Recorded regularly in October during 1959 and the 1960s. A maximum of 12 in 1959. A male on 6 November 1979 and a female on 29 May 1987 are the only records since.

Brambling *Fringilla montifringilla*

Recorded regularly in most Octobers with over 50 on 17 October 1959 and 33 on 23 October 1965.

Siskin *Carduelis spinus*

Up to five on 13-20 October 1961. One or two between 9 and 14 October 1962. Four on 3 October 1981.

Linnet *Carduelis cannabina*

Two on 20 October 1982 and 11 on 19 May 1987.

Twite *Carduelis flavirostris*

Low numbers recorded in October in 1960, 1961, 1964 and 1965. A maximum of three on 13 October 1964.

Redpoll *Carduelis flammea*

Recorded most Octobers between 1959 and 1965 with a maximum of 20 being seen. One on 28 May 1977. Most records refer to mealy redpolls (*C.f.flammea*).

Arctic redpoll *Carduelis hornemanni*

Singles on 13 October 1972 and 7 October 1981.

Common crossbill *Loxia curvirostra*

30 on 29 July 1927 and one on 22 July 1936. Up to 51 recorded in June/July 1972.

Parrot crossbill *Loxia pytyopsittacus*

Two on 9 and one on 10-11 October 1962.

Scarlet rosefinch *Carpodacus erythrinus*

A female/immature on 28 May 1977.

Bullfinch *Pyrrhula pyrrhula*

One on 27 and 30 October 1960.

Lapland bunting *Calcarius lapponicus*

Recorded most Octobers with a few staying into November. A maximum of 20 on 6 October 1962.

Snow bunting *Plectrophenax nivalis*

Recorded regularly each autumn with peaks of 200 on 13 and 14 October 1961, more than 100 on 10-14 and 18 October 1959, about 100 on 19 and 20 October 1968 and 100 on 22 October 1970. Single males present on 28 May 1977 and mid-May 1986.

Red-headed bunting *Emberiza bruniceps*

A single male 25-28 June 1958 had possibly escaped from captivity.

Sula Sgeir

Fulmar *Fulmarus glacialis*

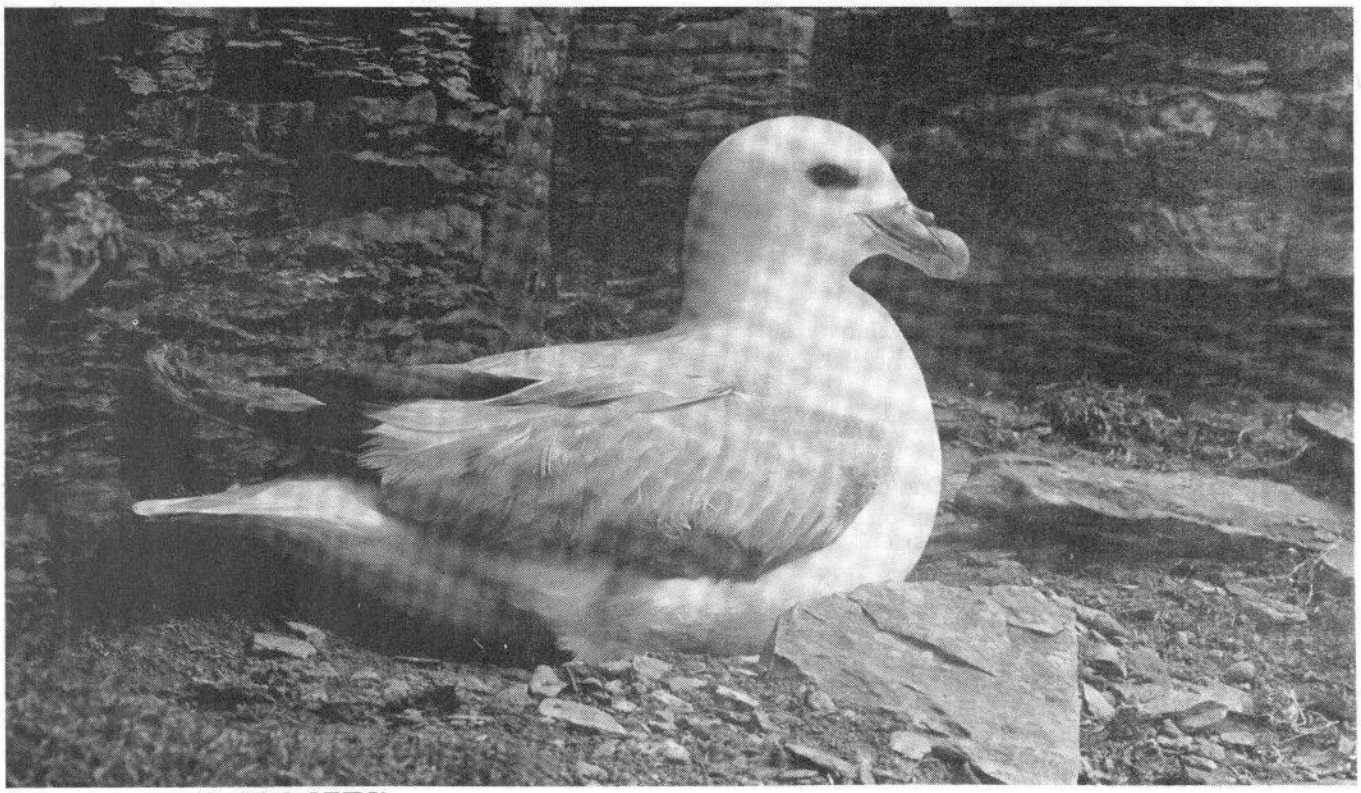
Fisher mentioned an unsubstantiated report by Fielden prior to 1850. Muir noted them on his visit in 1860, which was some years before they were seen anywhere else in Britain other than St Kilda. They were seen by Harvie-Brown in 1887 though breeding was not proved definitely until 1932 when under 150 pairs were present. There had, however, been only one visit in the intervening years. A large increase had taken place by 1937 and numbers have continued to rise to the present day though there may now be little room for expansion in the current nesting areas as the birds are breeding at a great density (2.9 per m^2). In common with other species, very few nest on Lunndastoth. The rate of increase (from 1860) has been c.8% p.a. but has probably slowed in recent years. 6532 birds were counted from aerial photographs taken in 1985, with a further 20% (1300) estimated out of sight - it is not possible to convert these figures to breeding pairs or occupied sites.

In 1954 McGeoch ringed 1014 young birds, seven of which were recovered within six months, as far apart as Orkney, Faroe Islands, Devon, Germany and Newfoundland. Older birds have been recovered from Norway, Ireland and France.

Table 7.

Counts of seabird populations on Sula Sgeir in 1972 and 1985/6.
This table includes estimates of numbers of auks present in the gannetry, and thus differs from Table 8.
p = pairs, i= individuals, nc = no counts, nr = not recorded, * = greater than 1% of UK population present, ? = uncertain.

Year		1972	1985/6
Date		7 July	15/16 June
Species	Units		
Fulmar*	i	3250	7832
Storm petrel	p	nr	nc
Leach's petrel*?	p	nc	nc
Gannet*	p	9000	9143
Shag	p	20	10
Herring gull	p	54	20
Great black-backed gull	p	46	3
Kittiwake	p	1038	1066
Guillemot*	i	9263	25382
Razorbill	i	913	790
Black guillemot	i	3	0
Puffin	p	460	500



Fulmar on nest (A. Gilpin/NHPA)

Sula Sgeir

Sooty shearwater *Puffinus griseus*

One flying close to the island on 18 August 1986.

Manx shearwater *Puffinus puffinus*

Twenty seen two miles south of the island on 15 June 1986 and four to the east on 28 June 1981.

Storm petrel *Hydrobates pelagicus*

Only recorded in 1930, 1954, 1958, 1959 and 1986. Most visits have been during the day when these nocturnal birds could be overlooked though none was recorded on a night visit in June 1980. Only one was caught during an hour's mist netting in June 1958, although others were heard calling.

Leach's petrel *Oceanodroma leucorhoa*

First recorded in 1932, but not proved to breed until 1939 although most previous visits had been during the day. In 1954 McGeoch could only find a dozen birds although he searched for several nights; otherwise no estimates of numbers have been made. Eighteen were caught in one hour's mist netting in June 1958.

Gannet *Sula bassana*

The earliest positive evidence of gannets inhabiting the rock was given by Martin in 1703 but Monro's account suggests the gannetry was already in existence by 1549. In 1883 Swinburne considered there to be 7000 pairs. Numbers then fell until by 1939 only 3970 pairs were recorded (land count). There was then an increase until 1969 and numbers have remained at about 9000 pairs since. 9143 occupied sites were counted from aerial photographs in 1985. The extent of the gannetry has been mapped several times since 1932 (Figure 9). The average number of gannets killed each year over the last hundred years has apparently remained fairly stable at between 2000 and 3000 birds but with up to 4500 taken in the early 1970s. Up to 1983, gannets of all ages could be taken; currently, licences are issued for 2000 birds of the year only.

Thirteen ringed young have been recovered - mostly in their first autumn between Spain and west Africa.

Figure 9 Maximum, minimum and current extent of the gannetry on Sula Sgeir.
(Crown copyright reserved)

Gannet (A. Gilpin/NHPA)

Sula Sgeir

Shag *Phalacrocorax aristotelis*

Small numbers have been recorded by most visitors and they were noted breeding in the bothies and under large rocks between 1883 and 1949. Eight adults and four juveniles were counted in 1971 and 40 adults and 11 juveniles the following year. Ten nests were found in 1986.

Whooper swan *Cygnus cygnus*

One, long dead, on 15 June 1985.

Eider *Somateria mollissima*

Present in 1549. A nest with four fresh eggs in 1883, but no records of birds or nests since then.

Oystercatcher *Haematopus ostralegus*

One on 3 August 1939 and one between 13 and 31 August with two on 16 August 1954.

Sanderling *Calidris alba*

One on 2 August 1980.

Purple sandpiper *Calidris maritima*

One on 2 August 1980.

Dunlin *Calidris alpina*

Singles on 18 August 1954 and 2 August 1980.

Whimbrel *Numenius phaeopus*

One 3 August 1939.

Curlew *Numenius arquata*

One 3 August 1939 and up to 12 in mid-August 1954.

Redshank *Tringa totanus*

Two on 13-31 August 1954, one on 18 August 1986.

Greenshank *Tringa nebularia*

One on 16 August 1954.

Turnstone *Arenaria interpres*

A maximum of 22 on 13-31 August 1954, five on 7 July 1972 and 45 on 2 August 1980.

Arctic skua *Stercorarius parasiticus*

One on 29 June 1958.

Great skua *Catharacta skua*

First recorded in 1980 when 2 present on 23 June. Since then singles in mid-May 1985, 15 June 1985, 16 June 1986 and 18 August 1986.

Lesser black-backed gull *Larus fuscus*

The only records are of birds present on 24 June 1971 and two birds on 7 July 1972. There has been no proof of breeding.

Herring gull *Larus argentatus*

First proved to breed in 1971 though present since at least 1939. 20 pairs were thought to be nesting in 1986 - a decline since 1972 when 54 pairs were recorded.

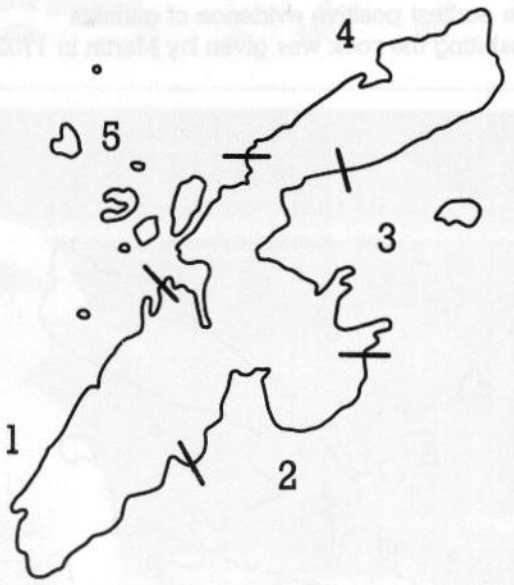


Figure 10 Division of Sula Sgeir into 5 sections used for counts of kittiwakes, guillemots and razorbills. (Crown copyright reserved)

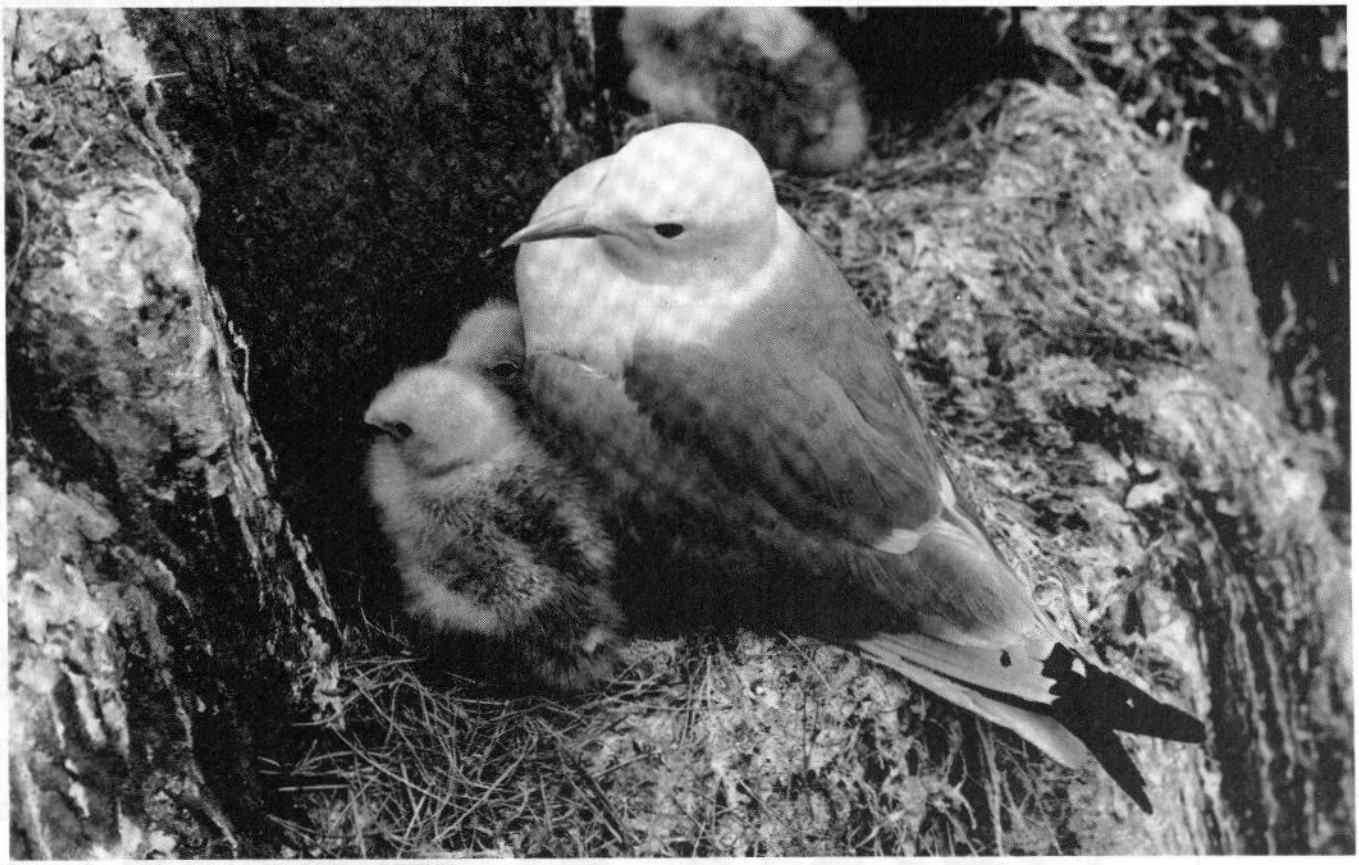
Sula Sgeir

Great black-backed gull *Larus marinus*

First noted breeding in 1939 but no counts were made until 1972 (46 pairs) since when there has been a decline (3 pairs in 1986).

Kittiwake *Rissa tridactyla*

Present in large numbers since at least 1883. Few estimates have been made although a large increase apparently took place between 1932 and 1937. There was no change in numbers between the only complete counts in 1972 (1038 pairs) and 1986 (1031 apparently occupied nests counted with an additional 35 estimated) and little change in colony distribution (Table 7, 8).



Kittiwake with chicks (S. Dalton/NHPA)

Table 8.

Distribution of kittiwakes, razorbills and guillemots on the coast of Sula Sgeir (see Figure 10). This table does not include to estimates of birds not visible to counters. Count units as in Table 7.

Section	Kittiwake		Razorbill		Guillemot	
	1972	1986	1972	1986	1972	1986
1	190	275	400	175	1420	4290
2	319	260	100	236	5300	10649
3	140	138	300	80	1480	5500
4	22	4	13	38	88	25
5	367	354	100	51	975	4300
Total	1038	1031	913	580	9263	24764

Sources: Evans (1972) and this study.

Arctic tern *Sterna paradisaea*

The only records are of a pair on 3 August 1939 (no sign of breeding) and five unidentified terns in mid-May 1985.

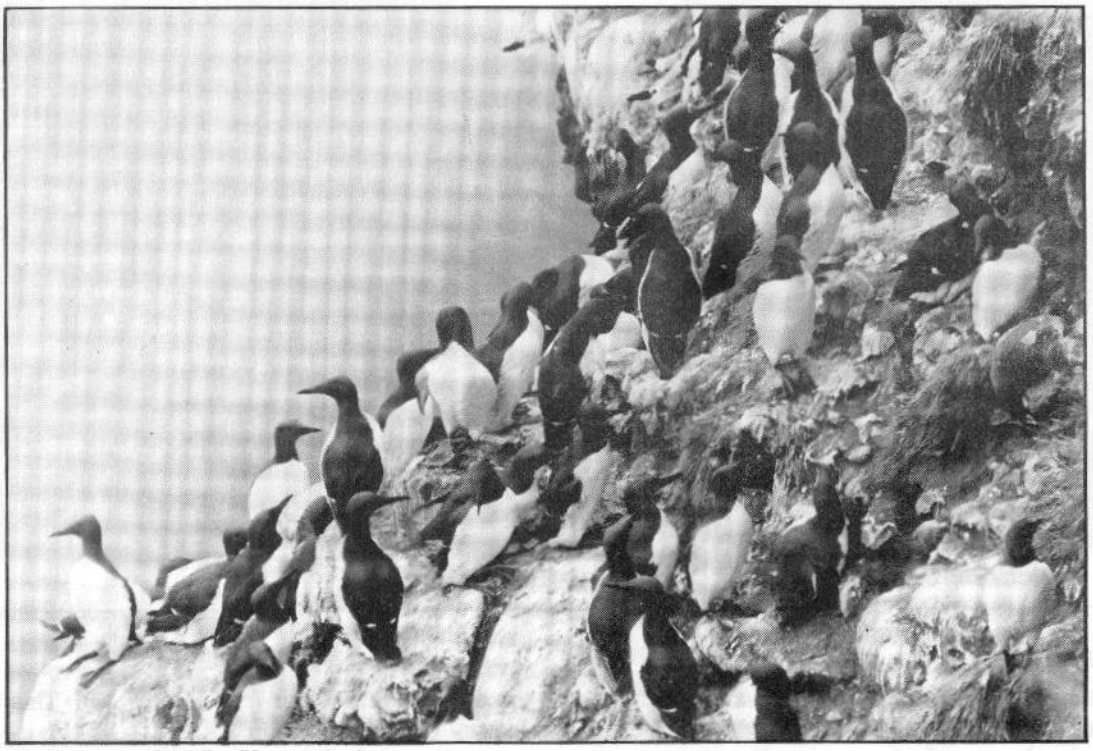
Guillemot *Uria aalge*

Plentiful in 1883 and still very common in 1932 and 1937. The first complete count of 9263 was in 1972 on the late date of 7 July (so the count may have been low). 24,764 were counted in 1986 with an additional 618 estimated out of sight (Table 7); different sections of the island have increased apparently at different rates (Table 8). Estimates of about 20,000 in 1980 and 1985 are more in keeping with the 1986 figure.

In 1958 and 1972, 19.5% and 17.5% of samples of guillemots were bridled.

Puffin *Fratercula arctica*

In 1883 Swinburne found numbers comparable to the North Rona colonies; they were still very common in 1932. Stewart on a late visit in 1937 found very few and little soil left in which they could burrow whilst Ainslie and Atkinson in 1939 thought the only place left for puffins to nest was under boulders. Soil has built up on parts of the island since then but much of the ground is now occupied by fulmars which might prevent puffins from recolonising. An estimate of between 500 and 1000 pairs was made in 1980 with some birds nesting in the bothy walls. In 1986 breeding was noted in the same areas as in 1980 and the estimated minimum of 500 pairs was also unchanged.



Guillemots (S.M.D. Alexander)

Razorbill *Alca torda*

Razorbills were plentiful in 1883 and large numbers were noted in 1932 and in 1958. The only complete counts are of 913 individuals in 1972 and 580 plus an estimated 210 in the gannetry in 1986 (Tables 7, 8).

Black guillemot *Cepphus grylle*

Three individuals on 7 July 1972; present also on 26 July 1969 and 28 June 1981. No proof of breeding.

Collared dove *Streptopelia decaocto*

One on 16 June 1986.

Short-eared owl *Asio flammeus*

One long dead on 16 June 1986.

House martin *Delichon urbica*

Three on 29-30 June 1958 and one on 16 June 1986.

Sula Sgeir

Meadow pipit *Anthus pratensis*

Probably bred in 1958 as an adult was seen carrying food on 29 and 30 June. Migration noted in late August 1954 with up to 50 seen. One on 27 May 1965.

Rock pipit *Anthus littoralis*

Six pairs found breeding in 1971 and 1972 and birds were present in 1932, 1939, 1954, 1958, 1962 and 1965. None seen in 1986.

White wagtail *Motacilla alba*

Up to six on 24-31 August 1954 and one on 27 May 1965.

Wren *Troglodytes troglodytes*

One in September 1930.

Wheatear *Oenanthe oenanthe*

Passage noted in August 1954 with a maximum of 60 on 22-23. Other records of singles on 29-30 June 1958, 21 May 1962 and 24 June 1971.

Willow warbler *Phylloscopus trochilus*

Two present on 24-31 August 1954 with three on the 28th.

Red-breasted flycatcher *Ficedula parva*

Single on 21 May 1962.

Hooded crow *Corvus corrone*

Two on 2 August 1980 and one on 18 August 1986.

Raven *Corvus corax*

One on 16 June 1986.

Starling *Sturnus vulgaris*

Present in August 1954 and June/July 1971 when breeding suspected. One individual soaked in fulmar oil on 23 June 1980 and two dead on 16 June 1986.

Common crossbill *Loxia curvirostra*

One male and two females seen on 7 July 1972.

Lapland bunting *Calcarius lapponicus*

Two on 27 August 1954 and five on 11 September 1957.

The relative importance of the waters around North Rona and Sula Sgeir for seabirds

Seabirds form the most important aspect of the avian fauna of North Rona and Sula Sgeir. These birds, as their name implies, rely on the sea. Their health is intimately connected with that of the waters around the colony. Any pollution incident that affects the colonies on the islands is likely to arise at sea. It is thus important to know which areas of the sea around the islands are particularly important for seabirds and the times of year when seabirds are particularly vulnerable.

Surveys conducted in 1986, by the NCC's Seabirds at Sea Team, examined these problems (Benn et al. 1987, 1988; Burton et al. 1987). A summary of the findings from waters around the island is presented below. In order to put these findings into context, the bird-life of much of the sea area to the north and west of Scotland is described also. The year is considered by seasons. The most vulnerable birds in the area are the auks, owing mainly to their habit of remaining predominantly on the water surface. The more aerial species are less vulnerable. Special surveys were carried out around the islands in June and August 1986, to examine the location of areas used by auks for feeding during the breeding season and for moulting respectively.

April, May, June

From April to June, the waters around North Rona and Sula Sgeir were important for the birds breeding at the colonies (Figure 11a). During June 1986 most auks remained within 30 km of the colonies while rearing chicks. Auks were present around the islands from April onwards. High densities of guillemots and puffins occurred also to the south of the islands and in the northern Minch. High densities of razorbills were found only in the northern Minch. Low numbers of auks were present in the areas north of North Rona and Sula Sgeir and in the central Minch.

Gannets were commonest between Sula Sgeir and the Butt of Lewis and from there to Cape Wrath during June, but were dispersed more widely in April and May. Fulmars were present throughout the area; in April and May densities remained high at the continental shelf edge, but in June lower numbers were present. Kittiwakes, great skuas and lesser black-backed gulls were widespread but scarce. The latter two species arrived back in the area in April having wintered further south. Manx shearwaters were common throughout, but in largest numbers in the more inshore areas.

Storm petrels were found in large numbers at the shelf edge and east of North Rona and in moderate numbers elsewhere. By day, Leach's petrels were confined to the shelf edge. Both petrel species were most frequent in areas with trawling activity. Petrels return to their colonies by night, and so presumably the inshore areas were more important at this time. In June, herring and great black-backed gulls were seen in low numbers close to land; earlier in this period, small parties were also found near trawlers at the shelf edge.

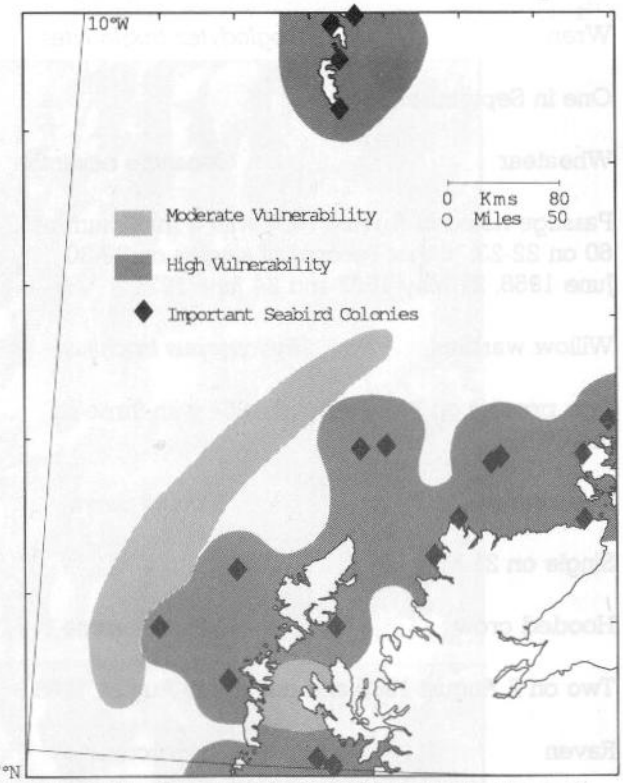


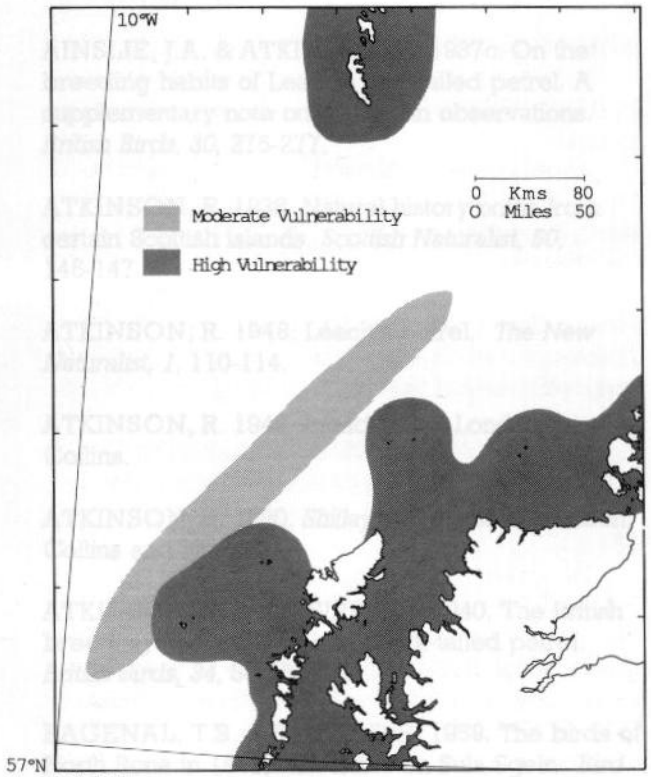
Figure 11 Areas likely to hold concentrations of vulnerable seabirds.
(Crown copyright reserved)

(a) Breeding season (April to June)

July

In late June and July, young unfledged guillemots and razorbills departed from their colonies, accompanied by the male parent. During this period, these birds are particularly vulnerable to pollution as they are confined to the sea surface. The Minch remained important for auks in July, as did the areas around North Rona, Sula Sgeir and the Flannans (Figure 11b). All of these areas also held many Manx shearwaters. Much of the area adjacent to the Scottish mainland was not surveyed but probably held numbers of auks dispersing

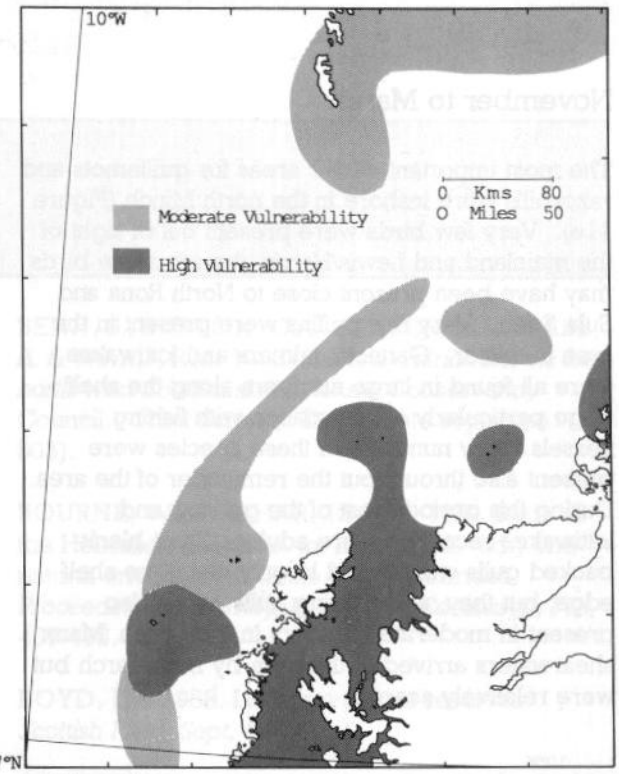
from nearby colonies. Gannets were common along the shelf edge and between Sula Sgeir and the Butt of Lewis; few were present elsewhere. In contrast, fulmars were common, widespread and particularly abundant at the shelf edge and in the north Minch. Kittiwakes were scarce and were found mostly in the Minch and adjacent to their colonies. Large concentrations of storm petrels were present at the shelf edge and in the area between the Flannans and the Butt of Lewis; there were few elsewhere. As in April-June, Leach's petrels were found by day only at the shelf edge. The large gulls were scarce and confined mostly to the Minch.



(b) July

August

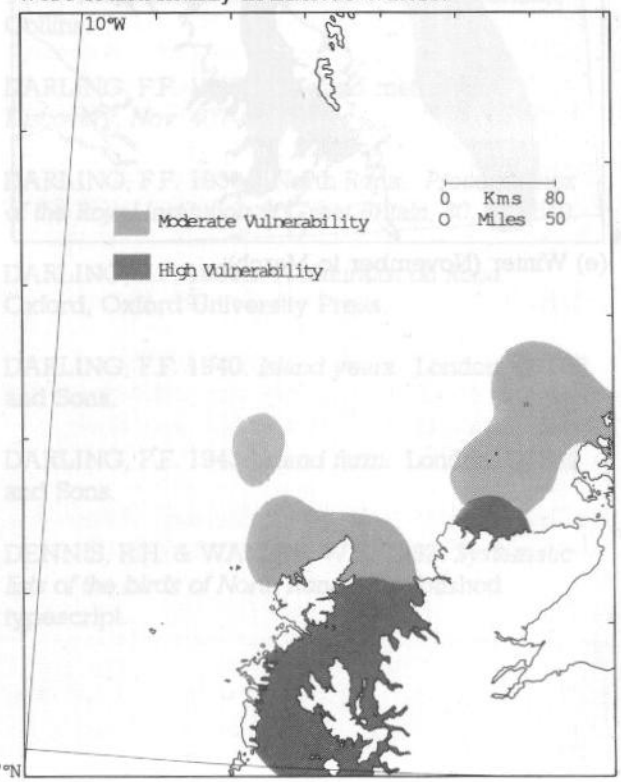
By August (Figure 11c) very large numbers of guillemots, razorbills and puffins were in the Minch. Concentrations of guillemots and razorbills are particularly vulnerable at this time owing to a moult of flight feathers. This renders them flightless and less able to escape from an area. Puffins do not moult in the autumn, but nevertheless they hardly fly at all. Few guillemots or razorbills were found outside the Minch, but puffins were widespread over much of the shelf area. The Minch held also many Manx and sooty shearwaters, fulmars, kittiwakes and storm petrels. The breeding seasons of gannet, Manx shearwater, storm and Leach's petrel and fulmar continue into August. The waters around Sula Sgeir, St Kilda and the Butt of Lewis remained important for gannets. The shearwaters were common in shallow water areas. Fulmars and storm petrels were common in all areas, but particularly so at the shelf edge. Leach's petrels were again found exclusively at the shelf edge by day. Few large gulls were present.



(c) August

September and October

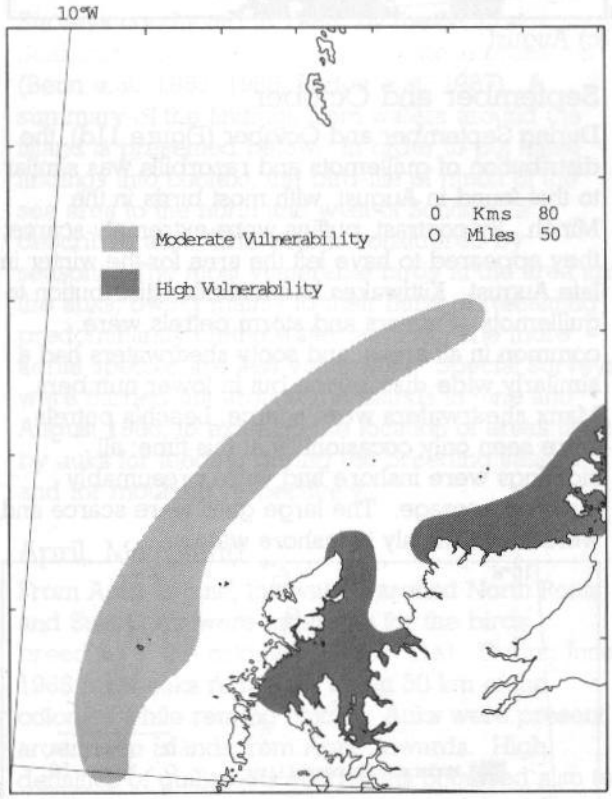
During September and October (Figure 11d), the distribution of guillemots and razorbills was similar to that found in August, with most birds in the Minch. By contrast, puffins were extremely scarce; they appeared to have left the area for the winter in late August. Kittiwakes had a similar distribution to guillemots. Fulmars and storm petrels were common in all areas, and sooty shearwaters had a similarly wide distribution but in lower numbers. Manx shearwaters were scarce. Leach's petrels were seen only occasionally at this time; all sightings were inshore and were presumably birds on passage. The large gulls were scarce and were found mainly in inshore waters.



(d) September and October

November to March

The most important winter areas for guillemots and razorbills were inshore in the north Minch (Figure 11e). Very few birds were present out of sight of the mainland and Lewis/Harris, though a few birds may have been present close to North Rona and Sula Sgeir. Very few puffins were present in the area in winter. Gannets, fulmars and kittiwakes were all found in large numbers along the shelf edge particularly in association with fishing vessels. Low numbers of these species were present also throughout the remainder of the area. During this period most of the gannets and kittiwakes recorded were adults. Great black-backed gulls were found largely along the shelf edge, but they, and herring gulls, were also present in moderate numbers in the Minch. Manx shearwaters arrived in the area by mid-March but were relatively scarce.



(e) Winter (November to March)

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