ADVICE ON SCIENTIFIC ASPECTS OF THE MANAGEMENT OF SEALS IN 1990

A. GREY SEALS

1 Total Scottish Population

The DAFS has requested advice on population numbers, trends and distribution of grey seals in Scottish waters, and information on new or recently established breeding colonies. The DAFS would also like to know whether any further changes in the methodology of counting have been made or are planned.

SMRU Comments

The SMRU conducted aerial or ground surveys of all the major grey seal breeding colonies in Scotland during the 1989 pupping season. However, due to mechanical problems with the survey aircraft and poor weather surveys of colonies in the Inner Hebrides were incomplete. The number of pups born at each colony was estimated by fitting a birth curve to the number of pups counted on different surveys made throughout the season using the technique of Ward et al. 1987 (Symp. zool. Soc. Lond. 58: 181-191). These values have been added to the time series of estimates of pup production for previous years calculated using the same method. This time series was then used to estimate the size of the Scottish grey seal population at the start of the 1989 pupping season using the maximum likelihood method described in NERC News Journal, March 1984. No changes in the methodology used to estimate pup production are anticipated in the near future. Over the next five years the method used to estimate population size will be improved to provide estimates of error, and to take account of the movement of animals between colonies.

Estimates for the number of pups born in 1989 with approximate 95% confidence limits, and for the total number of seals alive at the start of the 1989 pupping season are shown below. Confidence limits for the estimates of population size will be wider than those for the estimated number of pups, but final figures are not yet available.

AREA	NUMBER OF PUPS (to nearest 100)	POPULATION SIZE (to nearest 500)
Orkney	7,200 ± 1,400	26,500
Outer Hebrides	10,400 ± 2,100	38,500
Isle of May	900 ± 200	3,500

Estimates from previous years for other Scottish stocks are:

Inner Hebrides	2,000	7,000
Shetland	1,000	3,500
Total Scottish Population		79,000

This is 4% higher than the estimate for 1988.

Six hundred and sixty-six pups were counted at the mainland site in Loch Eriboll, and these animals have been included in the figure for the Outer Hebrides. Two hundred and seventy pups were counted by DAFS scientists at the Helmsdale colony and these have been included in the Orkney figure.

Trends in pup production in each area over the last six years (during which a consistent survey procedure has been used at all sites) are listed in Table 1 and shown graphically in Figure 1. Time series of estimates for the total,

all-age grey seal population breeding in Orkney and the Outer Hebrides is shown in Figure 2. This is based on two time series of pup productions going back to the 1960s, one based on the current methodology for estimating pup production (the "revised" method) and the other based on the peak number of pups observed at each colony (the "old" method). Both show a continuing increase in numbers of 4-5% per annum.

Pup production at the Isle of May and the Farne Islands has varied over the last decade. However, it increased steadily from 1983 to 1986 and was approximately 1,800 in 1986 and 1987. In 1988 pup production at the Isle of May was 20% less than that observed in 1987; at the nearby Farne Islands it was 13% less. Pup production at both sites rose in 1989 to a level similar to that observed in 1987.

In the Outer Hebrides and Orkney, pup production rose on average by 8% each year between 1984 and 1987, whereas in the Inner Hebrides year-to-year changes have been erratic with a decline from 1984 to 1985 and substantial increases in 1986 and 1987. Pup production in Orkney rose by 15% between 1986 and 1987, possibly as a consequence of the cessation of pup hunting in Orkney in 1983, but in 1988 it was 11.5% lower than in 1987. In the Outer Hebrides pup production in 1988 was 1% higher than in 1987, a marked downturn in the rate of increase observed until then. In 1989 pup production in both areas was higher than in 1988, but not as high as would have been expected if the trend observed up to 1987 had continued. It is therefore still not clear whether the lower pup production observed in 1988 was a short-term effect, caused by reduced fecundity in that year, or the result of increased mortality. The results of surveys conducted in 1990 may clarify this, however.

No significant new grey seal colonies have been detected on SMRU surveys. The recently established colony in Loch Eriboll was surveyed in 1989 for the first time since 1984; 666 pups were counted compared to 406 on the previous survey.

2. Grey seals in England and Wales

Question

It is understood that the National Trust will seek a licence to take grey seal pups at the Farne Islands to prevent damage to the habitat.

SMRU Comments

The actions of the National Trust at the Farne Islands, which are aimed at preventing seals from pupping on those islands which have a sensitive cover of vegetation, have been effective in their purpose. However, as a consequence many pups are now born on islands which are regularly washed by storms and pup mortality is often high. In addition, a significant number of breeding animals have almost certainly migrated to the Isle of May. This has made it difficult for SMRU to provide reliable estimates of the size of the grey seal population associated with these islands from counts of the number of pups born there. However, these problems are the result of the disturbance associated with the Trust's activities rather than the number of pups which are killed, which has been small (around 10 per year) since 1983.

B. COMMON SEALS

Question

The DAFS has requested advice on population numbers, trends and distribution of common seals in Scottish waters.

SMRU Comments

Until 1985 the SMRU surveyed British common seal populations from small boats at the end of the pupping season. However, it is now known that the haul out behaviour of seals at this time is unpredictable and these counts do not provide a reliable index of abundance. Since 1985 surveys have been conducted from the air during the first two weeks of August when the seals are moulting and their haul out behaviour is more consistent. Other European countries also conduct their major surveys at this time. In areas where the precise distribution of moulting seals is not known, a thermal imager has been used to detect animals resting on rocks. These groups are then photographed for accurate counting. This technique has been used by SMRU to survey common seals in Orkney in 1985 and 1989 (with assistance from Aberdeen University), the Wash in 1988 and 1989, and on the west coast of Scotland from Lismore to Ullapool in 1988 and 1989, and by Aberdeen University in the Moray Firth in 1987, 1988 and 1989.

The maximum number of seals counted in the different parts of Britain during surveys before and after the 1988 epizootic caused by phocine distemper was:

	pre-epizootic	1989
Inner Hebrides/West coast Scotland	5,900	6,000
Outer Hebrides	1,300	-
Shetland	4,700	-
Orkney	6,600	7,100
East coast Scotland	1,100-1,400	1,000
East coast England	3,900	2,000

There are no time series of estimates for any area which can be used to estimate trends in local population size. However, there is some evidence of an increase in Shetland based on a comparison of the results of surveys conducted in 1978 and 1983, and on the east coast of England up until August 1988 (based on an analysis of aerial survey results). If there was an increase it may have been a consequence of the cessation of pup hunting in 1973.

C. EFFECTS OF THE PHOCINE DISTEMPER EPIZOOTIC

Question

The DAFS has requested an overall assessment of the impact of the phocine distemper virus among common seals, and any broader conclusions which can be drawn in relation to long-term dynamics of seal populations here and elsewhere. The Home Office has requested information on the condition of the seal population, with particular reference to the effect of the phocine distemper virus on their numbers.

SMRU Comments

Figure 3 shows the impact of the phocine distemper virus on common seal populations throughout Europe estimated by comparing the results of surveys conducted before and after the outbreak of virus infection. In most areas seal numbers were reduced by 50-60%. However, in Scotland only the population in the Moray Firth showed a detectable change in numbers. Mortality apparently caused by the virus was reported from Orkney and northern Norway in 1989, but only about 50 dead animals were reported in each of these incidents. Seals showing symptoms of virus infection have been reported from the Wadden Sea in 1989 and 1990, although there has been no widespread mortality. No seal showing such symptoms has been reported to SMRU in 1990. As part of a joint project with the Institute of Zoology and the Natural History Museum, funded by the Department of the Environment, attempts will be made to carry out full autopsies on as many as possible of the marine mammals found dead around the coast of England and Wales. This survey should provide a more reliable indication of the prevalence of the phocine distemper virus amongst British seals.

A recent joint meeting of the ICES Working Group on Baltic Seals and the Study Group on Contaminants in Marine Mammals was charged with identifying seal populations which were vulnerable as a result of the epizootic. It concluded that only the common seal population in the Baltic could be described as potentially vulnerable. However, the meeting recommended careful monitoring of the recovery of these populations depleted by the virus.

The long-term implications of recurrent disasters, such as epizootics, for the population dynamics of marine mammals are discussed in Harwood and Hall (in press, attached as Appendix 1); the risks of a recurrence of the phocine distemper epizootic are assessed in Harwood and Grenfell (in press, attached as Appendix 2). One of Harwood and Hall's conclusions is that British seals have probably suffered in the past from large scale mortality at approximately 50 year intervals and that the risk of such events should be taken into account when management plans are developed. Harwood and Grenfell conclude that the risks of recurrence can only be assessed in the context of a properly defined epidemiological framework. No such framework exists at present, although one is being developed.

TABLE 1. Estimated numbers of grey seals associated with colonies in different parts of Britain

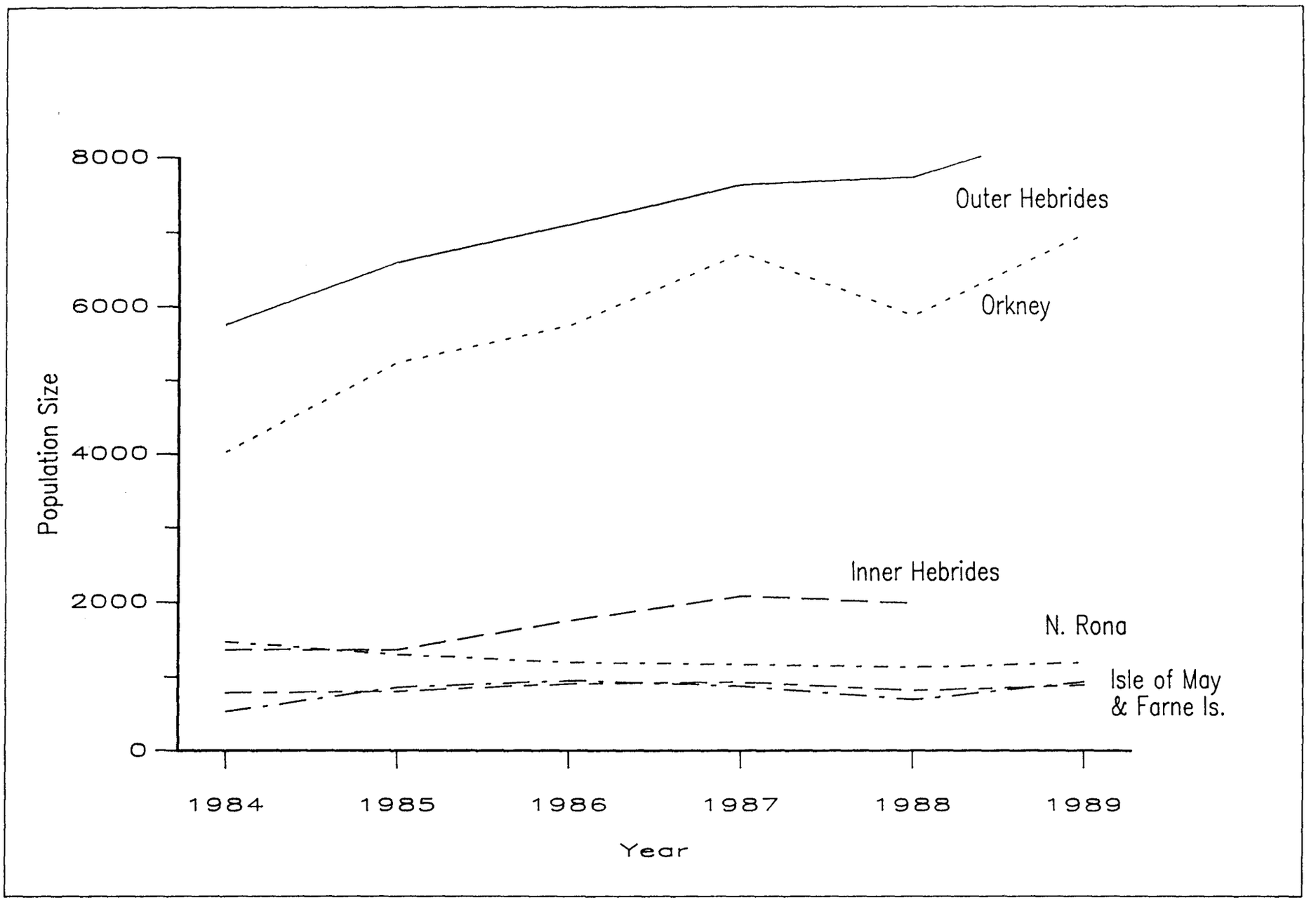
	1984	1985	1986	1987	1988	1989
INNER HEBRIDES	1360	1362	1749	2078	1974	-
OUTER HEBRIDES	5758	6592	7097	7629	7727	8423
NORTH RONA	1467	1295	1189	1160	1123	1194
ORKNEY	4025	5243	5739	6709	5864	6964
ISLE OF MAY	530	860	950	870	690	935
FARNE ISLANDS	780	804	908	930	810	890

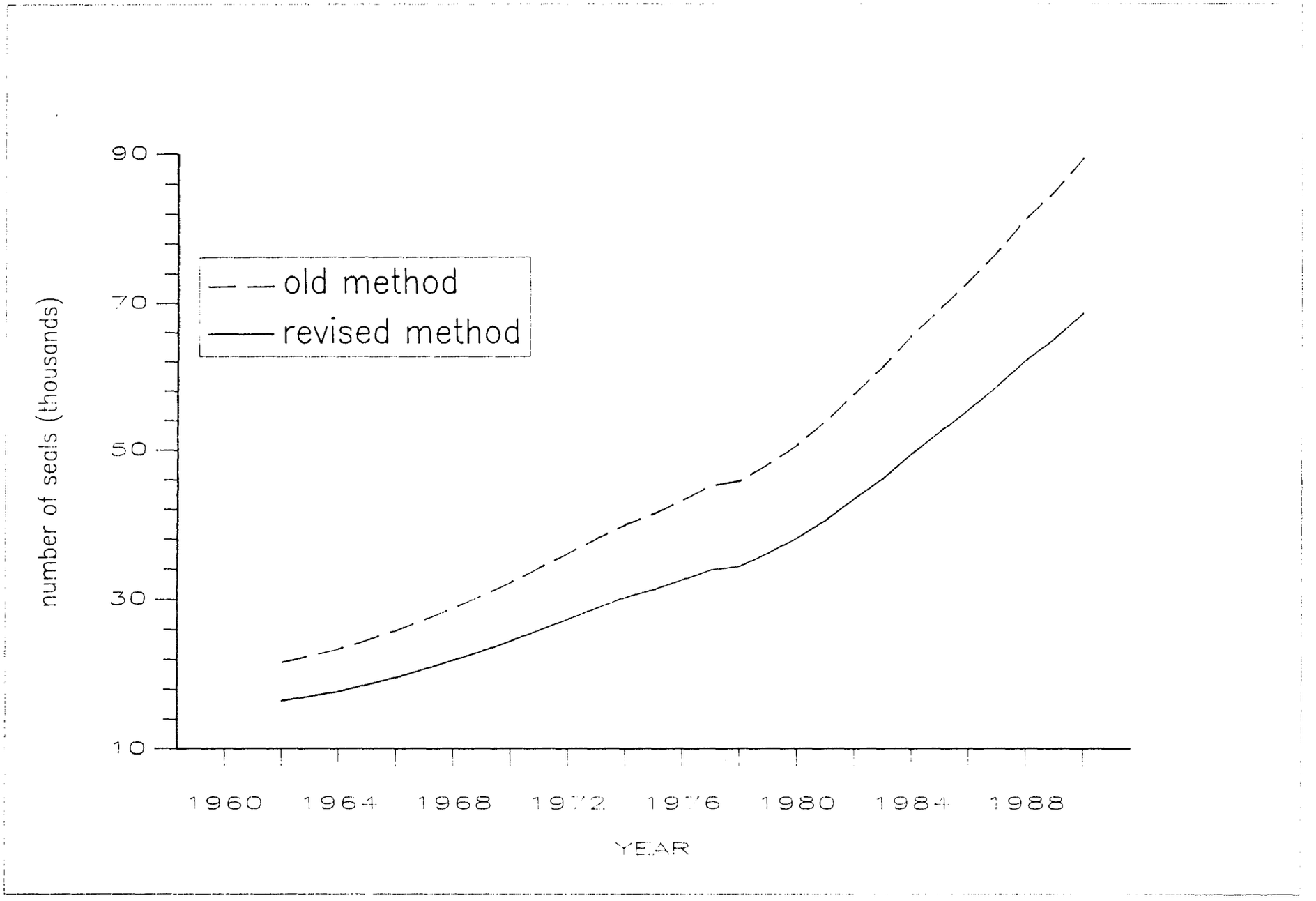
CAPTIONS FOR FIGURES

FIGURE 1: Trends in numbers of grey seals associated with colonies in different parts of Britain over the period 1984-89.

FIGURE 2: Population trends of grey seal numbers associated with colonies in the Outer Hebrides and Orkney based on pup production estimated from the maximum number of pups counted at each colony ("old" method) or by fitting a birth curve ("revised" method).

FIGURE 3: Estimated impact of the 1988 phocine distemper epidemic on European common seal populations. The area of each circle is proportional to the maximum number of seals counted in that region before the epidemic. The unshaded area represents the numbers counted after the epidemic.


8000
6000
4000
2000
0
Population Size
Outer Hebrides
Orkney
Inner Hebrides
N. Rona
Isle of May
& Farne Is.
1984
1985
1986
1987
1988
1989
Year


90
70
50
30
10
number of seals (thousands)
old method
revised method
1960
1964
1968
1972
1976
1980
1984
1988
YEAR

EFFECT OF PHOCINE DISTEMPER ON COMMON SEAL POPULATIONS, 1988–1989

The area of each circle is proportional to the number of seals counted in each area before the virus struck. The white area shows the proportion of that number which are believed to have survived. The figure by each circle is the number of dead seals found in that area

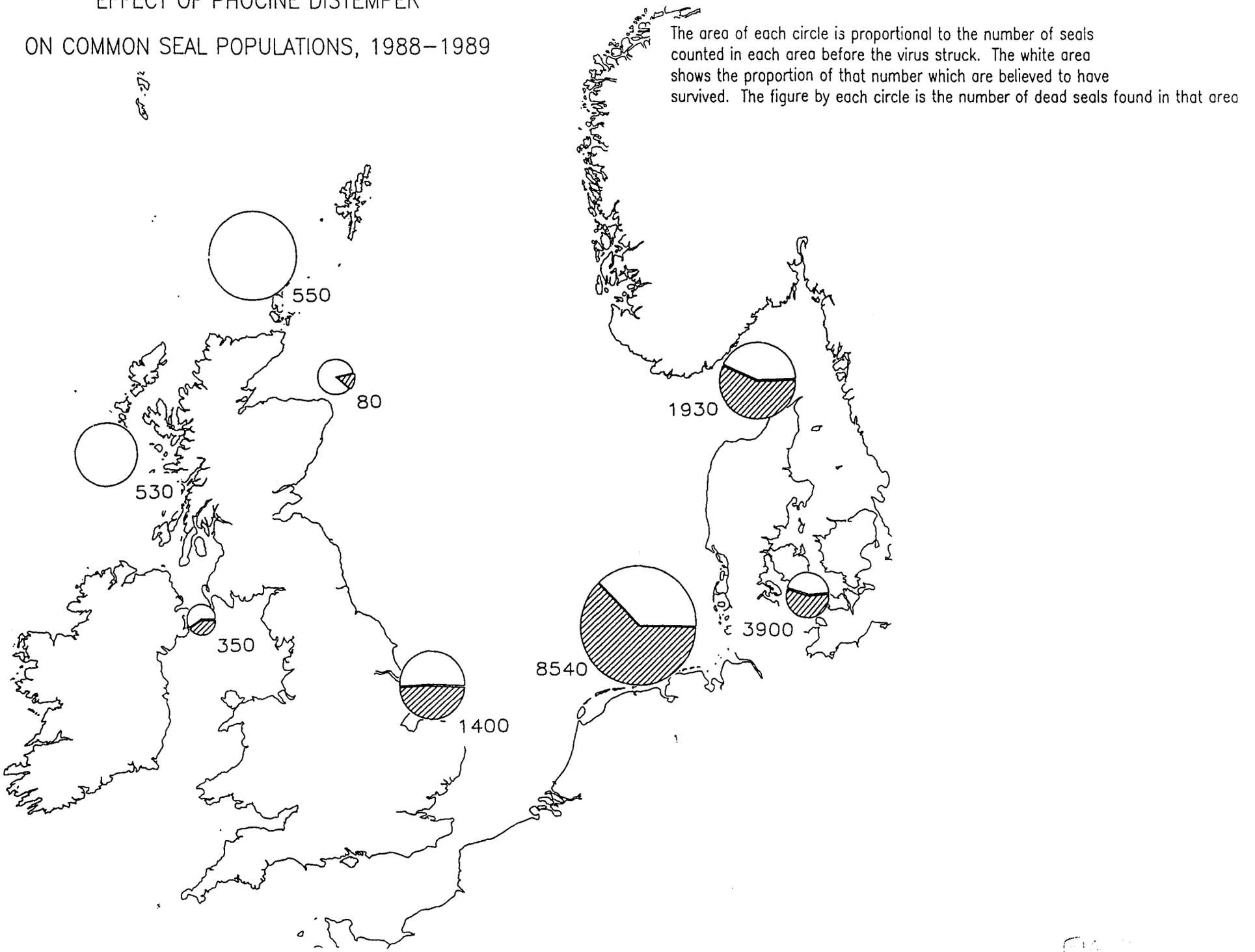


FIGURE 4

THE EFFECT OF PHOCINE DISTEMPER

ON COMMON SEAL POPULATIONS, 1988–1989

The area of each circle is proportional to the number of seals counted in each area before the virus struck. The shaded area shows the proportion of that number which are believed to have survived.