IN CONFIDENCE
NATURAL ENVIRONMENT RESEARCH COUNCIL

ADVICE ON THE STATUS OF BRITISH GREY SEAL POPULATIONS: 1995

Summary

This document contains advice from the Natural Environment Research Council on the current size and status of British grey seal populations, based on information provided by the Sea Mammal Research Unit (SMRU). Appendix 1 describes the method used to estimate pup production from aerial photographs of grey seal breeding sites. Tables 1-4 give production estimates by year and breeding site. Appendix 2 describes how the pup production estimates are used to estimate all-age population size. Table 5 gives these population estimates. Figures 1 and 2 show the trends in pup production for major groups of breeding sites, Figure 3 shows the corresponding trend in population size (extrapolated to 1996). Figures 4 illustrates the location of the major grey seal breeding sites, Figure 5 shows the location of sites where grey seals have been observed during the summer surveys for common seals, and Figure 6 shows the world distribution of grey seals.

The size of the British grey seal population at the start of the 1994 pupping season is estimated to be 108,500: 99,300 seals are associated with breeding sites in Scotland and 9,200 with breeding sites in England and Wales. The increase in population size since 1993 was 7.1%, although pup production increased by only 2.5%.

Surveys conducted in 1994

Every year SMRU conducts surveys of the major grey seal breeding sites in Britain in order to estimate the number of pups born there. In addition, new sites where grey seal pups have been reported or which appear to be suitable for colonization are regularly visited. During 1994 aerial surveys were flown of all the major sites in the Hebrides and Orkney, and of the Isle of May. Ground counts of the numbers of pups born at the Farne Islands were carried out by staff from the National Trust; similar counts were carried out by members of the Lincolnshire Trust for Nature Conservation at Donna Nook on the Humber estuary, by members of the Dyfed Wildlife Trust in Wales, and by staff of Scottish Natural Heritage on South Ronaldsay, Orkney.

Estimation of Pup Production

The methods used to estimate production and population size for this year's advice are similar to those used in 1994. Pup production in each year is estimated from the aerial survey results using a model of the birth process and the development of pups.

In the 1994 advice, NERC expressed concern that undetected pup mortality and misclassification of pups into different stage categories might affect estimates of pup production. In order to check on this, seven breeding sites in Orkney were visited in 1994 and direct counts of live and dead pups made. These revealed that pup mortality was very low, but that levels of misclassification were higher than expected. The model used to estimate pup production was therefore modified to take account of this greater uncertainty in classification. Figure 2a shows the effect of these changes on the estimates of pup production, which are on average 6% lower than those obtained with the model used in 1994.

Estimation of Population Size Associated with Regularly Surveyed Sites

Population size is estimated by fitting a demographic model to the entire series of pup production estimates obtained since 1984. This method, which is described in Appendix 2, provides an estimate of the total seal population associated with all the breeding sites which are surveyed annually. For illustrative purposes the components of this population which are associated with each of the major breeding areas have been calculated. However, it should be recognized that the distribution of seals outside the breeding seasons is unlikely to be the same as the distribution of the breeding sites. Estimates of pup production and population size for the main colonies surveyed in 1994, which account for more than 85% of all pups born each year, are:

Location	Pup production	Change from 1993	Total population (to nearest 100)
Inner Hebrides	2,788	-5%	9,200
Outer Hebrides	12,226	+2%	40,200
Orkney	11,606	+7%	38,200
Isle of May	1,408	-4%	4,600
Farne Islands	1,025	-2%	3,400
Donna Nook	302	+47%	1,000

Confidence Limits

Ninety-five percent confidence limits on the pup production estimates at each location are within 14% of the point estimate. The exact limits depend on a number of factors, including the number of surveys which are flown in a

particular year. The confidence limits for year to year variation in production at all Scottish colonies which are surveyed annually, are shown in Figure 1b. It is also possible to calculate 95% confidence limits for the estimate of the female component of the population; these are within 23% below and 38% above the point estimates. The size of the male component of this population has been derived in a different way; as a result, it is not possible to calculate formal confidence limits for the estimate of total population size. If it was possible, they would be at least as large as those for the female component.

Sites Surveyed Less Frequently

The other British breeding areas are surveyed less frequently and intensively. Estimates of pup production have been calculated for these, but confidence limits cannot be calculated. The total population associated with these remaining areas has been calculated using the ratio of total population to pup production for the main areas. The resulting figures are:

Location	Date of last survey	Pup production	Total population (to nearest 100)
Mainland Scotland and South Ronaldsay	1992/94	1,200	3,900
Shetland	1977	1,000	3,300
Southwest Britain	1973/94	1,500	4,800

Recent Changes in the British Grey Seal Population

Taken together, these figures provide an estimate of 108,500 for the size of the British grey seal population at the start of the 1994 pupping season: 99,300 seals are associated with breeding sites in Scotland and 9,200 with breeding sites in England and Wales. The equivalent estimates for 1993 are 92,700 for Scottish sites and 8,600 for those in England and Wales. The increase in population size between the two years was 7.1%, although pup production increased by only 2.5%. The large grey seal population in Canada is increasing more rapidly than the British population, as a result the proportion of the world population which breeds in Britain is declining. Britain now holds 36% of the world population of grey seals (see Figure 6).

Pup production in Orkney continues to increase at around 7% per year. New sites, such as Calf of Eday and Copinsay, are growing rapidly. Neither of these latter sites had significant numbers of births before 1991. Since 1992 seals have also started breeding on the northwest tip of Stronsay, opposite Little Linga. However, the production in the Outer Hebrides was only 2% higher than in 1993 and that in the Inner Hebrides decreased, so that, for the second year in succession, the increase in total pup production is relatively small. The method used to estimate all-age population size and to predict population size in future years (see Figure 3) assumes that fecundity remains constant from year to year. However, pup production in 1994 was substantially less than that predicted by this model (Figure 2b), suggesting that fecundity may have been reduced in this year. If fecundity has declined, it would be misleading to extrapolate population size to future years using historical fecundity levels.

Quantities and Species of Fish Consumed by Grey Seals in the North Sea

A recent report prepared by SMRU for MAFF (Grey Seals in the North Sea and their Interaction with Fisheries) provides new information on the diet of grey seals and the quantities of fish consumed by them. It concludes that sandeels and gadids (especially cod, ling and whiting) make up over 80% of the diet of grey seals in the North Sea, and that these seals consumed approximately 76,000 tonnes of fish in 1992. Radio tracking studies indicated that most of these fish were probably consumed in British coastal waters. However, most of the samples on which the estimates of seal diet were based were collected in 1985, and it was assumed that the proportion of different species in the diet had remained constant since then. The calculated consumption of cod by grey seals was only around 3% of the commercial catch in 1985. As a result of increasing seal numbers and declining catches, the equivalent figure for 1992 is 11% of the commercial catch. However, this figure must be treated with caution because there have been large year-to-year changes in the abundance of the size classes of cod preferred by grey seals over the last decade and it seems unlikely that the diet of seals has remained constant over this period. More research on the response of seals to changes in the availability of their preferred prey is essential before it will be possible to provide robust advice on the likely effect of changes in seal numbers on fish stocks. SMRU is currently holding discussions with the European Commission about funding for a major project which will address this problem.

Non-lethal Methods for Controlling Seal Populations

A recent review of non-lethal methods for controlling seal populations carried out by Aberdeen University for MAFF indicates that there are a number of hormonal and immuno-contraceptives which could be used to temporarily sterilize seals. Trials of some of these compounds have been carried out in Canada since 1992 with encouraging results. However, an effective vaccine will need to be 90% successful in use and to cause sterility for around 10 years. Such

a vaccine could be used to stabilize a seal population at a particular target level. However, it should be recognized that an operation of this kind is not an easy alternative to culling. Large numbers of seals will have to be vaccinated and it will be many years before the population stabilizes at the desired level. Vaccination on this scale may be feasible in Canada, where more than half of the total population breeds on one island and where females can be approached closely without causing desertion of their pups. This is not the case in Britain where seals are spread across more than 30 major colonies and where animals are very susceptible to disturbance. If populations are to be controlled by immuno-contraceptive methods, new techniques for monitoring population size will have to be developed. This is because the simple relationship between the number of pups born each year and total population size, which forms the basis of the current monitoring technique, will no longer hold.

TABLE 1 : Pup production estimates for islands in the Inner Hebrides group

YEAR	Gunna	Northern Treshnish	Fladda	Sgeir a Chaisteill & Eirionnach	Lunga	Soa	Eilean nan ron	Eilean nan eoin	Nave Island	TOTAL
1984	206	87	169	136	226	63	180	190	75	1332
1985	192	84	109	113	136	63	158	269	66	1190
1986	263	114	149	119	204	111	302	305	144	1711
1987	360	125	173	147	235	95	414	292	128	1969
1988	330	134	226	170	236	96	400	226	132	1950
1989	343	137	223	182	283	107	301	156	213	1945
1990	358	140	182	178	248	125	390	256	215	2092
1991	490	140	312	178	285	90	410	383	210	2498
1992	533	196	354	162	345	116	437	432	276	2851
1993	515	217	323	195	383	91	460	453	301	2938
1994	596	176	291	157	374	94	342	453	305	2788

TABLE 2: Pup Production estimates for islands in the Outer Hebrides group

YEAR	Gasker	Coppay	Shillay (Sound of Harris)	Haskier	Causamul	Deasker	Shivinish (Monachs)	Ceann Iar (Monachs)	Ceann Ear (Monachs)	Shillay (Monachs)	Stockay (Monachs)	Monachs total	Others	Rona	TOTAL
1960															
1961	847	62	120	81	67	13						0	0	1949	3142
1962															
1963															
1964															
1965															
1966	1084	230	120	96	242	0	0					38	0	1499	3311
1967	1084	153	80	96	161	0	0					114	0	1574	3265
1968	1084	115	161	96	161	0	0					152	0	1650	3421
1969															
1970	1129	324	714	130	103	41	0	0	84	60	460	605	0	2023	5070
1971															
1972	1141	316	605	167	271	67	0	0	274	49	730	1054	0	1309	4933
1973															
1974	1756	286	692	176	224	83	0	49	459	44	754	1307	0	1647	6173
1975	1538	367	631	212	202	51	0	141	690	217	932	1982	0	1961	6946
1976	1813	394	553	278	217	57	0	111	628	152	1053	1946	0	1886	7147
1977															
1978	1101	321	508	320	172	51	0	560	371	205	626	1764	0	2002	6243
1979	992	377	546	269	159	80	0	672	810	164	826	2474	0	1770	6670
1980	1345	462	794	351	163	31	0	1077	880	242	647	2848	162	1867	8026
1981	1255	423	1016	278	178	68	0	1279	486	331	847	2944	136	1785	8086

YEAR	Gasker	Coppay	Shillay (Sound of Harris)	Haskier	Causamul	Deasker	Shivinish (Monachs)	Ceann Iar (Monachs)	Ceann Ear (Monachs)	Shillay (Monachs)	Stockay (Monachs)	Monachs total	Others	Rona	TOTAL
1982	1443	634	219	322	260	110	0	1329	557	199	712	2798	85	1888	7763
1983															
1984	1120	389	386	277	143	0	83	2175	616	209	555	3638	0	1641	7594
1985	1303	408	335	254	168	0	261	2365	748	193	641	4208	0	1489	8165
1986	1258	378	356	225	108	0	283	2931	822	222	572	4830	0	1300	8455
1987	1319	416	379	233	126	0	349	3242	689	223	659	5162	0	1194	8829
1988	1194	368	390	203	135	0	426	3760	448	188	577	5399	0	1164	8853
1989	1255	399	365	176	82	0	520	3997	542	210	530	5799	0	1159	9235
1990	1395	422	349	154	127	0	571	4598	526	175	475	6345	0	1184	9976
1991	1363	465	337	160	98	0	580	5122	551	173	495	6921	0	1290	10634
1992	1531	441	548	188	83	0	581	5471	737	211	594	7594	0	1499	11884
1993	1538	377	456	166	117	0	648	5502	1047	204	518	7919	0	1442	12015
1994	1436	416	529	131	101	0	635	5991	944	206	526	8302	0	1311	12226

TABLE 3: Pup production estimates for islands in the Orkney group

YEAR	Muckle Green-holm	Little Green-holm	Little Linga	Holm of Spur-ness	Point of Spur-ness	Linga-Holm	Holm of Huip	Fara-holm	Faray	Rusk-holm	Wart-holm	Sweyn-holm & Gairsay	Grass-holm	Swona	Pent-land Skerry	Aus-kerry	Switha	Stroma	Calf of Eday	Cop-insay	TOTAL
1960	734	190	239	90	0	0	0	441	0	208	41	0	0	2	98	0	0	0	0	0	2048
1961	537	290	251	124	0	0	0	300	0	256	33	0	0	2	48	0	0	0	0	0	1846
1962	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1963	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1964	934	469	154	25	0	0	0	22	117	208	16	55	3	14	24	0	0	0	0	0	2048
1965	671	366	279	138	0	0	0	113	151	247	29	21	66	19	85	0	0	0	0	0	2191
1966	688	454	344	138	0	0	0	270	154	87	8	59	18	14	48	0	0	0	0	0	2287
1967	600	445	395	98	0	0	0	270	165	252	8	111	0	6	36	0	0	0	0	0	2390
1968	650	310	399	278	0	13	0	257	258	195	8	81	36	27	52	0	0	0	0	0	2570
1969	567	298	576	189	8	28	0	214	28	208	4	77	59	35	20	0	0	0	0	0	2316
1970	747	318	519	135	45	42	22	171	95	223	4	13	66	43	85	0	0	0	0	0	2535
1971	588	351	708	158	49	137	30	320	88	103	16	70	40	67	36	0	0	0	0	0	2766

YEAR	Muckle Green-holm	Little Green-holm	Little Linga	Holm of Spur-ness	Point of Spur-ness	Linga-Holm	Holm of Huip	Fara-holm	Faray	Rusk-holm	Wart-holm	Sweyn-holm & Gairsay	Grass-holm	Swona	Pent-land Skerry	Aus-kerry	Switha	Stroma	Calf of Eday	Cop-insay	TOTAL
1972	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1973	503	207	519	233	66	177	88	351	35	15	12	86	92	51	52	87	0	0	0	0	2581
1974	525	190	479	146	21	61	137	500	72	132	0	134	69	71	73	84	0	0	0	0	2700
1975	483	230	483	271	49	39	117	477	65	63	4	111	21	59	48	152	0	0	0	0	2679
1976	605	175	648	328	53	68	68	398	85	60	4	198	21	92	65	375	0	0	0	0	3247
1977	679	210	684	305	78	50	130	477	58	111	4	194	21	92	65	199	0	0	0	0	3364
1978	333	210	800	471	136	79	192	700	58	219	4	149	36	104	57	134	0	90	0	0	3778
1979	546	294	344	430	127	144	368	672	92	280	4	142	69	92	65	145	0	152	0	0	3971
1980	496	166	676	415	107	315	275	817	165	336	0	167	74	108	81	97	0	174	0	0	4476
1981	442	199	860	449	45	293	510	712	202	319	4	108	92	225	125	249	0	223	0	0	5064
1982	454	87	716	665	29	326	521	817	146	295	4	104	103	148	147	294	153	227	0	0	5241
1983	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1984	517	127	601	518	0	303	368	834	376	335	0	111	79	85	70	219	119	79	0	0	4741
1985	483	191	568	643	0	342	245	796	526	315	0	115	60	260	82	261	151	161	0	0	5199
1986	637	227	602	533	0	390	358	752	811	345	0	145	81	191	70	278	157	219	0	0	5796
1987	593	245	661	575	0	501	559	817	908	258	0	105	84	313	89	216	159	257	0	0	6340

YEAR	Muckle Green-holm	Little Green-holm	Little Linga	Holm of Spur-ness	Point of Spur-ness	Linga-Holm	Holm of Huip	Fara-holm	Faray	Rusk-holm	Wart-holm	Sweyn-holm & Gairsay	Grass-holm	Swona	Pent-land Skerry	Aus-kerry	Switha	Stroma	Calf of Eday	Cop-insay	TOTAL
1988	424	186	613	432	0	577	559	845	953	248	0	75	13	354	68	225	168	243	0	0	5983
1989	451	207	592	434	0	715	651	778	1465	228	0	154	40	305	69	281	226	315	0	0	6911
1990	359	223	636	345	0	808	729	957	1304	187	0	182	40	344	77	253	204	359	15	15	7037
1991	479	208	753	390	0	1141	886	1000	1594	194	0	212	70	515	93	274	271	436	83	124	8723
1992	544	235	868	467	0	1189	1062	1321	1874	212	0	225	53	614	72	176	308	567	141	234	10162
1993	639	247	854	382	0	1252	1227	1324	1794	224	0	286	83	604	83	163	321	605	269	507	10864
1994	676	273	799	363	0	1530	1317	1258	1911	228	0	266	69	669	68	174	338	515	323	829	11606

TABLE 4: Pup production estimates for sites other than those covered by aerial surveys

YEAR	Farne Islands	Isle of May	SW England	Wales	Donna Nook	Helms-dale	Eriboll	Shetland	South Ronaldsay (Orkney)
1956	751	.	.	.	.	.	.	.	.
1957	854	.	.	.	.	.	.	.	.
1958	869	.	.	.	.	.	.	.	.
1959	898	.	.	.	.	.	.	.	.
1960	1020	.	.	.	.	.	.	.	123
1961	1141	.	.	.	.	.	.	.	152
1962	1118	.	.	.	.	.	.	.	.
1963	1259	.	.	.	.	.	.	.	.
1964	1439	.	.	.	.	.	.	.	115
1965	1404	.	.	.	.	.	.	.	74
1966	1728	.	.	.	.	.	.	.	107
1967	1779	.	.	.	.	.	.	.	132
1968	1800	.	.	.	.	.	.	.	152
1969	1919	.	.	.	.	.	.	.	127
1970	1987	.	.	.	15	.	.	.	103
1971	2041	.	.	.	1	.	.	.	148
1972	1617	.	.	.	0	.	.	.	.
1973	1678	.	107	.	0	.	.	578	123
1974	1668	.	.	.	.	.	.	.	136
1975	1617	.	.	.	.	.	.	.	197
1976	1426	.	.	.	.	.	.	.	160
1977	1243	.	.	645	.	.	.	700	156
1978	1162	.	.	.	.	.	.	.	169
1979	1320	300	.	.	.	.	.	.	164
1980	1118	499	.	.	.	.	.	.	140
1981	992	505	.	.	34	.	.	.	82
1982	991	603	.	.	43	.	.	.	103

YEAR	Farne Islands	Isle of May	SW England	Wales	Donna Nook	Helms-dale	Eriboll	Shetland	South Ronaldsay (Orkney)
1983	902	336	.	.	.	.	.	.	.
1984	778	517	.	.	30	94	406	.	.
1985	848	810	.	.	53	.	.	.	.
1986	908	891	.	.	35	.	.	.	.
1987	930	865	.	.	72	.	.	.	.
1988	812	608	.	.	54	.	.	.	.
1989	892	936	.	.	94	280	666	.	.
1990	1004	1122	.	.	152	.	.	.	.
1991	927	1225	.	.	223	321	.	.	241
1992	985	1252	.	1321	200	225	612	.	246
1993	1051	1468	.	1377	205	.	700	.	244
1994	1025	1408	.	1343	302	.	700	.	258

TABLE 5: Estimated size of the population associated with all major grey seal breeding sites in Scotland and Northumberland, except Loch Eriboll, Helmsdale and the Shetlands. Estimates refer to the number of seals of age 1 and over at the time of the breeding season.

YEAR	Pup Production	Female Population	Female + Male Population
1984	14970	26735	48011
1985	16246	28693	51526
1986	17770	30826	55362
1987	19005	33175	59597
1988	18260	35682	64115
1989	20043	37989	68198
1990	21351	40551	72749
1991	24230	43276	77583
1992	27334	46441	83247
1993	28541	50076	89814
1994	29355	53829	96577
1995		61936	111153

Legends to figures

Figure 1a. Total production estimated for all sites in the Outer Hebrides and the Orkneys since the 1960's, when regular monitoring began.

Figure 1b. Total production estimated for all sites in the Inner and Outer Hebrides, and the Orkney islands from 1984 to 1994. Production values are shown with their upper and lower 95% confidence limits, where these are available. These limits assume that the various pup development parameters which are involved in the estimation procedure remain constant from year to year. They therefore underestimate the total variability in the estimates, but they are useful for a comparison of the precision of the estimates in different years.

Figure 2a. Total pup production at all regularly monitored colonies as estimated by the current method (scos95) and as estimated by the method used to provide advice in 1994 (scos94).

Figure 2b. A comparison of estimated pup productions at all regularly monitored colonies, with their 95% confidence limits, and the pup production which is predicted on the basis of the historical time series of pup production estimates and the assumption that adult and juvenile survival, and fecundity have remained constant. Fecundity was adjusted downwards between 1988 and 1991 to account for the effects of the 1988 phocine distemper epizootic.

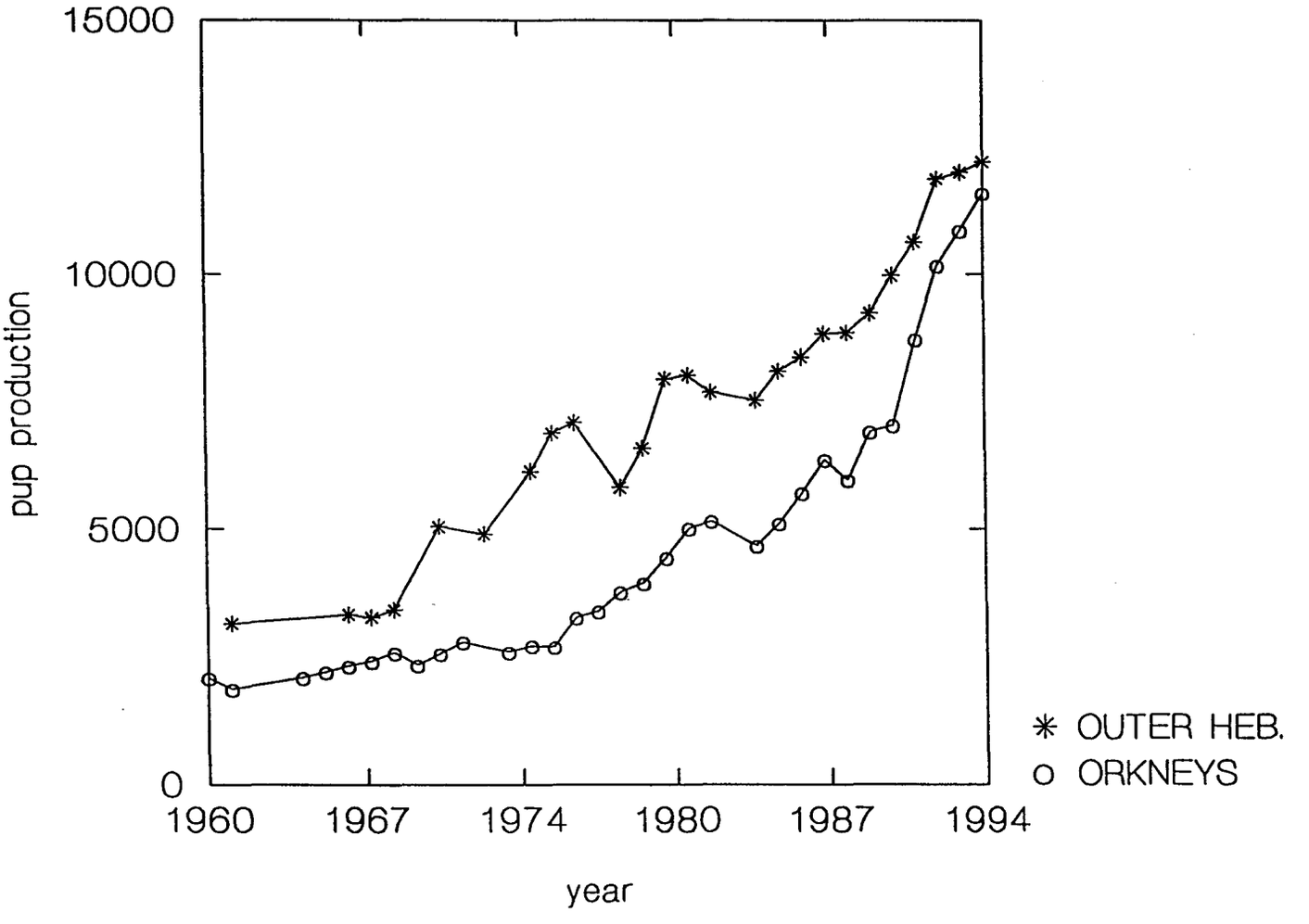
Figure 3. Female and total population size estimates for seals born at the Inner and Outer Hebrides, Orkney (excluding South Ronaldsay), Isle of May, Farnes and Donna Nook. These breeding sites have been monitored annnually since 1984. Estimates refer to the number of seals surviving to just before the breeding season.

Figure 4. The location of the main grey seal breeding sites in Britain

Figure 5. Distribution of the number of grey seals hauled out in Scotland as revealed by surveys for common seals conducted in the summers of 1988-1993.

Figure 6. Distribution and size of grey seal populations in the North Atlantic.

Figure 1a


15000
10000
5000
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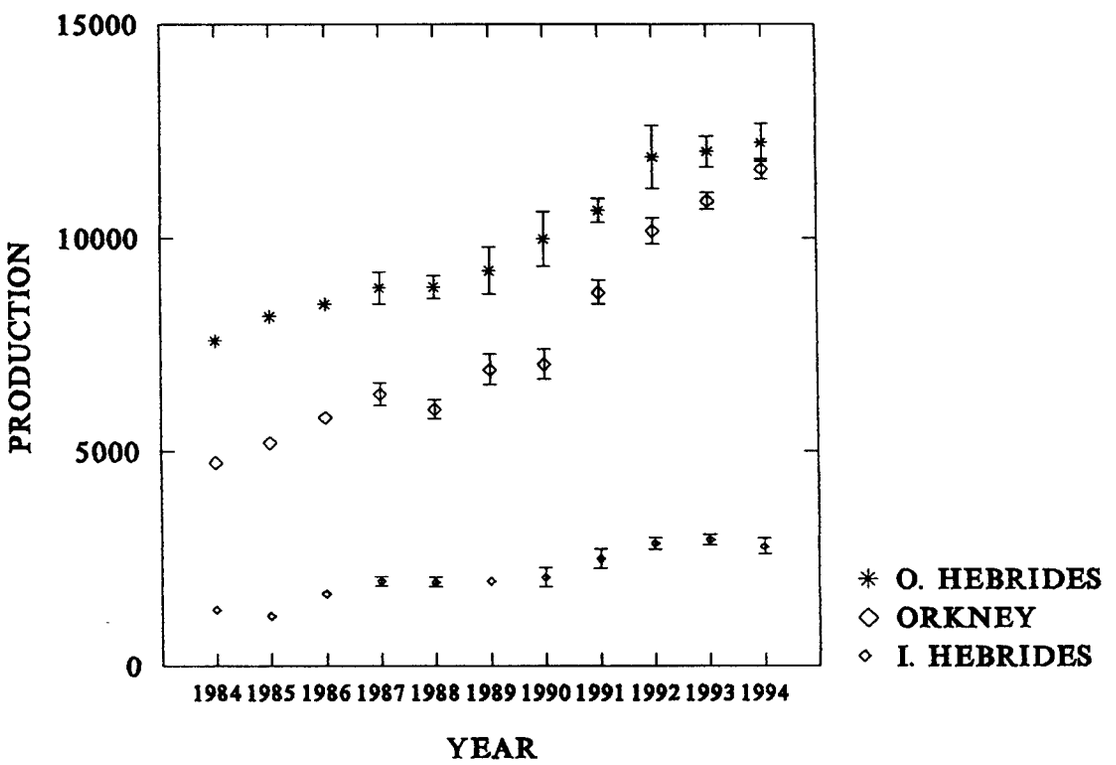
pup production
1960
1967
1974
1980
1987
1994
year
* OUTER HEB.
o ORKNEYS

Figure 1b


15000
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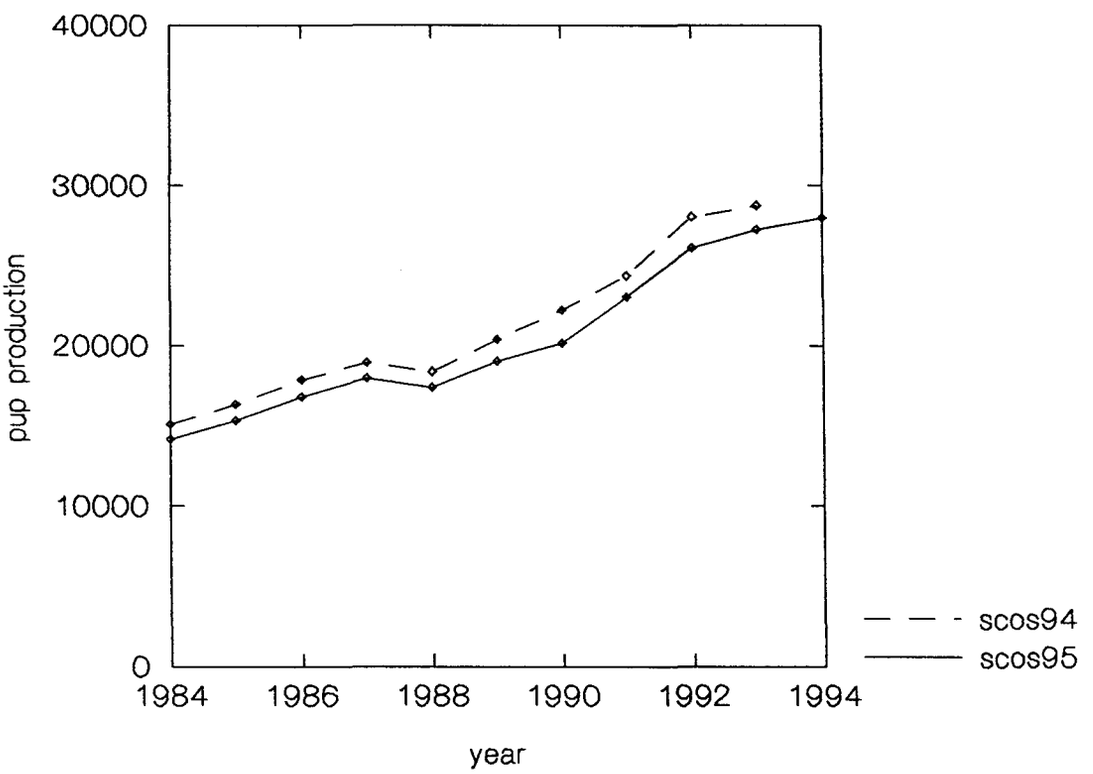
PRODUCTION
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
YEAR
O. HEBRIDES
ORKNEY
I. HEBRIDES

Figure 2a


40000
30000
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pup production
1984
1986
1988
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year
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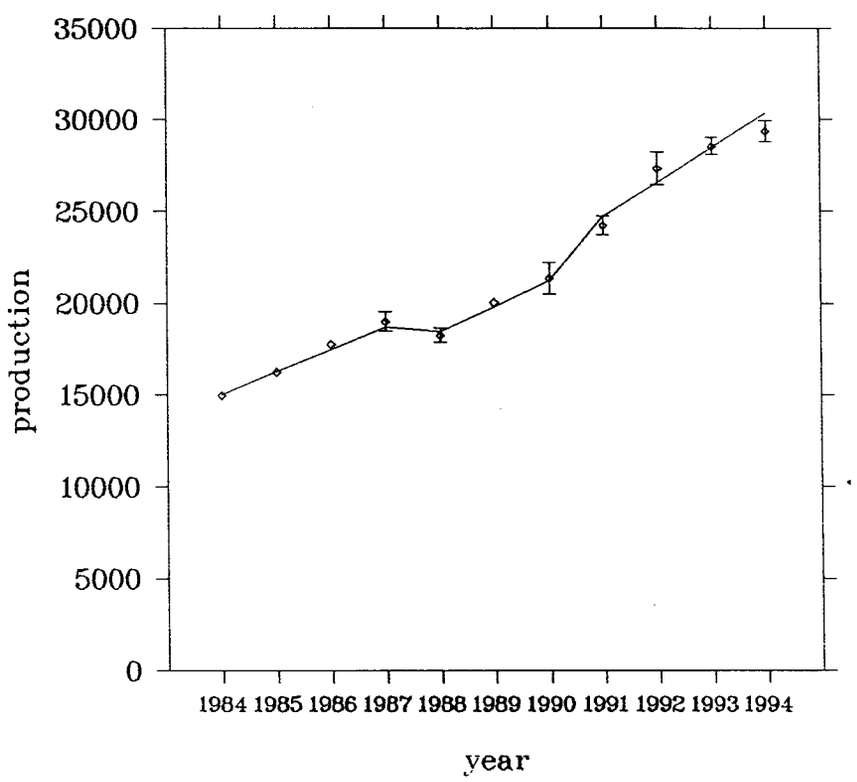
Figure 2b


35000
30000
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production
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
year

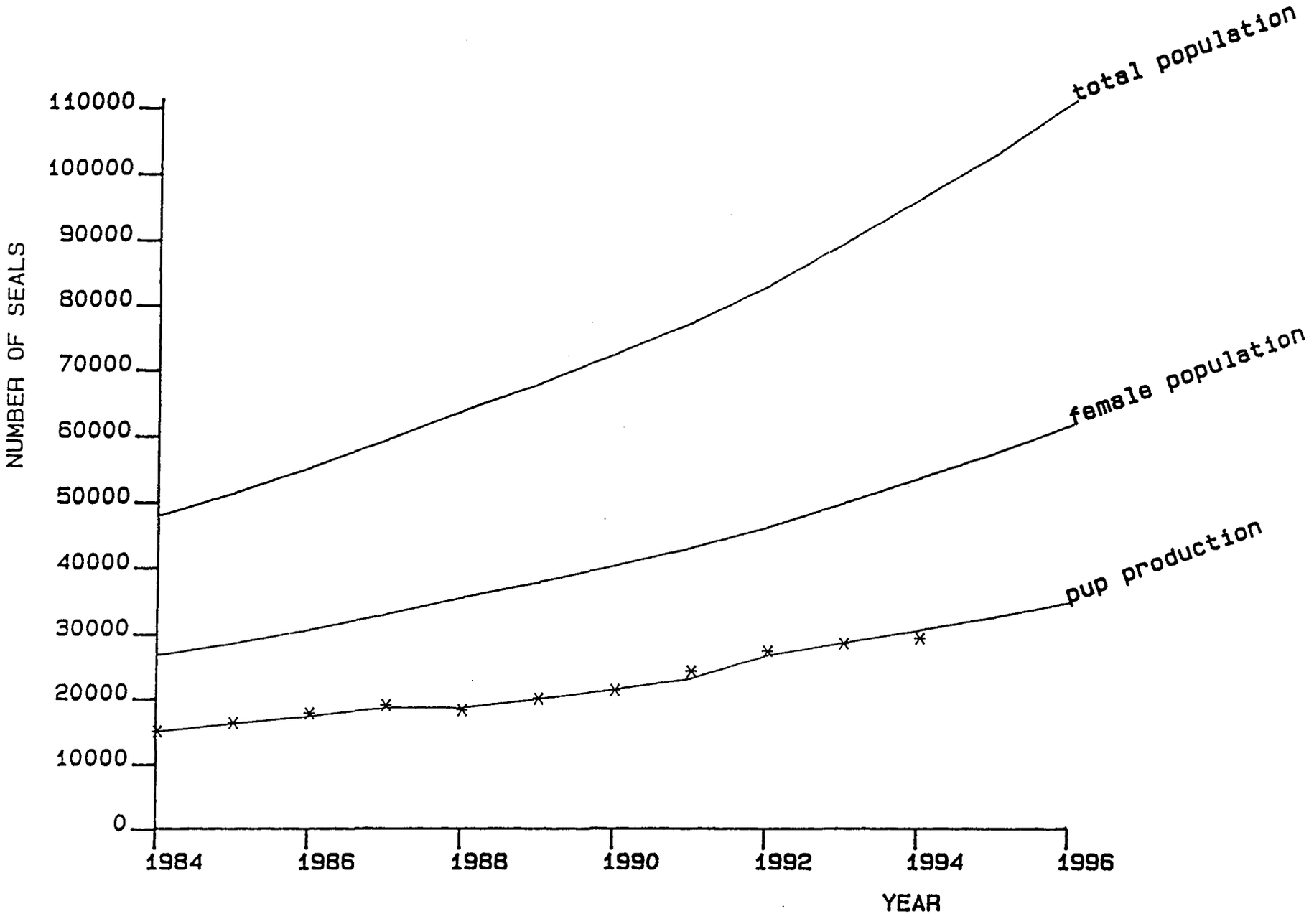
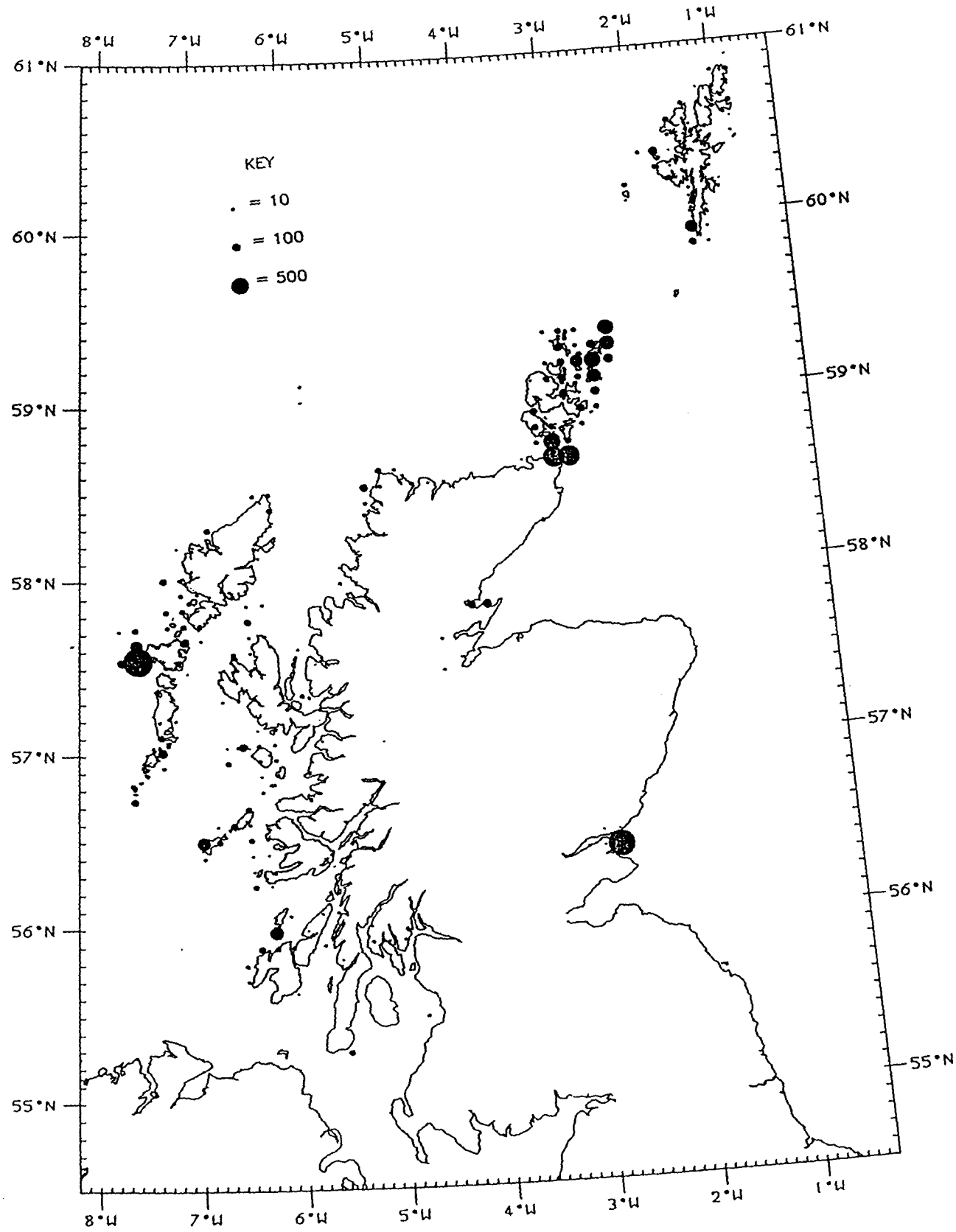

total population
female population
pup production
NUMBER OF SEALS
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1984
1986
1988
1990
1992
1994
1996
YEAR

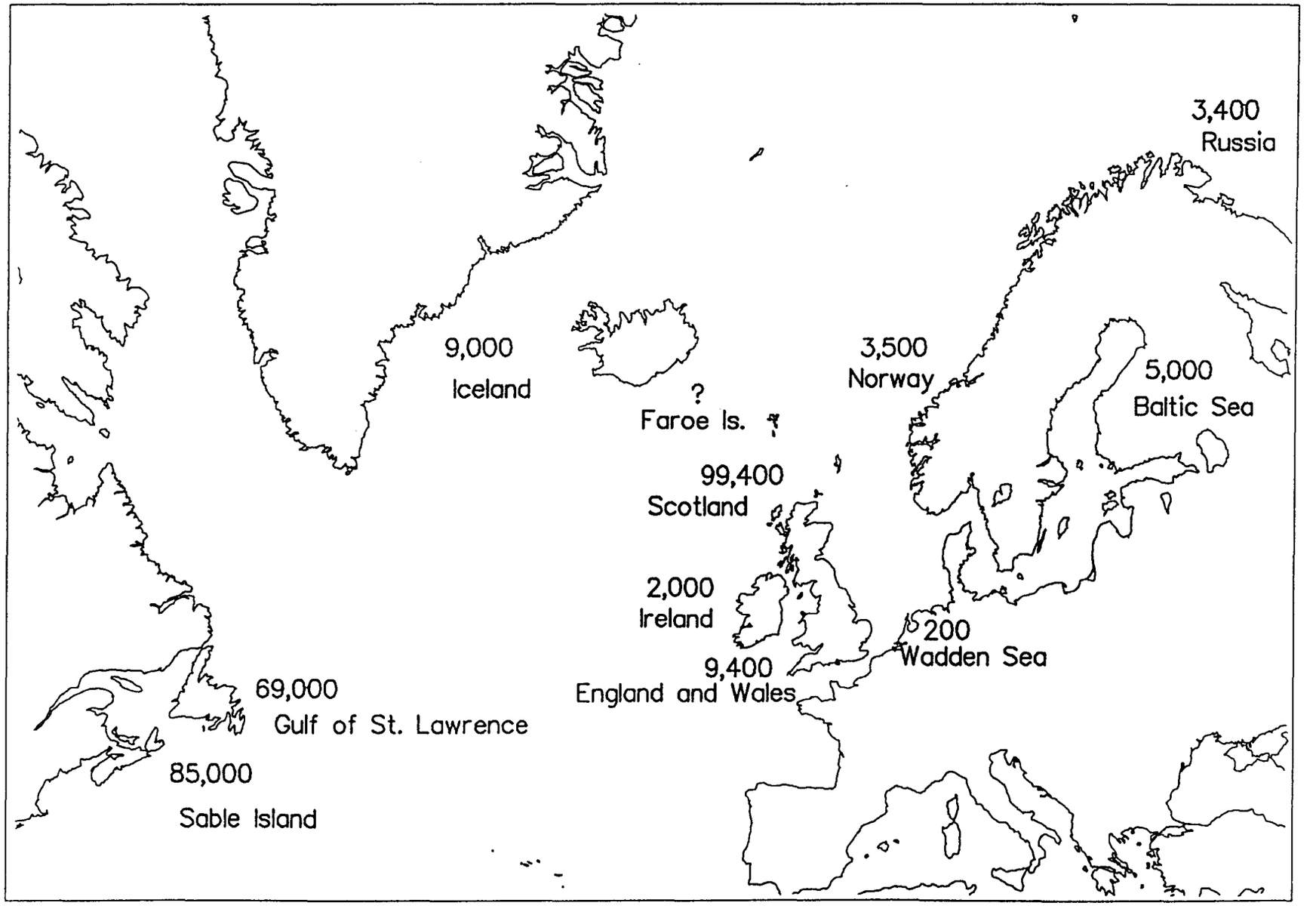
Figure 3

MAIN GREY SEAL BREEDING SITES

Figure 4

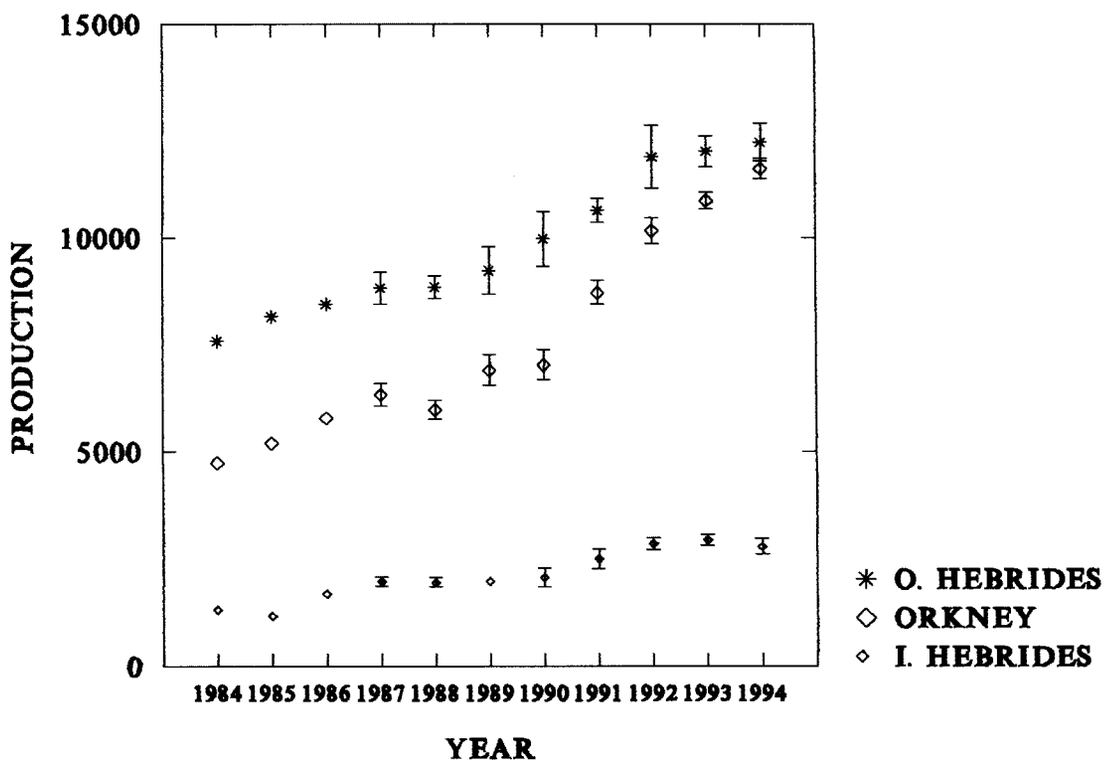
Figure 5

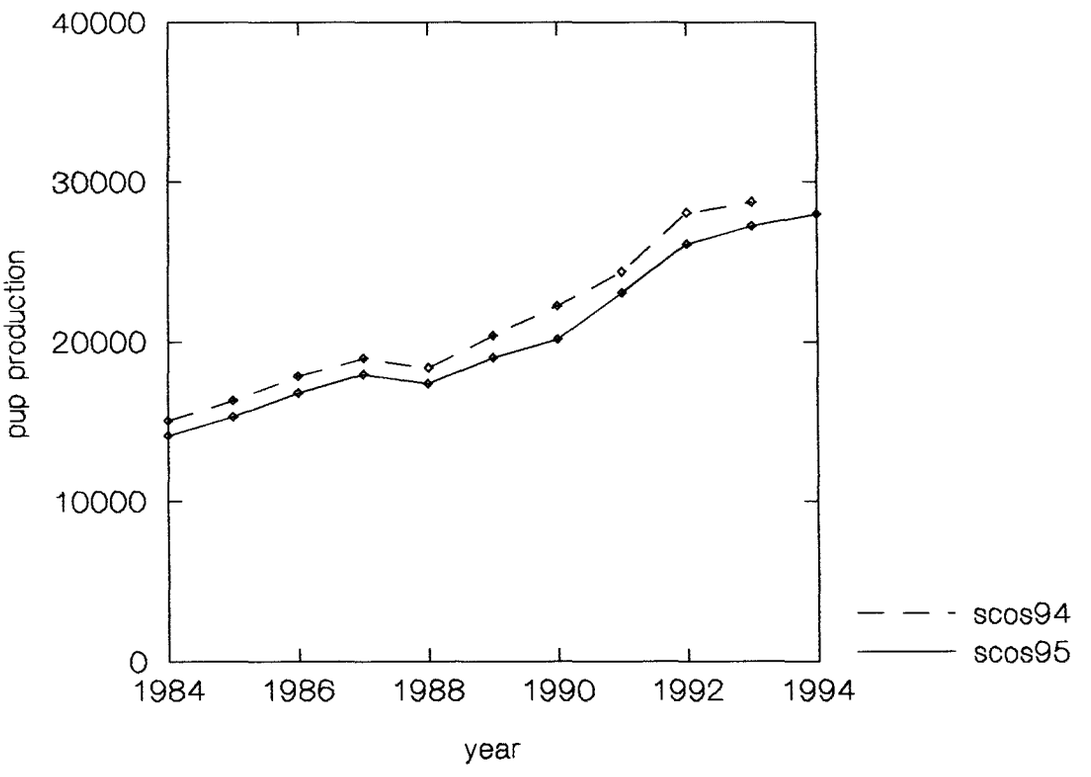


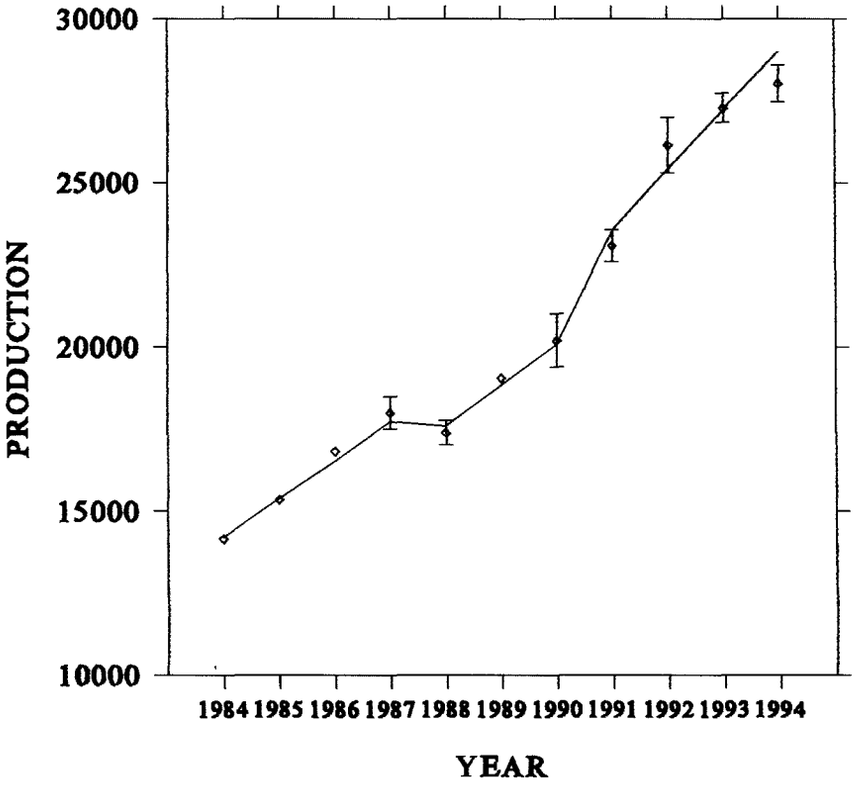


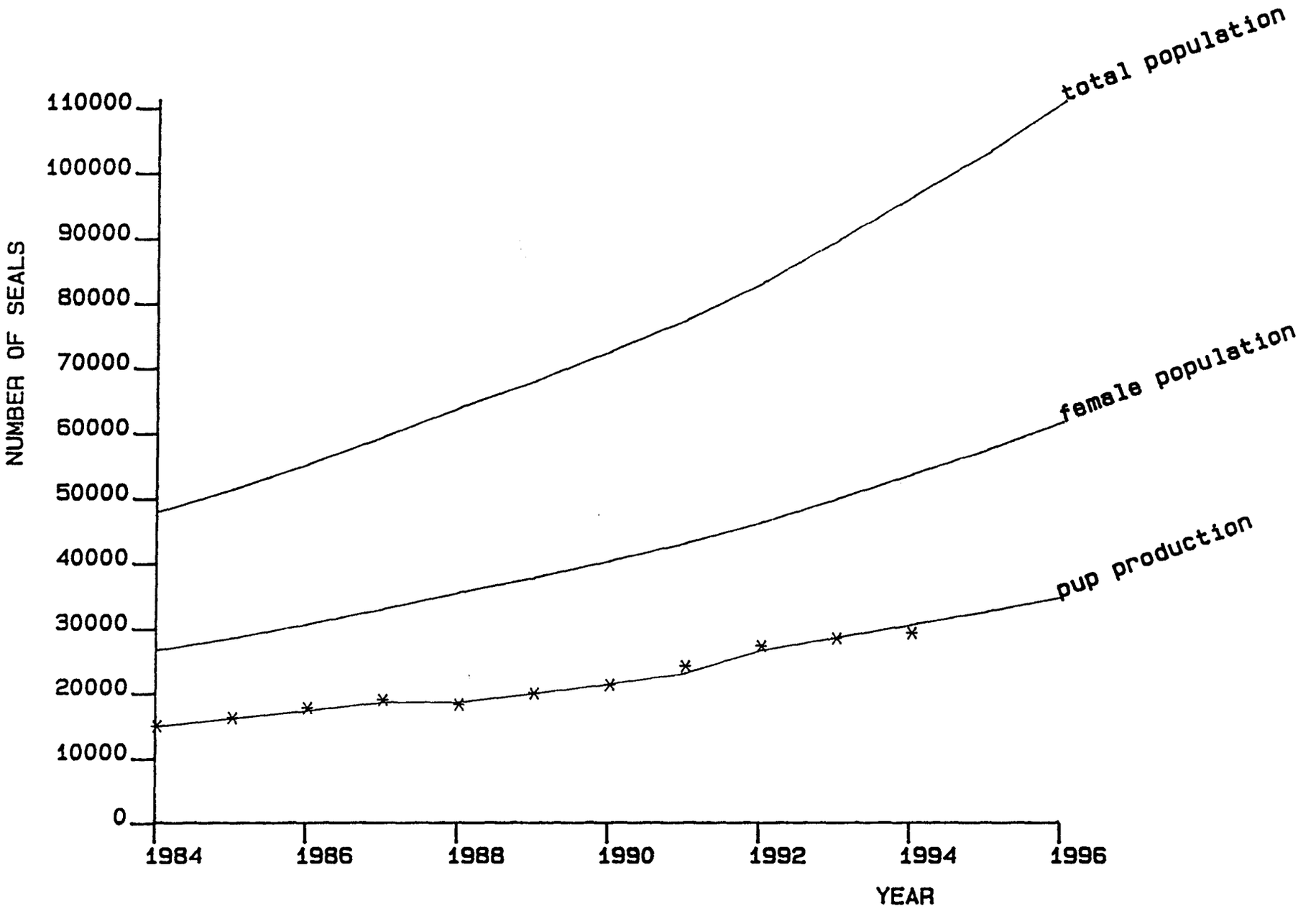
Distribution and Abundance of Grey Seals in the North Atlantic

Figure 6

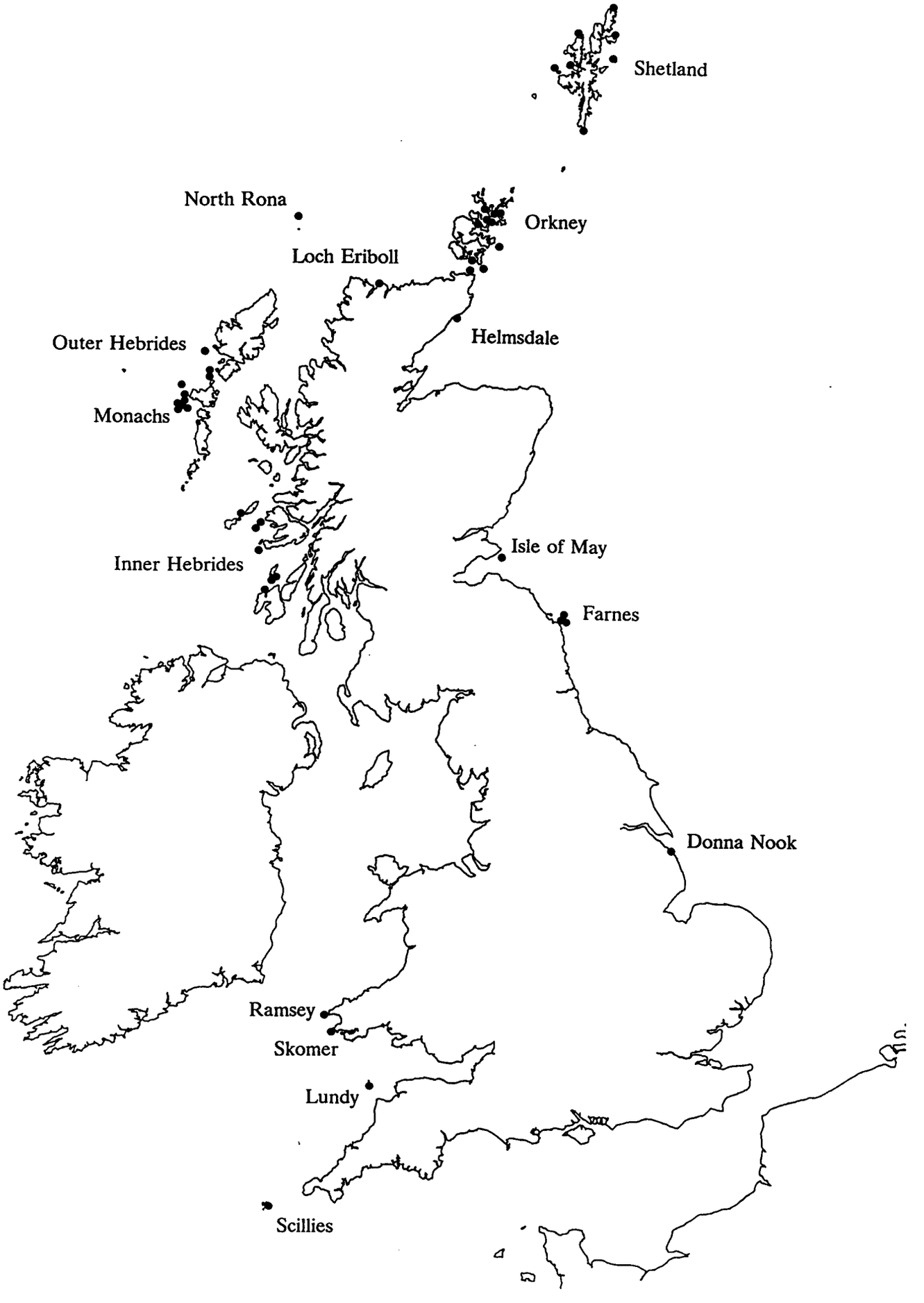

15000
10000
5000
0
PRODUCTION
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
YEAR
O. HEBRIDES
ORKNEY
I. HEBRIDES

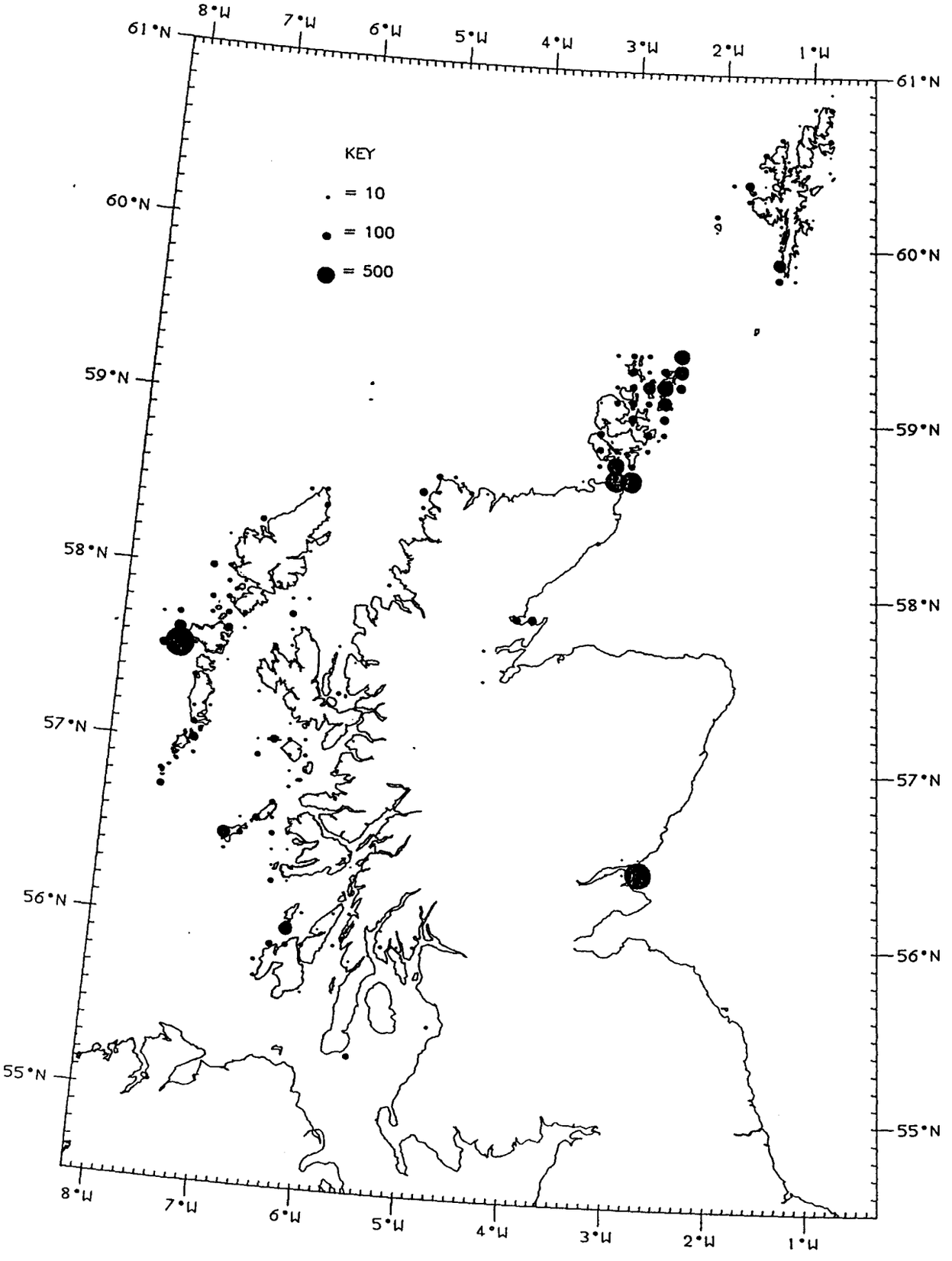

40000
30000
20000
10000
0
pup production
1984
1986
1988
1990
1992
1994
year
scos94
scos95

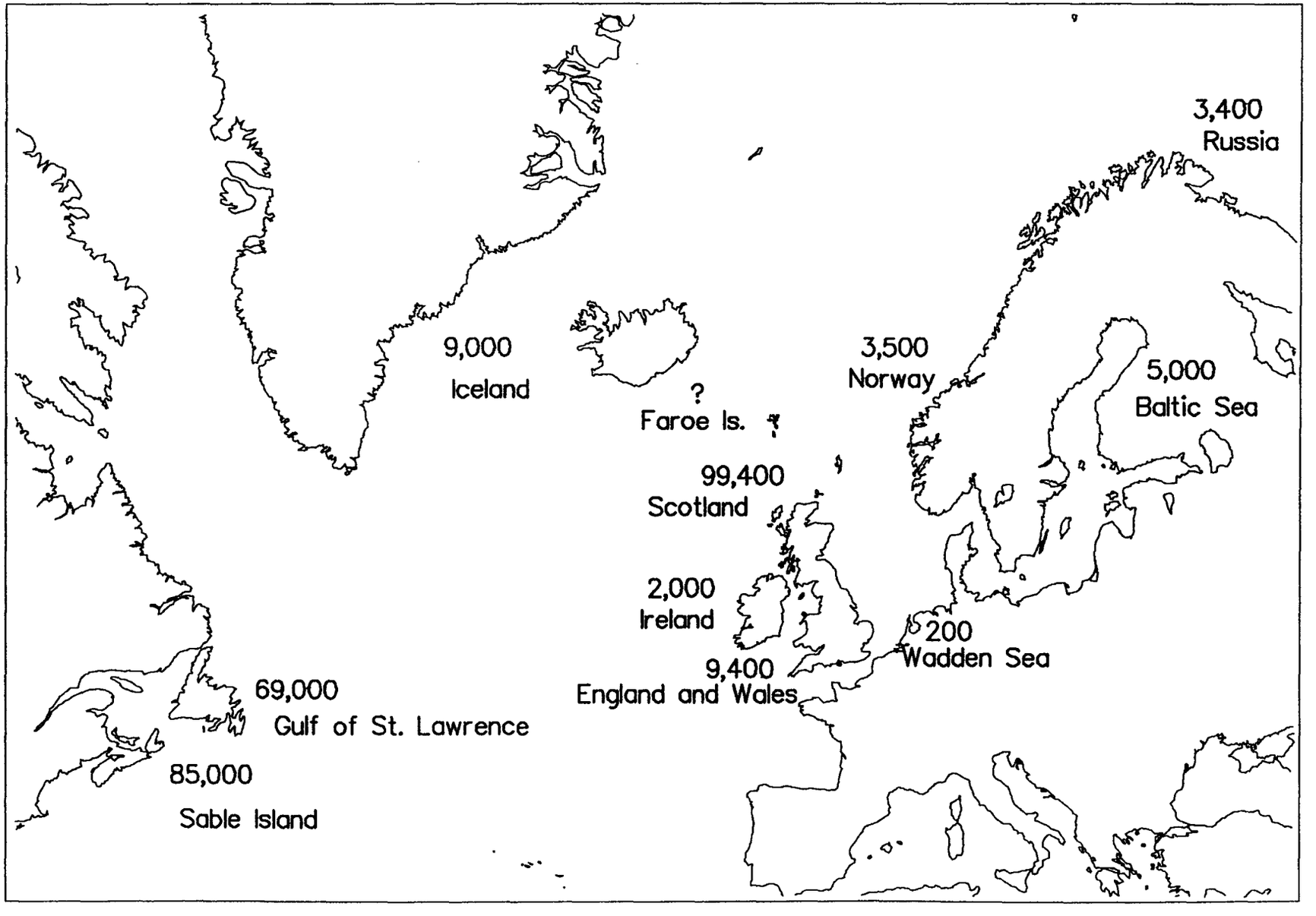

30000
25000
20000
15000
10000
PRODUCTION
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
YEAR


total population
female population
pup production
NUMBER OF SEALS
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1984
1986
1988
1990
1992
1994
1996
YEAR

MAIN GREY SEAL BREEDING SITES

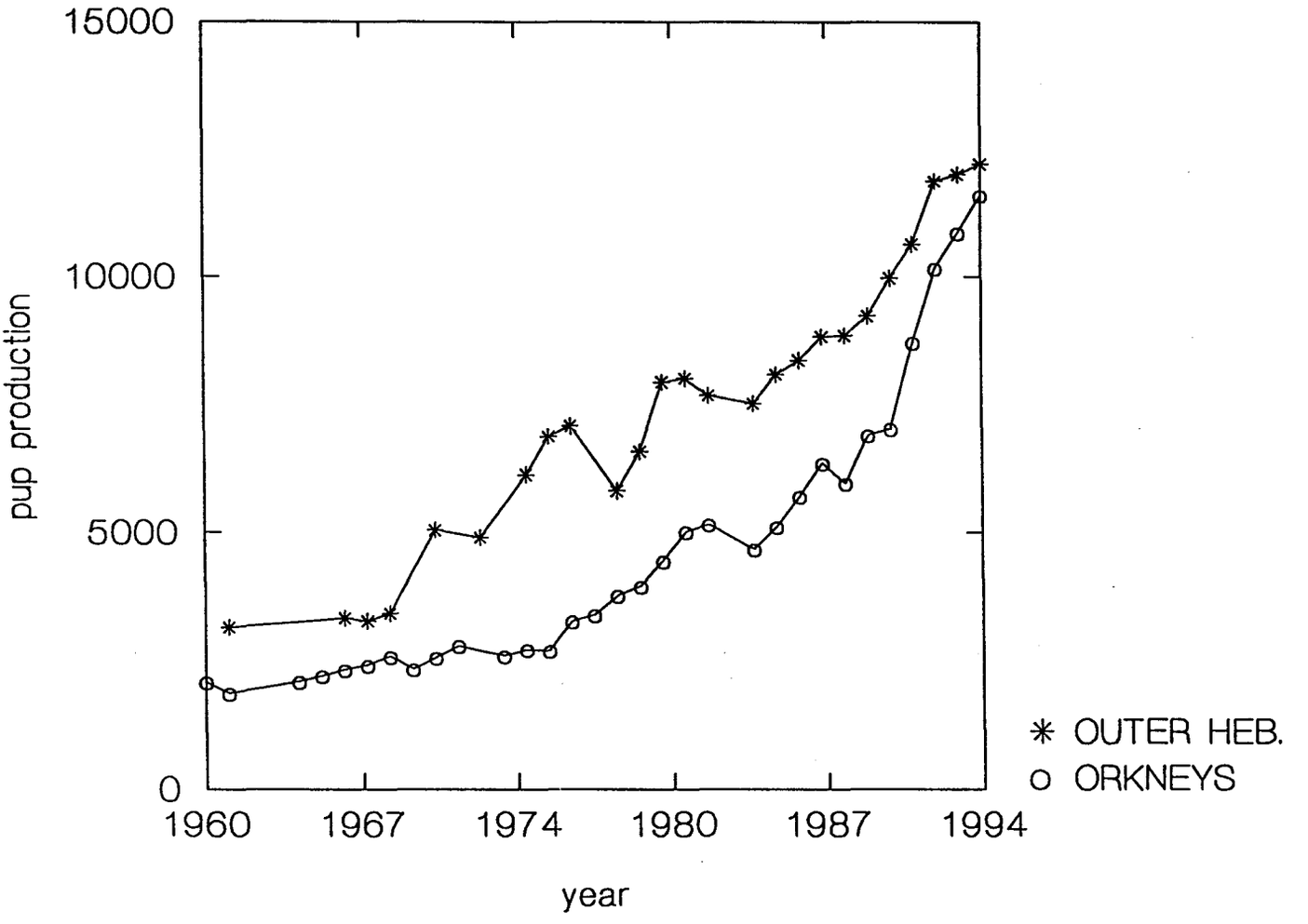



KEY
= 10
= 100
= 500
8°W
7°W
6°W
5°W
4°W
3°W
2°W
1°W
61°N
60°N
59°N
58°N
57°N
56°N
55°N

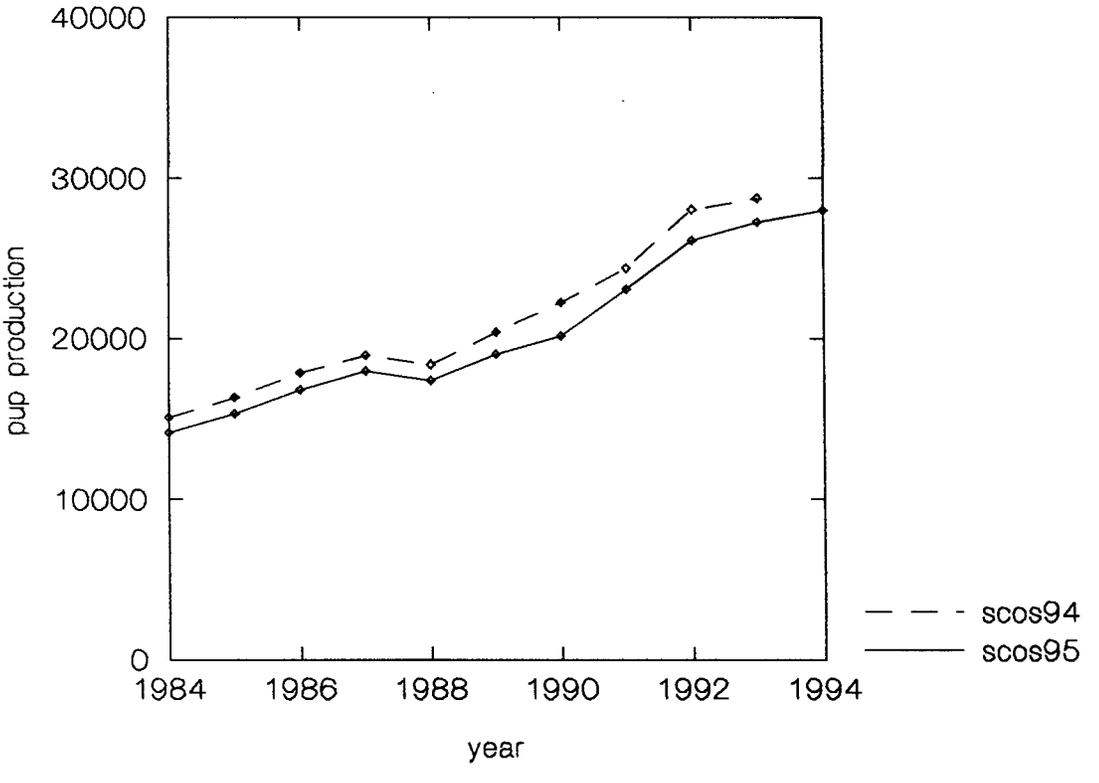


Distribution and Abundance of Grey Seals in the North Atlantic

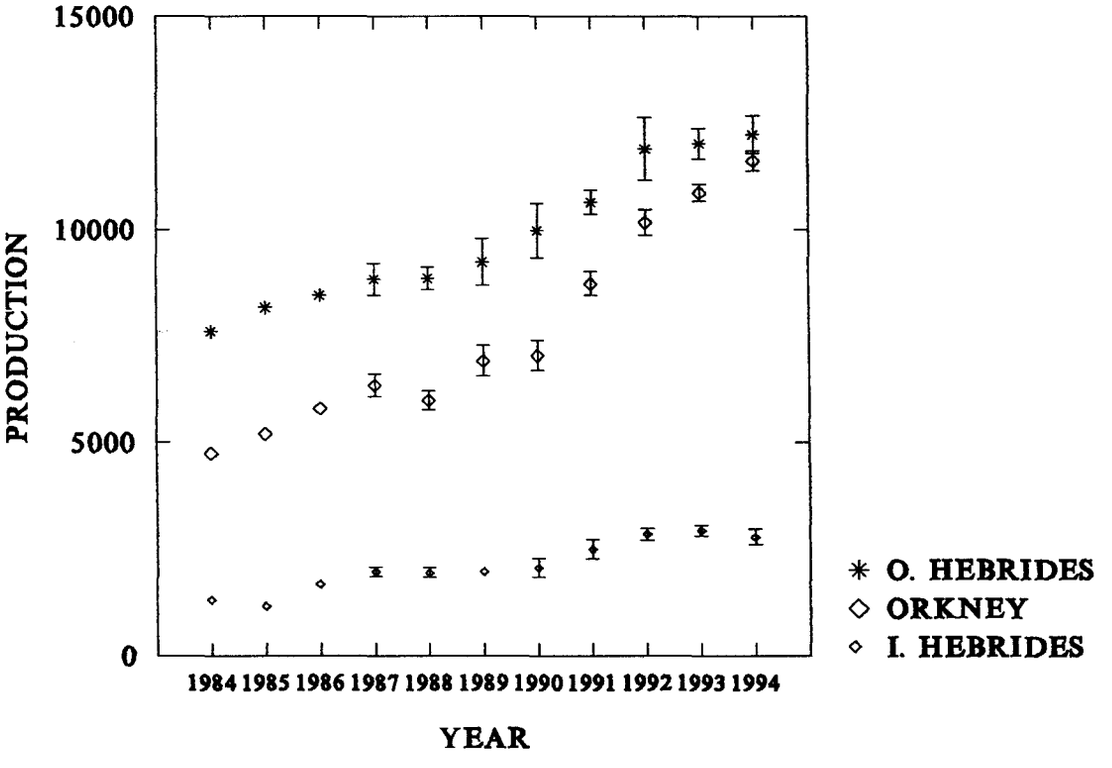
Grey Seal Advice Figure 1a



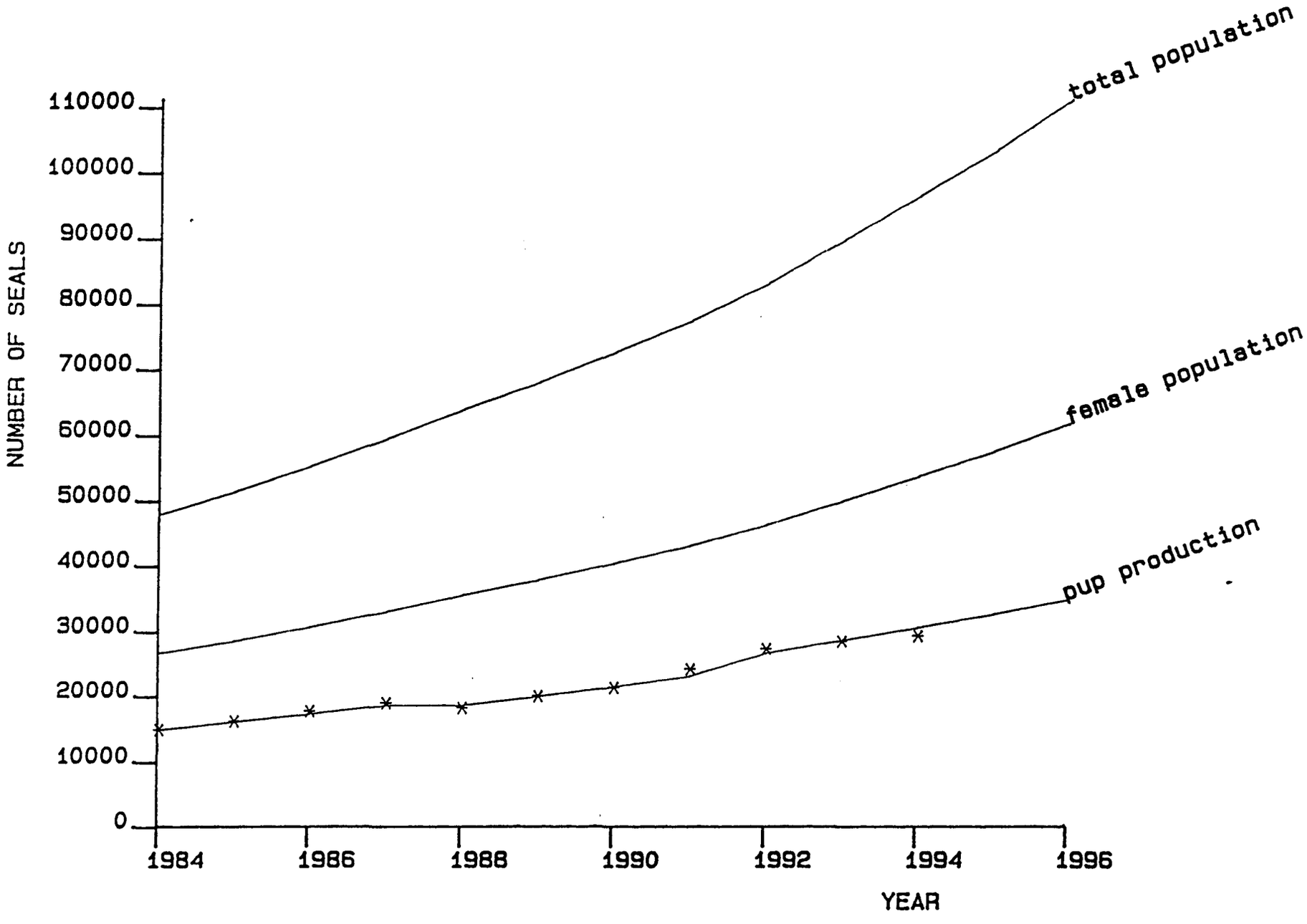
Grey Seal Advice Figure 1b



Grey Seal Advice Figure 2a

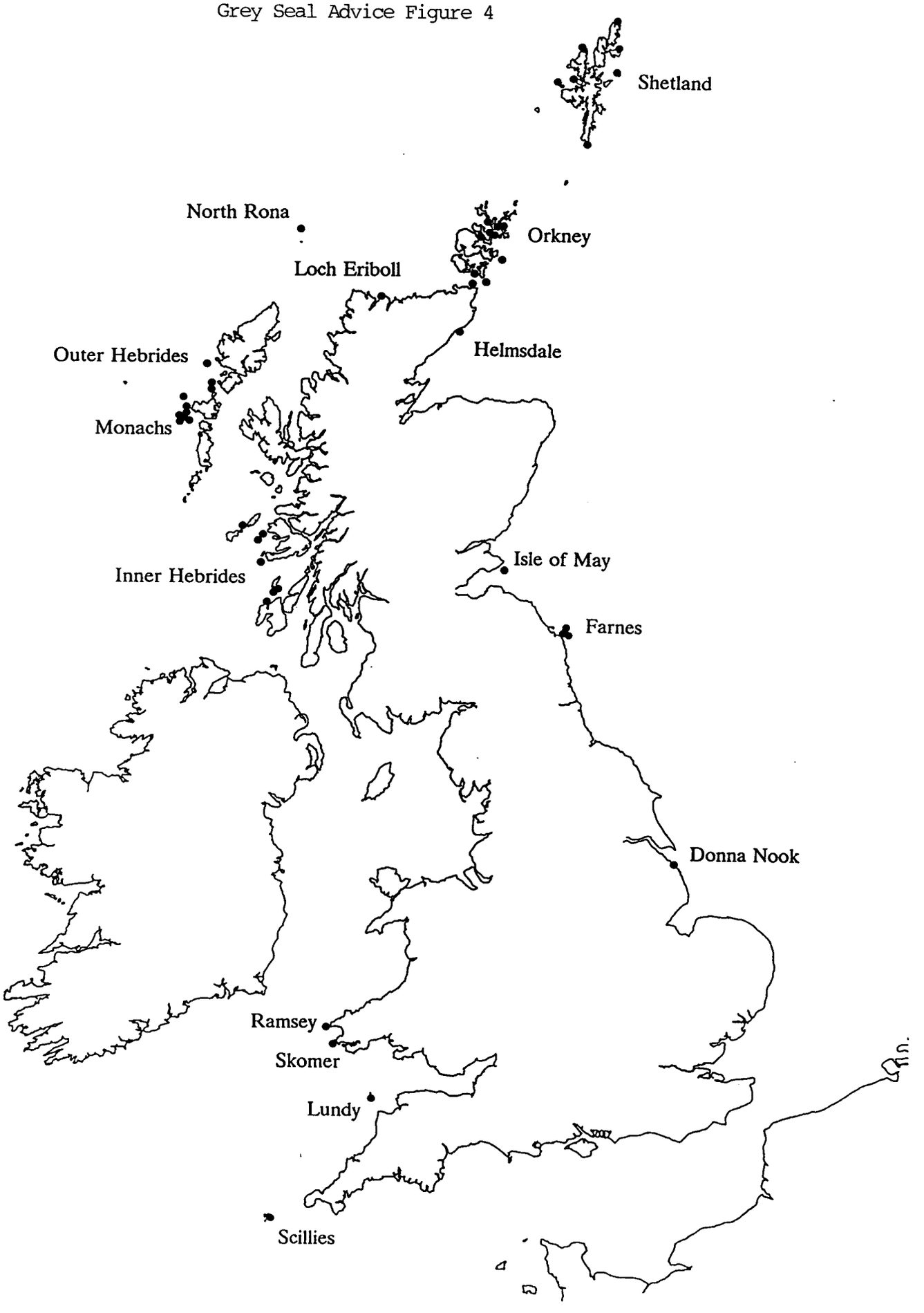


Grey Seal Advice Figure 3



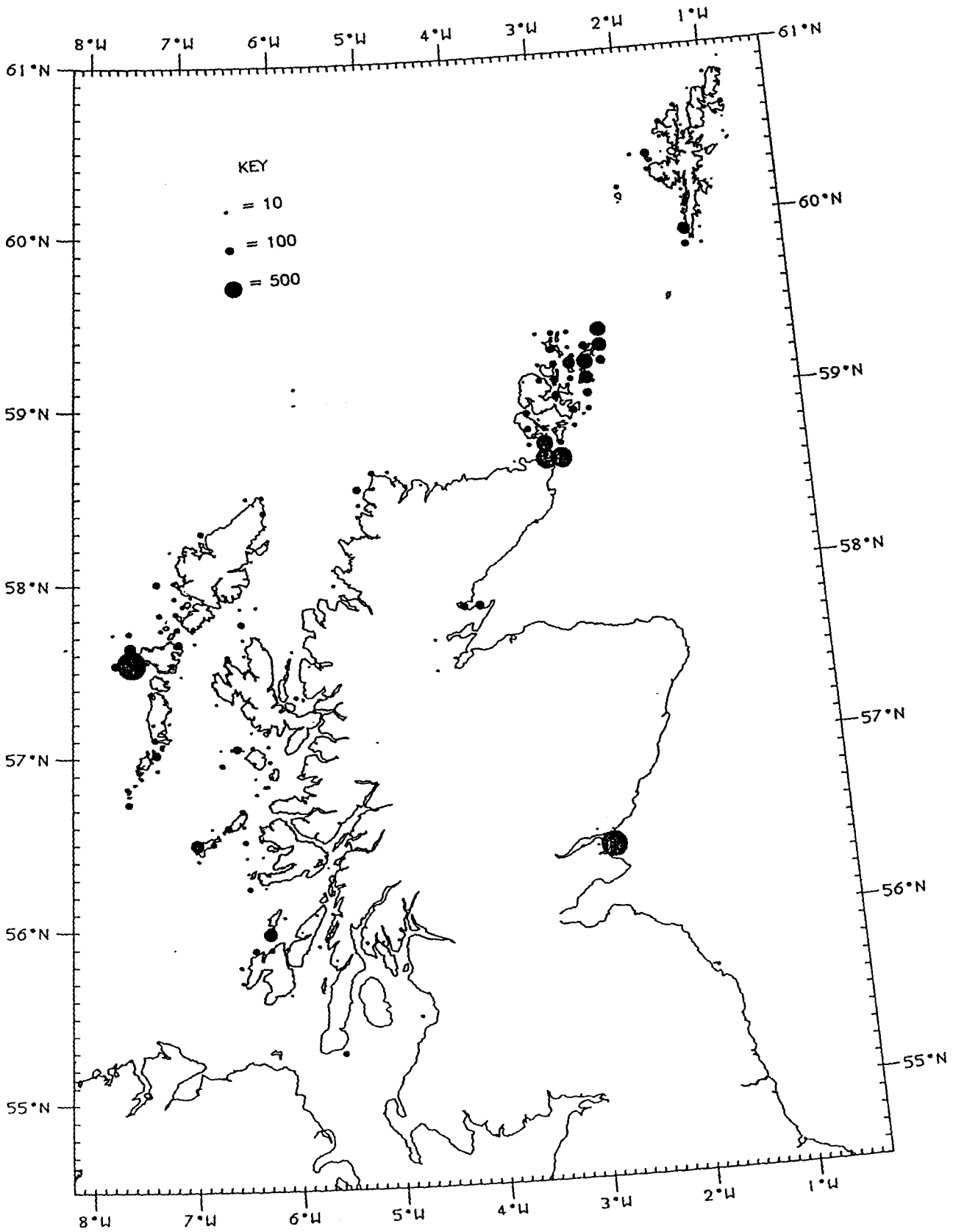
MAIN GREY SEAL BREEDING SITES

Grey Seal Advice Figure 4

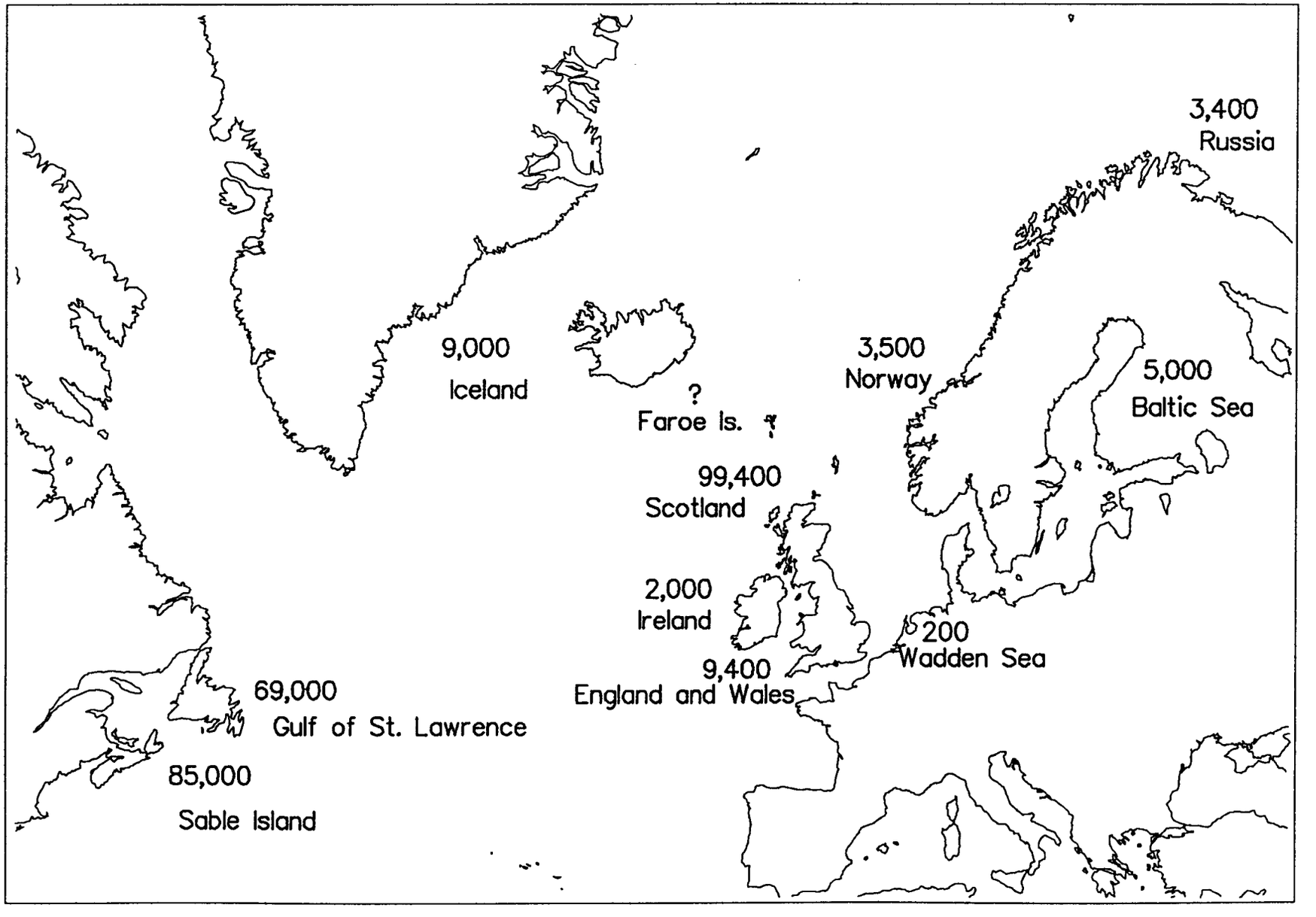


Grey Seal Advice Figure 5

Grey seals in August 1988 - 1993



Grey Seal Advice Figure 6



Distribution and Abundance of Grey Seals in the North Atlantic