ABUNDANCE AND TRENDS OF ANTARCTIC PINNIPED POPULATIONS

(Report to the CCAMLR Scientific Committee
from the SCAR Group of Specialists on Seals)

ABUNDANCE AND TRENDS OF ANTARCTIC PINNIPED POPULATIONS

(Report to the CCAMLR Scientific Committee
from the SCAR Group of Specialists on Seals)

June 1992

In response to a request from the CCAMLR Scientific Committee, the SCAR Group of Specialists on Seals reported in 1988 on the abundance and trends of Antarctic pinniped populations (SC-CAMLR-VII/9 and SC-CAMLR-VII/12). The Scientific Committee had requested that SCAR continue to review available information and to update its report on the status and trends of pinnipeds every five years. The SCAR Group of Specialists on Seals met in Bariloche, Argentina, from 8 to 12 June 1992. The following paragraphs and tables are excerpted from the report of the Group's meeting.

Five-Year Update of Abundance and Trends Report to CCAMLR

3.25 The Group considered the most appropriate way to respond to the request from CCAMLR for assistance in providing an updated report on the abundance and population trends of Antarctic pinnipeds. The Group's previous summary report to CCAMLR on this topic was developed by the Group in 1988. The CCAMLR Scientific Committee had thanked the Group for its help at that time, and requested that the Group provide updated reviews to CCAMLR every five years.

3.26 In anticipation of the 1992 review of pinniped status and trends, the CCAMLR Secretariat had prepared and distributed to individual pinniped researchers standardised forms for reporting abundance data to CCAMLR. In reviewing these forms, the Group agreed that it would be difficult to enter into a database the judgements necessary to estimate population trends. For example, census data for many sites were incomplete, survey methods varied among sites, and assumptions or conditions peculiar to individual censuses were not available on the standardised forms. Thus, some of the resulting descriptions of increasing or decreasing trends were based on professional judgements arising from combined technical expertise. In the Group's view, the CCAMLR Scientific Committee would be assisted most effectively in considering pinniped population trends by the Group providing it with analyses and interpreted judgements.

3.27 The Group therefore agreed that it would probably be most helpful to CCAMLR to provide summaries of the available population data. The updated reviews of population status and trends for

Antarctic pinniped populations are given in Tables 2, 3, 4 and 5. The Convener was requested to convey this information through SCAR to the CCAMLR Scientific Committee for its consideration.

Recent Population Abundance Estimates

3.12 Antarctic fur seal (*Arctocephalus gazella*) populations continue to increase in most areas. Fur seal abundance in the South Shetland, Macquarie, Heard, and Marion Islands appears to be increasing, while the breeding population in the South Orkney Islands has been relatively stable since about 1973 (Table 2).

3.13 A census of Antarctic fur seal pup production at South Georgia in 1990/91 yielded an estimated total of 269 000 (95% confidence limits 198 000 to 340 000) pups born in that year. However, several indicators suggested that pup production was low that year. Pup production in 1990/91 was lower than predicted (378 000) based on longterm monitoring of population size at Bird Island. The average annual increase of the population was 9.8% between 1976/77 and 1990/91. Knowledge of the age structure of the population is insufficient to provide an accurate estimate of total population size, but a conservative estimate would be 1.5 million. Population expansion at South Georgia has occurred mainly through the progressive colonisation of coastline from west to east and most fur seals (>90% of pup production) are still located at the west end of the island, west of Tawny Gap. This means that the fur seal breeding population at South Georgia remains concentrated close to the original center of recolonisation at Bird Island.

3.14 Numbers of Antarctic fur seals at other breeding sites are generally increasing. The average annual rate of increase in pup production at Marion Island has slowed somewhat in recent years compared with estimates made between 1974 and 1981, but this could have been caused by undercounts made in 1974. This may have caused the early estimate of the average annual increase to be inflated.

3.15 Dr Bengtson described the results of a recent census (1992) of the nine known Antarctic fur seal pupping locations identified during a 1986/87 census in the South Shetland Islands. Including pup counts at Cape Shirreff (2 973) supplied by Dr Torres, at least 6 781 pups were born in the South Shetland Islands during the 1991/92 season. This represents a significant increase over the number of pups born in 1986/87 (3 821). At individual sites in the South Shetland Islands there were large variations in the levels of change over the five years between censuses (from -15% to +300%).

3.16 Sub-Antarctic fur seal (*A. tropicalis*) populations are increasing rapidly, and a small population appears to be establishing itself at Macquarie Island together with Antarctic fur seals and New Zealand fur seals (Table 3). The first record of sub-Antarctic fur seals breeding south of the Antarctic Polar Front suggests that a similar situation may be developing at Heard Island as at Marion Island, lle de la Possession, and Macquarie Island, where land-breeding populations of the Antarctic and sub-Antarctic fur seal occur together.

3.17 The recent status of the three stocks of southern elephant seals was considered in detail by the Workshop on Southern Elephant Seals held in 1991 (Table 4). Southern elephant seal populations are declining in the Indian and Pacific Ocean sectors of the Antarctic, while the status of the South Georgia stock is uncertain.

3.18 Despite doubts about the status of possible population fluctuations at South Georgia due to the fact that the apparent stability of the population is based upon two censuses of pup production made 35 years apart, it does not show the longterm population decline illustrated by most other stocks. The uncertainty is mainly due to the long period between censuses and their limited number. However, there is no indication that the South Georgia population has experienced either a large decline or a large increase in recent years.

3.19 The elephant seal populations in the Indian Ocean sector are continuing to decline, especially at Marion and Heard Islands. However, at lles Kerguelen, which represents the largest component of this stock, pup production appears to be stable.

3.20 Although stocks of elephant seals at Macquarie Island were classified as being in decline in the Workshop Report, Mr Burton reported that, after a long period of declining numbers, pup production has been stable for the past four years.

3.21 At Peninsula Valdez, Argentina, the population of southern elephant seals has been increasing since at least 1975.

3.22 Thus, although declines in the numbers of southern elephant seals are continuing at some localities, on the basis of stocks in all regions, there is a suggestion of a trend towards population stability.

3.23 In contrast to the land-breeding Antarctic pinnipeds, there are relatively few data available for estimating the size or trends of ice-breeding seal populations. The dramatic changes in seasonal ice coverage, coupled with the logistic difficulties of operating ships and aircraft in the sea ice zone, present special challenges to obtaining census data.

3.24 Since 1983, there has been only one major survey (conducted early in 1992). The 1992 census data have been incorporated into Table 5, which updates the Group's 1988 compilation of ice seal census data. The Group felt it was unable to make meaningful assessments of potential trends in population abundance based on these limited data. The importance of acquiring additional census data for the pack ice seals was once again emphasized (see paragraphs 5.1 to 5.10).

Table 2: Population estimates of Antarctic fur seals (*A. gazella*).

Area	Numbers		Year	Trend	Reference
	Pups	Total			
South Georgia	378 000	1 500 000	1990/91	–	Boyd, 1992
South Orkney Is	7	--- [1]	?	---	
South Sandwich Is	0	400	1960	---	O'Gorman, 1961
South Shetland Is	6 781	27 802[2]	1991/92	–	Bengtson and Torres, unpubl. Aguayo *et al.*, 1992
Bouvet Is	2 000	> 9 501	1989/90	–	Bakken, 1991
Heard Is	248	--- [3]	1987/88	–	Shaughnessy and Goldsworthy, 1990
McDonald Is	100	300[1]	1979/80	–	Johnstone, 1982
Iles Kerguelen (Ile de Croy)	1 693	3 935[1]	1984/85	–	Stonehouse, 1988
Iles Crozet (Possession)	20	---	?	–––	Jouventin *et al.*, 1982
Marion Is	91	335[2]	1988/89	–	Wilkinson and Bester, 1990
Prince Edward Is	--	200	1981/82	–	Kerley, 1983
Macquarie Is	60	---	1991/92	–	Shaughnessy and Goldsworth, 1992

[1] Number in broad age and sex classes counted

[2] Total numbers estimated from pup counts only

[3] Large influxes of non-breeding animals reported in late summer at South Orkney Islands (Boyd, 1992; Vergani, unpublished) and Heard Island (Shaughnessy and Goldsworthy, 1990)

Table 3: Population estimates of sub-Antarctic fur seals (*A. tropicalis*).

Area	Numbers		Year	Trend	Reference
	Pups	Total			
Gough Is	> 53 076	> 200 000[1]	1977/78 (1988/89)[3]	–	Bester, 1987, 1990
Tristan da Cunha Group	> 20	> 1 200	?	–	Holdgate and Wace, 1976
Marion Is	9 338	44 822	1988/89	–	Wilkinson and Bester, 1990
Prince Edward Is	5 372	25 786 14 761[1]	1987/88	–	Wilkinson and Bester, 1990
Iles Crozet (Possession)	758	300	?	–	Jouventin *et al*., 1982
Amsterdam Is	10 898	> 35 000[1,2]	1981/82	–	Hes and Roux, 1983
St Paul Is	66	---	1984/85	–	Roux, 1987
Macquarie Is	19	---	1991/92	–	Shaughnessy and Goldsworthy, 1992
Heard Is	1	10	1987/88	–	Shaughnessy and Goldsworthy, 1992

[1] Numbers in broad age and sex classes counted
[2] Excludes yearlings
[3] Trends determined from censuses on parts of coastline

Table 4: Size and status of southern elephant seal populations within the three stocks of the Southern Ocean. Pup production estimates for 1990 were extrapolated from the most recent census figures using the rates of change in pup numbers shown below.

Stock	Locality	Year	Pup Production		Annual Rate of Change	Period	Status	Reference
			Observed	1990				
South Georgia	South Georgia	1985	102000	102000	?	1951-1985	Uncertain	McCann and Rothery, 1988
	South Orkney Islands	1985	<100	-	?	1948-1985	Uncertain	McCann, 1985
		1980s	5-10	approx. 5	?	1970s-1980s	Declining	Boyd, pers. comm.
	Falkland Islands	1960	approx. 1000	approx. 1000	?	-	Uncertain	Laws, 1960
	Gough Island	1989	28	28	0.0	1973-1989	Stable	Bester, 1990
	King George Island	1980	708	560	-0.05	1980-1990	Declining	Vergani, pers. comm.
	Nelson Island	1985	106	106	?	-	Uncertain	Vergani *et al.*, 1987
	Valdes Peninsula	1982	6737	-	+5.1	1975-1982	Increasing	Vergani *et al.*, 1987
		1990	9636	9636	+3.2	1982-1990	Increasing	Campagna and Lewis, pers. comm.
Iles Kerguelen	Marion Island	1989	585	540	-4.8	1951-1989	Declining	Wilkinson and Bester, in prep.
	Heard Island	1985	1300	11530	-2.4	1949-1985	Declining	Burton, 1986
	Iles Kerguelen	1977	45000	-	-4.1	1970-1977	Declining	Van Aarde, 1980
	(Courbet)	1989	41000	41000	0.0	1984-1989	Stable	Guinet *et al.*, in press
	Iles Crozet	1976	approx. 3000	-	-5.8	1966-1976	Declining	Barret and Mougin, 1978
	(Possession)	1989	612	578	-5.7	1980-1989	Declining	Guinet *et al.*, in press
Macquarie Island	Macquarie Island	1985	24000	-	-2.1	1949-1985	Declining	Hindell and Burton, 1987
		1990	22068	22068	-1.6	1985-1990	Declining	Slip, pers. comm.
	Campbell Island	1986	5	4	-8.6	1947-1986	Declining	Taylor and Taylor, 1989
	Antipodes Island	1978	113	113	?	-	Uncertain	Taylor and Taylor, 1989
World total		1990		189168				

Table 5: Population densities of lobodontine seals observed in six regions of Antarctic pelagic pack ice (Erickson and Hanson, 1988).

Region	Data Set*	Census			Crabeater			Weddell			Leopard			Ross		
						Corrected			Corrected			Corrected			Corrected	
		Method	Date	Total Area (nm^2)	No. Obs.	No.	Dens. (nm^2)	No. Obs.	No.	Dens. (nm^2)	No. Obs.	No.	Dens. (nm^2)	No. Obs.	No.	Dens. (nm^2)
Amundsen and	3,4	Aerial	1/23-2/15/72	1076.4	6118	6449	5.99	181	188.1	0.175	285	301.5	0.280	109	116.4	0.108
Bellingshausen	3	Shipb'd	1/23-2/15/72	184.4	1931	2972	16.12	8	12.5	0.068	74	131.8	0.715	13	15.8	0.085
Seas 60°W-130°W																
West, Ross Sea	3,4	Aerial	2/06-2/14/72	163.7	717	768	4.69	4	4.2	0.058	12	12.9	0.079	2	2.1	0.013
East, Ross Sea	3,5	Aerial	1/16-1/16/73	164.2	633	672	4.09	38	40.5	0.247	35	37.1	0.226	14	14.9	0.091
130°W-160°E																
Southern Pacific	3,6	Aerial	1/16-1/26/73	452.0	1438	1508	3.33	34	35.5	0.078	110	114.6	0.253	44	46.7	0.103
Ocean	6	Aerial	1/18-1/28/74	254.7	1682	1974	7.75	183	204.5	0.803	104	121.6	0.478	100	134.2	0.527
90°E-160°E	6	Shipb'd	1/18-1/28/74	50.3	530	1036	20.61	8	9.8	0.194	20	28.3	0.563	12	15.7	0.313
	7	Aerial	1/30/83	48.1	53	64	1.33	42	47.6	0.989	23	27.6	0.575	6	6.8	0.142
	7	Shipb'd	1/24-2/02/83	50.1	109	128	2.55	3	3.3	0.067	15	18.9	0.377	5	6.0	0.120
Southern	7	Aerial	2/03-2/09/83	95.2	543	637	6.69	241	360.6	3.788	13	16.5	0.174	3	9.3	0.098
Indian Ocean	7	Shipb'd	2/03-2/11/83	55.8	119	233	4.18	14	27.3	0.490	3	6.6	0.118	8	11.7	0.210
20°E-90°E																
Eastern	7	Aerial	2/12-2/16/83	90.9	1102	1222	13.44	23	26.0	0.286	38	43.6	0.479	24	25.5	0.292
Weddell Sea	7	Shipb'd	2/12-2/16/83	30.8	206	359	11.64	6	8.0	0.259	11	19.8	0.643	2	2.9	0.094
20°E-20°W																
0°-5°W	8	Aerial	12/18-30/92	228.1	438		1.92	8		0.035	0		0	13		0.057
		Aerial	1/31-2/04/92	139.4	559		4.01	4		0.029	14		0.100	17		0.122
Western	1,2	Shipb'd	1/30-3/13/68	110.5	773	1145	10.38	5	8.3	0.075	11	15.0	0.136	1	1.0	0.009
Weddell Sea	2	Shipb'd	2/18-3/24/69	132.7	1130	1622	12.22	10	16.0	0.120	22	28.1	0.211	3	3.5	0.026
20°W-60°W	7	Aerial	2/17-3/03/83	331.9	423	473	1.42	201	308.5	0.930	13	16.5	0.050	5	5.4	0.016
		Shipb'd	2/17-3/03/83	185.1	1248	1741	9.41	31	51.7	0.280	114	180.3	0.974	2	2.4	0.013

*1 = Siniff *et al*., 1970
2 = Erickson *et al*., 1971
3 = Erickson *et al*., 1972
4 = Gilbert and Erickson, 1977
5 = Erickson *et al*., 1973
6 = Erickson *et al*., 1974
7 = Erickson *et al*., 1983
8 = Erickson and Bester, in prep.

References Cited in Tables 2, 3, 4 and 5

AGUAYO, A., J. CAPELLA, H. TORRES, R. JAÑA, and D. TORRES. 1992. Progresso en el estudio ecologico del lobo fino antarctico, *Arctocephalus gazella*, en Cabo Shirreff, Isla Livingston, Antarctica. *Bol. Antarct. Chileno 11*(1): 12-14.

BAKKEN, V. 1991. Fulge-og- selundersøkelser pa Bouvetøya a Desember/Januar 1989/90. *Meddelelser Nr. 115*. Nortsk Polarinstitutt: Oslo.

BARRAT, A., and J.L. MOUGIN. 1978. L'éléphant de mer *Mirounga leonina* de l'île de la Possession, Archipel Crozet. *Mammalia 42*: 143-147.

BESTER, M.N. 1987. The sub-Antarctic fur seal (*Arctocephalus tropicalis*) at Gough Island (Tristan da Cunha Group). *NOAA Technical Report NMFS 5*: 57-60.

BESTER, M.N. 1990. Population trends of sub-Antarctic fur seals and southern elephant seals at Gough Island. *S. Afr. J. Antarct. Res., 20*: 9-12.

BOYD, I. 1992. Pup production and distribution of breeding Antarctic fur seals (*Arctocephalus gazella*) at South Georgia. *Antarct. Sci.* (in press).

BURTON, H.R. 1986. A substantial decline in the numbers of the southern elephant seal at Heard Island. *Tasmanian Naturalist, 86*: 4-8.

ERICKSON, A.W., D.B. SINIFF, D.R. CLINE and R.J. HOFMAN. 1971. Distributional ecoloy of Antarctic seals. In: DEACON, G. (Ed.) *Symposium of Antarctic Ice and Water Masses (Tokyo, 1970), SCAR*. pp. 55-76.

ERICKSON, A.W., J.R. GILBERT, G.A. PETRIDES, R.J. OEHLENSCHLAGER, A.A. SINHA and J. OTIS. 1972. Populations of seals, whales and birds in the Bellingshausen and Amundsen Seas. *Antarct. J. US, 7*: 70-72.

ERICKSON, A.W., J.R. GILBERT and J. OTIS. 1973. Census of pelagic seals of the Oates and George V coasts, Antarctica. *Antarct. J. US, 8*: 191-194.

ERICKSON, A.W., R.N. DENNEY, J.J. BRUEGGEMAN, A.A. SINHA, M.N. BRYDEN and J. OTIS. 1974. Seal and bird populations off Adélie, Claire and Banzare Coasts. *Antarct. J. US, 9*: 292-296.

ERICKSON, A.W., M.B. HANSON and D.M. KEHOE. 1983. Population densities of seals, birds and whales observed during the 1983 circumnavigation of Antarctica by the USCGC *Polar Star*. *Antarctic J. US., 18*.

ERICKSON, A.W. and M.B. HANSON. 1988. Continental estimates and population trends of Antarctic ice seals. In: *Proceedings of the 5th SCAR Symposium on Antarctic Biology, Hobart, August, 1988.*

ERICKSON, A.W. and M.N. BESTER. In prep. Census of seals in the pack ice off Prince Martha Coast, Antarctica, 1991-92.

GILBERT, J.R. and A.W. ERICKSON. 1977. Distribution and abundance of seals in the pack ice of the Pacific sector of the Southern Ocean. In: LLANO, G. (Ed.). *Adaptations within Antarctic Ecosystems.* pp. 703-740.

GUINET, C., P. JOUVENTIN and H. WEIMERSKIRCH. In press. Population changes, haul out pattern and movement of southern elephant seals on Crozet and Kerguelen Archipelagos. *Polar Biol.*

HES, A.D. and J.P. ROUX. 1983. Population increase in the sub-Antarctic fur seal (*Arctocephalus tropicalis*) at Amsterdam Island. *S. Afr. J. Antarct. Res., 13*: 29-34.

HINDELL, M.R. and H.R. BURTON. 1987. Past and adult status of the southern elephant seal (*Mirounga leonina*) at Macquarie Island. *J. Zool. (Lond.), 21*: 365-380.

JOHNSTONE, F.W. 1982. Zoology. In: Expedition to the Australian Territory of Heard Island and the McDonald Islands, 1980. Division of National Mapping Australia. *Technical Report 31*.

JOUVENTIN, P., J.C. STAHL and H. WEIMERSKIRCH. 1982. La recolonisation des Iles Crozet par les otaries (*Arctocephalus tropicalis* et *A. gazella*). *Mammalia, 46*: 505-514.

KERLEY, G.I.H. 1983. Relative population sizes and trends, and hybridization of fur seals (*Arctocephalus tropicalis* and *A. gazella*) at the Prince Edward Islands, Southern Ocean. *S. Afr. J. Zool., 18*: 388-392.

LAWS, R.M. 1960. The southern elephant seal (*Mirounga leonina*) at South Georgia. *Norsk. Hvalfansttid Tidd., 49*: 466-476, 20-542.

MCCANN, T.S. 1985. Size, status and demography of southern elephant seals (*Mirounga leonina*) populations. In: LING, J.K. and M.M. BRYDEN (Eds). *Studies of Sea Mammals in Southern Latitudes*. South Australian Museum, Adelaide.

MCCANN, T.S. and P. ROTHERY. 1988. Population size and status of the southern elephant seal (*Mirounga leonina*) at South Georgia, 1951-1985. *Polar Biology, 8*: 305-309.

O'GORMAN, R.A. 1961. Fur seals breeding in Falkland Island Dependencies. *Nature, 192*: 914-916.

ROUX, J.P. 1987. Sub-Antarctic fur seal (*Arctocephalus tropicalis*) in French sub-Antarctic territories. *NOAA Technical Report, NMFS, 51*: 79-81.

SHAUGHNESSY, P.D. and S.D. GOLDSWORTHY. 1990. Population size and breeding season of the Antarctic fur seal (*Arctocephalus gazella*) at Heard Island. *Mar. Mamm. Sci. 6*: 292-304.

SHAUGHNESSY, P.D. and S.D. GOLDSWORTHY. 1992. Feeding ecology of fur seals and their management at Macquarie and Heard Islands. Fourteenth Symposium on Polar Biology. National Institute of Polar Research, Japan, Extended Abstract.

SINIFF, D.B., D.R. CLINE and A.W. ERICKSON. 1970. Population densities of seals in the Weddell Sea, Antarctica, in 1968. *Antarctic Ecology, Vol 1*: 377-394. Academic Press: London.

STONEHOUSE, B. 1988. Southern fur seals (*Arctocephalus gazella*) return to breed on Iles Kerguelen. *Polar Rec., 2*.

TAYLOR, R.H. and S.A. TAYLOR. 1989. Reassessment of the status of southern elephant seals (*Mirounga leonina*) in New Zealand. *NZ J. Mar. Greshaut Res. 23*: 201-213.

VERGANI, D.R., M.N. LEWIS and Z.B. STANGANELLI. 1987. Observation on haul out patterns of the breeding populations of southern elephant seals at Peninsula Valdes (Patagonia) and Stranger Point (25 de Mayo - King George Island). Document *SC-CAMLR-VI/36*: 1-39. CCAMLR, Hobart Australia.

VAN AARDE, R.J. 1980. Fluctuations in the population of southern elephant seals at Kerguelen Is. *S. Afr. J. Zool., 15*: 99-106.

WACE, N.M. and M.W. HOLDGATE. 1976. Man and nature in the Tristan de Cunha Islands. IUCN Publications News Series, Supplementary Papers.

WILKINSON, I.S. and M.N. BESTER. 1990. Continued population increase in fur seals, *Arctocephalus tropicalis* and *A. gazella*, at the Prince Edward Islands. *S. Afr. J. Res.*, *20*: 58-63.

WILKINSON, I.S. and M.N. BESTER. In press. Population parameters of a declining southern elephant seal population at Marion Island.