

Chapter 4

Time series of data for Cape Fur Seals in the BCLME

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Introduction

This report contains an inventory of time series of Cape Fur Seal data that are available in South Africa and Namibia. The chapters and sections in the report correspond with the relevant chapters and sections in the Manual of Methods for Monitoring Cape Fur Seals, annexed to this report. Details of study objectives and techniques of data collection, are given in the manual.

Ownership of data is given in square brackets below each inventory table. The following definitions apply:

MCM: Marine and Coastal Management
(South Africa)
MFMR: Ministry of Fisheries and Marine Resources
(Namibia)

Where applicable, the name of the database where the data is stored is given in brackets.

Queries regarding MCM data should be directed to:

The Deputy Director
Sub-directorate Ecosystem Utilization and Conservation
Department of Environmental Affairs and Tourism
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Queries regarding MFMR data should be directed to:

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1. Monitoring the diet of Cape Fur Seals

1.1 Background

Most studies of Cape Fur Seal diet have followed one of two approaches – analysis of stomach contents of seals sampled at sea, or analysis of feces (scats) collected at colonies. Both techniques are subject to many limitations and biases. In recent years, analysis of scats collected at colonies has been the preferred method of investigating fur seal diet. This technique is cheap and practical relative to the at-sea sampling of seals for dietary information, and can provide important information on spatial and temporal trends in the relative consumption of the main prey species (Tollit and Thompson 1996), and quantitative information which can be useful for the management of fish stocks (Mecenero 2005).

1.2 Scat sample analysis

Scat samples were collected at three mainland colonies in Namibia, namely Atlas Bay (including Wolf Bay), Cape Cross and van Reenen's Bay, since January 1994. Sampling was monthly, but there were many months, especially at Cape Cross and van Reenen's Bay, when no samples were collected. The distribution of sampling at the three colonies is shown in Table 1.

1.3 Stomach sample analysis

Dedicated cruises for the pelagic sampling of seals commenced in 1974. Thirty cruises took place from then to 2001. There were no cruises in some years, and multiple cruises in others. There was variation between cruises in timing, geographical distribution, sample size and sex ratio of the samples (Table 2). Stomach contents, as well as morphometric and reproductive data, were collected from sampled animals.

2. Estimating Cape Fur Seal pup numbers

2.1 Background

Assessments of the size and trend of the Cape Fur Seal population, or parts thereof, have been based on pup numbers, for various reasons:

- ▲ Pups are the only demographic category that are all confined to land simultaneously (during their first few weeks of life);
- ▲ Their small size and the black pelage of their first ten weeks of life permit them to be easily distinguished from other age classes;
- ▲ Their small size permits them to be physically restrained with relative ease.

Two techniques have been used to determine pup numbers, namely tag–recapture and aerial censusing. The aerial census method is judged to be the most practical and cost-effective method of surveying the seal population (Wickens *et al.* 1991), although Shaughnessy (1993) considered tag–recapture to be more accurate.

2.2 Aerial census

Pup counts from aerial photographs, taken during aerial surveys between 1972 and 2004, are shown in Table 3. Surveys are conducted (with noted exceptions) between 17 and 22 December. However, the year by which each census is named is the year in which the pup cohort was weaned, ie, the following year. Comprehensive surveys, where all or nearly all of the major colonies were photographed, were conducted during 13 of the 32 years. Counts of the most recent censuses (2005–2007) are not complete, to date.

2.3 Tag–recapture

The tag–recapture method provides an estimate of the number of pups in the colony at the time of tagging (~20 January). Different estimates of pup numbers have been obtained, based on the time of recapture (Table 4).

3. Mass at birth, growth of Cape Fur Seal pups

3.1 Background

Annual changes in the average mass of fur seal pups at birth is considered to be a good indicator of fetal growth in the last few months of gestation, and thus a possible indicator of food availability in the area where cows forage before parturition (Reid 2002). During the lactation period, mass gains by pups depend on provisioning by the mothers, therefore the growth rates of pups reflect the rate of energy transfer from mothers to pups, and provide a good indication of prey availability (Beauplet *et al.* 2004). In addition, because fur seal mothers are central place foragers during the lactation period, the growth rates of pups should reflect conditions whose spatial and temporal boundaries can be readily determined or esti-

mated (Reid 2002). Changes in pup mass with time can be determined either via longitudinal sampling, whereby the same individuals are weighed repeatedly over a period of time, or cross sectional sampling, whereby a random sample of different individuals in the population are weighed at pre-defined intervals.

3.2 Birth mass

Pups have been weighed soon after birth at Atlas Bay since the 1989–1990 breeding season (Table 5).

3.3 Longitudinal sampling

In some years, it has been attempted to measure the growth of pups, tagged and weighed soon after birth, by serially reweighing them. The method becomes exceedingly difficult after pups are about two months old. Listed in Table 6 are the sample sizes of male and female pups that were serially weighed until they were approximately two months old, and for which three or more data points exist.

3.4 Cross sectional sampling

Cross-samples of pup mass have been collected at Atlas Bay (including Wolf Bay), Cape Cross and van Reenen's Bay, between January and the age of weaning (Table 7). Dead pups were also weighed at the factories, following harvesting, in many years.

References

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Table 1: Dates on which scats were collected at 3 mainland colonies in Namibia, since 1994

Year	Month	Day			Year	Month	Day			Year	Month	Day		
		AWB	CC	VRB			AWB	CC	VRB			AWB	CC	VRB
1994	1	15		15	1997	1	20	28		2000	1			
	2	7				2	2	18	26		2	18		
	3		4			3	3	20	18		3	30	16	
	4	7	11	8		4	4	23	17		4	20	7	
	5	6	19	8		5	5		16		5			
	6	10	22	8		6	5	20			6	19		
	7	7	27	9		7	1	18			7	27		
	8	11				8	5	19			8	19		
	9		23			9	5	24			9	28	15	
	10		6			10	6	3			10	20	13	
	11		29			11	27	27	13		11	28	8	
	12	30	1			12	18				12	21		10
1995	1	20	25	12	1998	1	14	15	27	2001	1	17		22
	2	27	25			2	23	6	20		2	21	28	19
	3	12	27			3	10	23			3	20		24
	4	25	27			4	17	23			4	21	5	18
	5	23	26	12		5	13	16	20		5	23	17	21
	6	14				6	22	9			6	21	21	21
	7	18	25	12		7	17				7	19	20	17
	8	23	30			8	21	21			8	21	17	19
	9	18	19			9	18	23			9	25	21	21
	10	19	26	12		10		21			10	25	22	18
	11	20	16			11	5	14			11	25	20	1
	12	20	1			12					12	25	20	1
1996	1	17	18		1999	1	22		24	2002	1	18	23	19
	2	16	29	13		2	19				2	20	20	22
	3	19	27			3	19	2	12		3	19	19	21
	4	17	15			4	19	22			4	19	19	24
	5	21	9			5	23	27						
	6	17	26	9		6	17		12					
	7	16	16			7	21							
	8	9	21			8	30		29					
	9	19	10			9	27	27	12					
	10	17	24			10	27	15	24					
	11	16	28			11		8	14					
	12	17	1			12	31		31					

[MFMR]
{AP_diet from scats database – Access database file}

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Table 2: Details of all stomach-sampling cruises from 1974 to 2001. Sample sizes exclude animals with empty stomachs, and animals estimated to be less than one year old. Month denotes the month in which the greater part of sampling occurred

Cruise no.	Year	Month	Start point	End point	Closest inshore (km)	Furthest offshore (km)	<i>n</i> Females	<i>n</i> Males
1	1974	Apr	Cape Town	Dyer Island	9.0	11.0	3	1
2	1975	Mar	Cape Town	Algoa Bay	1.0	17.0	14	6
3	1975	Aug	Orange River	Ichaboe Island	1.0	26.0	35	18
4	1977	Mar	Ichaboe Island	Conception Bay	2.0	23.0	45	62
5	1977	Oct	Conception Bay	Cape Cross	2.0	15.0	57	49
6	1979	Mar	Cape Cross	Mowe Bay	1.0	14.0	61	42
7	1980	Aug	Kleinzee	Ichaboe Island	1.0	35.0	14	1
8	1981	Apr	Cape Town	Orange River	6.0	53.0	54	29
9	1982	Sep	Cape Town	Port Nolloth	0.5	3.0	58	38
10	1984	Oct	Cape Town	Port Nolloth	0.5	3.0	94	81
11	1985	Apr	Cape Town	Algoa Bay	1.0	7.0	43	55
12	1986	May	St Helena Bay	Walvis Bay	1.0	37.0	62	65
13	1987	Jul	Walvis Bay	Kunene River	1.0	15.0	34	79
14	1988	Jan	Cape Town	Buchu Twins	1.1	18.0	54	39
15	1989	Apr	Cape Town	Lamberts Bay	0.5	33.0	18	38
16	1989	Feb	Cape Town	Lamberts Bay	0.7	35.0	9	26
17	1989	Apr	Cape Town	Lamberts Bay	2.0	14.0	17	31
18	1989	Jun	Cape Town	Lamberts Bay	1.5	18.0	11	25
19	1989	Aug	Cape Town	Lamberts Bay	4.2	41.0	12	27
20	1989	Oct	Cape Town	Lamberts Bay	1.6	48.0	29	23
21	1990	Jan	Cape Town	Lamberts Bay	3.0	41.0	18	42
22	1990	Mar	Cape Town	Lamberts Bay	4.0	42.0	14	40
23	1990	Nov	Cape Town	Lamberts Bay	1.3	12.0	26	9
24	1992	May	Cape Infante	Port Nolloth	1.7	38.0	72	55
25	1992	Nov	Cape Town	Cape Town	8.0	25.0	17	5
26	1993	May	Hout Bay	Kleinzee	2.1	30.8	22	24
27	1994	Jun	Quoin Point	Port Nolloth	1.4	47.0	61	28
28	1995	Oct	Cape Point	Mossel Bay	4.8	11.2	4	13
29	1996	Jun	Cape Point	Port Nolloth	3.0	30.0	48	19
30	2001	May	Bok Punt	Port Nolloth	1.5	20.0	41	47

[MCM] {AP_pelagic sampling database – Access database file}

Table 3: Pup counts from aerial surveys (1972–2004), taken from Kirkman *et al.* (2007). The underlined years are “full-census” years

Colony	1971	<u>*1972</u>	1973	1974	1975	1976	<u>1977</u>	1978	1979	<u>1980</u>	1981	1982	<u>1983</u>	1984	1985	<u>1986</u>	1987	1988	<u>1989</u>
Cape Frio		0							0				1			3			
Cape Cross	17 839						22 097			16 327			26 623			35 590		37 882	55 247
Hollams Bird Island		5042					2772						1945						5216
Mercury Island		0					0			0			0		1128	3606	3828	5178	3114
Marshall Reef		755					378	258								398			666
Staple Rock		2910					2114	2472		1236						2212			2325
Boat Bay Rock		1691					978	971		528			1167			1618			2066
Dumfudgeon Rock		2875					779	920		616			883			1623			2003
Wolf Bay		7443 ^b		8805 ^a			15 017 ^b		17 852				26 669			10 616 ^c		29 454	24 548
Atlas Bay		8879 ^b		23 295 ^a			23 759 ^b	36 453	55 852				61 438			16 860 ^c		43 923	42 223
Long Island		12 228					9840		13 361	12 252			13 223			12 812			22 160
Albatross Rock		3722					2393			4632			5254				3331		4354
Black Rock							205			278			216		407	202	393	491	439
van Reenen Bay		3243					3208 ^a			3591			4953		6701	4820	6900	6235	5590
Sinclair Island		15 772					10 879	9461		11 370			9419			8011			11 139
Lion's Head		2769					3248						1614		1792	1817			3437
Buchu Twins							0								45	19	38		29
Kleinsee		30 450	27 776				52 075			59 165				83 469		43 267 ^c	47 113 ^c	46 850 ^c	74 620
Elephant Rock		2496	1095			1629	1398			1826			2748			2612		3740	3326
Jacob's Reef		4808	3376				3772						3132		3270	1086		1971	3886
Robbesteen		2427					1273						929		1515	1616	1368	1575	1224
Duikerklip		0													11	22	75	15	6
Seal Island, FB	14 449 ^a						12 199	12 297		8188		8574	10 017		11 010	12 116	5218 ^d	14 105	13 503
Geysers Rock		2680				4952	6638			4099		6137	9151	6954	8345	9584	8643	10187	12793
Quoin Rock		3746			1730		1090	765		630			1074			1644	1496	1756	2041
Seal Is, MB		3237			1262		1176	957		380			899				1170		
Black Rocks, AB		1703			904		86			442			561				808		800
Pelican Point																	0		0
Sandwich Harbour													0			672			4
Klein Ichaboe																		27	6
Bird Island, LB															0	10	8	8	0
Paternoster Rock																127	74	943	1098

* 1972 photographs taken on 4–6 December, therefore values are adjusted by a factor of 1.5539

^a Considered undercounts because photographs taken in January (Shaughnessy 1987)

^b Considered undercounts because unrealistic in comparison with harvest figures (possibly due to incomplete coverage of colonies)

^c Aerial surveys preceded by large bull harvests that resulted in breeding disturbance, thereby probably reducing pup production (Wickens *et al.* 1991)

^d Breeding population deliberately disturbed during breeding season therefore pup production reduced (Wickens *et al.* 1991)

^e Considered undercount due to high altitude of photographs

^f Missing areas filled in proportionally using 1999 counts of the same colony

^g Missing areas filled in using 2001 counts of the same colony

^h Digital photographs used

[South African colonies – MCM; Namibian colonies – MCM in conjunction with MFMR] {AP_census database – Access database file}

Table 3: continued. The underlined years are "full-census" years. "Y" denotes that counting of pups on the aerial photographs has yet to be completed

Colony	1990	1991	1992	<u>1993</u>	1994	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	1999	2000	2001	<u>2002</u>	2003	<u>2004</u>	2005	<u>2006</u>	2007
Cape Frio				477		3044	4337	4419	7191				10 880		16 608	Y	Y	Y
Cape Cross	51 890	44 636	65 557	61 891		29 990	35 498	38 564	48 993				37 394		54 546	Y	Y	Y
Hollams Bird Island	3267			4902		961	2026	1827	3478				2285		2305		Y	
Mercury Island	460 ^d			35		0	0	0	0				0		0			
Marshall Reef		384		942				242	146				106				Y	
Staple Rock		2314		1405				1542	1899				1462				Y	
Boat Bay Rock				1240				693	883				669				Y	
Dumfudgeon Rock		552		1667					465				1099				Y	
Wolf Bay	19 286		25 680	39 534	28 476	96 42	9158		36 700				15 184		29 531	Y	Y	Y
Atlas Bay	41 607			62 823		17 031	13 581		46 225				18 193		45 155 ^f	Y	Y	Y
Long Island				20 170		8809	7751	12 098	14 835				7822		12 648		Y	Y
Albatross Rock				1715		2031	1152	2451	2785				1335				Y	
Black Rock		461		200		252	210	100	206				84		259		Y	
van Reenen Bay	4990	5232		5293		3011	3317	3989	5783				2953				Y	
Sinclair Island				8703		6992	7967	7186	10771				7472		10 543	Y	Y	
Lion's Head				6121		4501	4623	5529	8308				6163		9603	Y	Y	
Buchu Twins	16			107												Y		
Kleinsee	78 809	63 246	79 301	72 203		59 370	69 669	69 930	87 841			91 641	79 710		80 897 ^g	Y	Y	
Elephant Rock		3476	3841	2193	3813	2110	3092	4074	2165				4293		4398		Y	
Jacob's Reef			3606	1265		1566	2221	2064	1650						3376 ^h		Y	Y
Robbesteen		1487	1722	964		707	976	1212	1155						908		Y	
Duikerklip	18	14	11	8		9							78			Y	Y	
Seal Island, FB	15 484	13 898	17 522	12 974	15 235	17 144	13 528	19 396	16 806				12 298		18 339 ^h	Y	Y	Y
Geyser Rock	10 749	9651	11 522	11 743	10 324	11 616	11 939	12 266	11 184				5659 ^e			Y	Y	
Quoin Rock	1676		2367	1834	1694	2080	1520	1639	1779				1223			Y	Y	Y
Seal Island, MB	1238			754				989	691				658				Y	
Black Rocks, AB				463				296	142				505		423		Y	
Pelican Point	0			3		24	12	0	0								Y	Y
Sandwich Harbour	18			292	75	502	756	26	33						71		Y	
Klein Ichaboe	17			68		63	157	89	128								Y	
Bird Island, LB	3	7	0	14		66	352	314	40				130		592		Y	
Paternoster Rock	1527	1697	1877	758		2476	1932	3233	1200				1014		908		Y	Y
Cape Columbine				107		42	96	91	57								Y	
Dolphin Head				2500	768		141	158	0				0				Y	
Conception Bay	35			231	112	1576	693	0	52						612		Y	
Baie dos Tigros																		Y
Mowe Bay																		Y
Torra Bay																		Y
Toscanini																		Y
Sylvia Hill																Y	Y	
Cliff Point																Y	Y	
Jutten Island																	Y	Y
Vondeling Island																	Y	Y

^{d-f} See preceding page

Table 4: Estimates of pup numbers from tag–recapture experiments, based on recaptures in January or at harvesting*

Colony	Recapture	Year	Estimate	Colony	Recapture	Year	Estimate
Cape Cross	January	1980	18 260	Staple Rock	January	1978	2043
	January	1986	27 583		Harvest	1978	2376
	Harvest	1980	20 036	Boat Bay Rock	January	1978	870
	Harvest	1986	35 541		Dumfudgeon Rock	January	1978
Wolf Bay	January	1979	30 278	Harvest		1978	872
	January	1985	30 174	Long Islands	January	1977	15 155
	Harvest	1974	21 655		January	1983	18 025
	Harvest	1979	29 462		Harvest	1977	20 809
Atlas Bay	January	1974	37 931	Albatross Rocks	January	1977	5586
	January	1979	54 151		January	1983	6955
	January	1985	59 713		Harvest	1977	5577
	January	1989	62 493	Sinclair Island	January	1978	11 931
	Harvest	1974	52 286		January	1983	12 589
	Harvest	1979	74 609		Harvest	1978	15 083
	Harvest	1985	65 861	Elephant Rock	January	1976	1196
Kleinsee	January	1973	30 006		Harvest	1976	1548
	January	1981	62 535	Seal Island (FB)	January	1971	1196
	January	1984	80 902		January	1982	9611
	January	1987	33 756		Harvest	1971	14 072
	January	1991	49 135	Geyser Rock	January	1976	6533
	January	1993	61 341		January	1982	8163
	January	1995	71 895	Quoin Rock	January	1975	2292
	January	1998	75 870		Harvest	1975	1740
	January	2002	69 675	Seal Island (MB)	January	1975	2095
	Harvest	1973	37 719		Harvest	1975	2552
	Harvest	1981	78 649	Marshall Reef	January	1978	248
	Harvest	1984	99 914		Harvest	1978	248

* As tag-induced mortality is apparently displayed more strongly in females than in males, the harvest estimate is based on recapture of male pups only.

[MCM] {AP_census database – Access database file}

Table 5: Sample sizes of male and female pups weighed shortly after birth at Atlas Bay or Wolf Bay

Season	Number of females	Number of males
1989–1990	340	338
1990–1991	341	308
1991–1992	45	65
1992–1993		
1993–1994	24	27
1994–1995	69	62
1995–1996	163	120
1996–1997	377	364
1997–1998	101	181
1998–1999	576	585
1999–2000	246	279
2000–2001	327	260
2001–2002	287	289
2002–2003	195	199
2003–2004	385	405
2004–2005	615	532

[MFMR] {AP_pup mass and growth – Access database file}

Table 6: Sample sizes of male and female pups measured at Atlas Bay for longitudinal growth, between birth and 60 (50–70) days of age, with three or more growth points

Year	Number of females	Number of males
1997	42	83
1999	25	36
2001	41	54
2002	19	44

[MFMR] {AP_pup mass and growth – Access database file}

Table 7.1: Sample sizes of male and female pups weighed during cross-samples, at Atlas Bay or Wolf Bay (A = alive; D = dead, ie, harvested)

Date	Julian days	No. males	No. females	State (A/D)	Date	Julian days	No. males	No. females	State (A/D)	Date	Julian days	No. males	No. females	State (A/D)
13 Apr 87	103	37	30	A	20 Jan 95	20	66	54	A	7 Sep 99	250	105	95	D
14 May 87	134	36	18	A	17 Feb 95	48	19	9	A	8 Sep 99	251	29	45	A
18 Jun 87	169	38	26	A	07 Mar 95	66	42	31	A	5 Jan 00	5	61	39	A
08 Jul 87	189	23	17	A	15 Mar 95	74	6	1	A	6 Jan 00	6	79	41	A
24 Jul 87	205	23	18	A	02 May 95	122	35	48	A	20 Jan 00	20	108	64	A
10 Sep 87	253	23	14	?	10 May 95	130	6	6	A	10 Feb 00	41	83	50	A
11 Sep 87	254	13	8	?	15 Jun 95	166	37	50	A	28 Feb 00	59	56	57	A
14 Sep 87	257	10	11	?	18 Jul 95	199	44	40	A	23 Mar 00	83	54	54	A
20 Jan 88	20	37	24	A	10 Aug 95	222	162	187	?	19 Apr 00	110	50	32	A
10 Feb 88	41	39	28	A	14 Aug 95	226	157	209	?	30 Jun 00	182	42	39	A
26 Feb 88	57	33	26	A	18 Jan 96	18	115	97	A	1 Aug 00	214	116	75	D
18 Mar 88	78	32	28	A	20 Mar 96	80	65	52	A	21 Aug 00	234	62	70	D
28 Mar 88	88	42	28	A	24 May 96	145	66	56	A	22 Aug 00	235	83	76	D
13 Apr 88	104	42	32	A	24 Jun 96	176	56	59	A	6 Jan 01	6	84	67	A
15 Apr 88	106	52	30	A	1 Jul 96	183	46	42	A	9 Jan 01	9	67	62	A
05 May 88	126	49	29	A	2 Jul 96	184	5	2	A	20 Jan 01	20	104	96	A
19 May 88	140	35	27	A	1 Aug 96	214	47	45	?	8 Feb 01	39	21	23	A
10 Jun 88	162	35	25	A	14 Aug 96	227	84	105	?	23 Feb 01	54	59	44	A
12 Jul 88	194	42	28	A	15 Aug 96	228	95	83	?	19 Mar 01	78	54	47	A
14 Jul 88	196	38	27	A	16 Aug 96	229	76	77	?	12 Apr 01	102	60	40	A
28 Jul 88	210	39	29	A	19 Aug 96	232	97	114	?	31 May 01	151	52	56	A
29 Jul 88	211	41	30	A	20 Aug 96	233	82	97	?	22 Jun 01	173	49	57	A
12 Aug 88	225	25	28	?	21 Jan 97	21	106	105	A	23 Jul 01	204	54	41	D
19 Jan 89	19	120	121	A	19 Feb 97	50	49	25	A	25 Jul 01	206	61	41	D
27 Feb 89	58	60	30	A	24 Mar 97	83	8	18	A	25 Jul 01	206	17	15	A
15 Mar 89	74	54	34	A	25 Mar 97	84	10	8	A	26 Jul 01	207	55	47	D
25 Apr 89	115	55	33	A	20 Aug 97	232	65	83	?	31 Jul 01	211	50	49	D
13 Jun 89	164	44	30	A	27 Aug 97	239	61	47	?	31 Jul 01	211	19	23	A
04 Jul 89	185	41	29	A	28 Aug 97	240	26	24	?	1 Aug 01	212	15	15	A
04 Aug 89	216	47	31	?	9 Jan 98	9	172	94	A	2 Aug 01	213	42	61	D
19 Jan 90	19	89	60	A	20 Jan 98	20	233	140	A	3 Aug 01	213	16	20	A
19 Feb 90	50	61	38	A	17 Feb 98	48	75	38	A	6 Aug 01	216	42	56	D
16 Mar 90	75	58	34	A	5 Mar 98	64	51	41	A	7 Aug 01	217	11	12	A
18 Apr 90	108	46	33	A	18 Mar 98	77	47	21	A	17 Aug 01	227	20	14	A
08 May 90	128	41	37	A	16 Apr 98	106	70	54	A	20 Aug 01	230	55	46	D
18 Jun 90	169	54	36	A	7 May 98	127	51	28	A	24 Aug 01	234	20	10	A
27 Jul 90	208	53	53	A	18 May 98	138	54	33	A	29 Aug 01	239	24	26	D
18 Jan 91	18	68	55	A	18 Jun 98	169	47	38	A	3 Sep 01	244	58	43	D
21 Feb 91	52	74	40	A	7 Jul 98	188	20	20	A	7 Sep 01	248	22	10	A
15 Mar 91	74	53	33	A	10 Aug 98	222	63	54	D	13 Sep 01	254	22	6	A
18 Apr 91	108	52	46	A	11 Aug 98	223	73	82	D	17 Sep 01	258	28	27	D
03 Jun 91	154	54	53	A	12 Aug 98	224	66	51	D	4 Jan 02	4	61	50	A
23 Jul 91	204	46	34	A	13 Aug 98	225	67	48	D	18 Jan 02	18	158	121	A
20 Aug 91	232	51	34	?	1 Oct 98	274	81	70	D	8 Feb 02	39	59	47	A
18 Feb 92	49	64	37	A	7 Jan 99	6	49	49	A	4 Mar 02	63	64	36	A
19 Mar 92	79	85	32	A	8 Jan 99	8	60	46	A	27 Mar 02	86	73	41	A
24 Apr 92	115	46	47	A	18 Jan 99	18	51	52	A	19 Apr 02	109	52	49	A
26 May 92	147	66	38	A	20 Jan 99	20	141	134	A	21 May 02	145	53	47	A
07 Jul 92	189	55	46	A	1 Feb 99	32	28	21	A	26 Jun 02	177	57	44	A
19 Jan 93	19	73	55	A	9 Feb 99	40	50	40	A	19 Jul 02	201	60	45	D
23 Feb 93	54	62	50	A	16 Feb 99	47	15	7	A	26 Jul 02	207	51	41	A
12 Mar 93	71	73	31	A	8 Mar 99	67	60	57	A	20 Jan 03	20	193	169	A
21 Apr 93	111	35	26	A	30 Mar 99	89	51	56	A	21 Jan 03	21	108	59	A
18 May 93	138	71	64	A	1 Apr 99	91	41	40	A	18 Mar 03	77	62	36	A
09 Aug 93	221	31	35	?	15 Apr 99	105	51	50	A	3 Jun 03	154	53	18	A
18 Jan 94	18	172	102	A	16 Apr 99	106	44	34	A	7 Jul 03	188	87	75	D
24 Feb 94	55	47	42	A	12 May 99	132	47	45	A	9 Jul 03	190	74	73	D
21 Apr 94	111	68	48	A	17 May 99	137	46	41	A	14 Jul 03	195	85	72	D
13 May 94	133	42	43	A	16 Jun 99	167	100	98	A	15 Jul 03	196	32	25	D
11 Jun 94	162	2	5	A	17 Jun 99	168	64	71	A	17 Jul 03	198	56	42	D
12 Jun 94	163	1	2	A	9 Aug 99	221	160	159	D	21 Jul 03	202	59	64	D
13 Jun 94	164	3	3	A	10 Aug 99	222	86	70	D	23 Jul 03	204	67	55	D
17 Jun 94	168	49	57	A	11 Aug 99	223	126	138	D	25 Jul 03	206	119	64	D
					12 Aug 99	224	135	102	D	28 Jul 03	209	78	65	D
					18 Aug 99	230	40	37	A	30 Jul 03	211	85	45	D

(Table 7.1: continued)

Date	Julian days	No. males	No. females	State (A/D)
6 Aug 03	218	48	54	D
7 Aug 03	219	65	41	D
13 Aug 03	225	52	53	D
20 Aug 03	232	64	39	D
21 Aug 03	233	57	42	D
7 Jan 04	7	62	40	A
9 Jan 04	9	54	47	A
11 Jan 04	11	72	32	A
19 Jan 02	19	64	38	A
18 Feb 04	49	62	34	A
2 Mar 04	62	55	55	A
8 Apr 04	125	52	36	A
6 May 04	153	76	58	A
05 Jun 04	184	68	47	A
22 Jun 04	200	68	65	A
5 Jul 04	213	124	105	D
9 Jul 04	217	66	74	D
13 Jul 04	221	100	102	D
3 Sep 04	273	114	101	D
8 Sep 04	278	113	108	D
20 Jan 05	46	121	88	A
31 Mar 05	116	72	35	A
26 Apr 05	142	51	63	A

[MFMR] {AP_pup mass and growth – Access database file}

Table 7.2: Sample sizes of male and female pups weighed during cross samples, at van Reenen's Bay (A = alive, D = dead; ie, harvested)

Date	Julian days	No. males	No. females	State (A/D)
27 Jan 98	27	68	48	A
20 May 98	140	52	49	A
22 Jan 99	22	49	30	A
12 Mar 99	71	50	46	A
14 May 99	134	41	34	A
22 Jan 01	20	49	48	A
19 Feb 01	50	51	51	A

[MFMR] {AP_pup mass and growth – Access database file}

Table 7.3: Sample sizes of male and female pups weighed during cross samples, at Cape Cross (A = alive, D = dead, ie harvested)

Date	Julian days	No. males	No. females	State(A/D)
28 Apr 87	118	17	16	A
22 Jun 87	173	9	13	A
22 Mar 88	82	34	20	A
23 Mar 88	83	51	50	A
23 Jun 88	175	45	48	A
26 Jun 89	146	39	52	A
15 Aug 89	227	52	24	?
2 Jun 90	37	77	68	A
25 Apr 90	115	49	49	A
25 Jun 90	176	41	39	A
8 Aug 90	220	51	30	A
21 Sep 90	264	47	37	D
2 Jun 91	37	64	40	A
22 May 91	142	60	46	A
20 Feb 92	51	62	54	A
6 Mar 92	155	61	31	A
4 Aug 93	98	39	38	A
4 Mar 94	63	74	58	A
19 May 94	139	58	48	A
2 Jun 94	153	52	51	A
25 Jan 95	25	67	48	A
27 Feb 95	58	55	37	A
26 Apr 95	116	56	42	A
6 Apr 95	155	53	40	A
25 Jun 95	176	53	41	A
17 Aug 95	229	98	91	D
23 Feb 96	54	76	55	A
9 Jun 98	157	13	18	A
23 Sep 98	266	50	50	D
2 Mar 99	61	58	50	A
22 Apr 99	112	49	50	A
27 May 99	147	39	35	A
2 Sep 99	245	88	68	?
28 Feb 01	59	82	47	A
17 May 01	137	15	18	A
12 Aug 01	224	52	43	A
13 Aug 01	225	50	50	D
13 Feb 02	44	57	43	A
5 Jun 02	156	52	48	A
11 Feb 04	42	66	40	A

[MFMR] {AP_pup mass and growth – Access database file}