

PELAGIC SCIENTIFIC WORKING GROUP  
BRANCH: FISHERIES MANAGEMENT

The current set of available data for evaluation of the Island Closure Feasibility study-**incorporating sample size and correcting the recruit survey time series.**

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A procedure for the International review of analyses related to island closures was agreed at a meeting held on the 30<sup>th</sup> July 2014 (see aide memoire of the 30<sup>th</sup> July meeting and FISHERIES/2014/JUL/SWG-PEL/38rev). At that meeting it was agreed that all analyses to be considered by the review panel will be strictly limited to a common dataset – this because not all data currently available are as yet finalised and/or in the public domain.

Listed below are the data tables that have been made available.

**Table 1: Fledging success**

Data provider: DEA/Richard Sherley

Year	Robben (series 1)	Robben (series 1) n	Robben (series 2)	Robben (series 2) n	Dassen	Dassen n
1989	0.415	65				
1990	0.319	47				
1991	0.592	71				
1992	0.590	61				
1993	0.535	71				
1994	0.446	74				
1995	0.383	47			0.825	174
1996	0.654	81			1.022	101
1997	0.968	124			1.180	149
1998	0.748	119			1.343	133
1999	0.600	130			1.376	74
2001			0.90	10		
2002			0.38	13		
2003			0.42	59		
2004			0.54	87		
2005			0.96	45		
2006			0.67	63		
2007			1.18	160		
2008			1.08	95	1.010	
2009			0.93	86	1.060	
2010			1.06	86	0.909	
2011			1.04	109	1.136	
2012			1.14	77		

**Table 2: Chick growth rates (Gompertz growth coefficients)**

Data provider: DEA/Richard Sherley

Year	Island	Growth rate	Sample size (no. of chicks)
1989	Dassen	0.0317	86
1995	Dassen	0.0374	111
1996	Dassen	0.0400	145
1997	Dassen	0.0446	136
1998	Dassen	0.0395	46
2008	Dassen	0.0268	14
2009	Dassen	0.0315	70
2010	Dassen	0.0328	45
2011	Dassen	0.0288	19
2004	Robben	0.0461	142
2008	Robben	0.0369	50
2009	Robben	0.0312	88
2011	Robben	0.0329	54
2012	Robben	0.0347	80

**Table 3: Active and potential nests**

Data provider: DEA/CapeNature

Year	Proportion of total nests which are active			
	Dassen	Dassen (n)	Robben	Robben (n)
1999	0.95	15155	-	-
2000	0.92	17042	0.96	5407
2001	0.85	21410	0.95	6427
2002	0.80	22681	0.94	7099
2003	0.66	20196	0.97	5968
2004	0.54	24901	0.88	7798
2005	0.49	22687	0.79	7152
2006	0.40	13283	0.86	3697
2007	0.43	11785	0.82	5935
2008	0.61	5719	0.99	2234
2009	0.48	5145	0.83	2415
2010	0.40	4929	0.77	2628
2011	0.43	3896	0.66	1817
2012	0.56	2678	0.73	1669

**Table 4: Foraging path length**

Data provider: DEA/UCT/Cape Nature

Year	Dassen	Dassen n	Robben	Robben n	St Croix	St Croix n	Bird	Bird n
2003	33.6	3	31.2	9				
2004	21.2	29						
2007							57.8	15
2008	57.1	10	42.7	9	69.3	18	36.5	30
2009	49.1	3			50.2	14	40.0	29
2010	61.1	15	49.2	11	69.2	21	52.1	31
2011	76.1	23	54.4	26	67.8	23	56.1	53
2012	50.7	37	33.5	39	89.9	20	61.5	55

Note: data highlighted in grey above are not final. Final data was requested by DAFF from UCT and received after the agreed date for finalisation of these data. The new, updated data has been made available to DAFF under strict conditions and are not in the public domain. Analysts wanting to update any analyses they may have performed on the above data (or check sensitivity of their results to the data changes) may request the updated data from Janet Coetzee.

**Table 5: Foraging trip duration**

Data provider: DEA/UCT/Cape Nature

Year	Dassen	Dassen n	Robben	Robben n	St Croix	St Croix n	Bird	Bird n
2003	9.6	3	11.0	9				
2004	12.5	29						
2007							20.3	15
2008	22.6	10	13.8	10	22.5	18	15.3	30
2009	17.0	3			17.1	14	18.4	29
2010	13.8	15	18.0	11	27.1	21	20.5	31
2011	17.7	22	16.5	25	20.1	24	21.7	54
2012	12.7	37	11.0	35	23.8	20	19.3	55

Note: data highlighted in grey above are not final. Final data was requested by DAFF from UCT and received after the agreed date for finalisation of these data. The new, updated data has been made available to DAFF under strict conditions and are not in the public domain. Analysts wanting to update any analyses they may have performed on the above data (or check sensitivity of their results to the data changes) may request the updated data from Janet Coetzee.

**Table 6: Chick condition**

Data provider: DEA/CapeNature

Year	Robben	Robben n	Dassen	Dassen n
2004	0.51	1168		
2008	0.27	762	0.32	393
2009	0.30	1176	0.28	947
2010	0.32	397	0.31	583
2011	0.24	464	0.27	717
2012	0.50	772	0.30	673

**Table 7: Small Pelagic Fishing Blocks used in the aggregation of pelagic catches within 10, 20 and 30 nm of the Islands. See reference maps included as appendix A for positioning of PFB along the South African Coast and their proximity to islands.**

Data provider: Jan van der Westhuizen (DAFF)

Robben			Dassen			St Croix			Bird		
10	20	30	10	20	30	10	20	30	10	20	30
4953	4902	4901	4931	4820	4810	4655	4600	4600	4702	4701	4600
	4903	4902		4830	4815		4605	4605		4702	4650
	4942	4903		4840	4820		4650	4650		4703	4701
	4943	4931		4921	4825		4655	4655		4751	4702
	4952	4932		4931	4830			4701		4752	4703
	4953	4941		4932	4835			4751		4753	4704
		4942		4941	4840			5610		5711	4751
		4943		4942	4845			5614		5712	4752
		4951			4850			5615		5713	4753
		4952			4855			5711			4754
		4953			4911						5610
		5911			4921						5620
		5912			4931						5711
		5913			4932						5712
					4941						5713
					4942						5714
					4943						5721
					4951						5722
					4952						5723
					4953						5724

Note: Catch per set and catch per trip data from 1987 to 2013 is also available from Jan van der Westhuizen on request. The large number of records precludes their listing in this document.

**Table 8: Catches taken by the purse-seine fishery within 10 nm of the islands.**

Data provider: Jan van der Westhuizen (DAFF)

10nm	Dassen			Robben			St Croix			Bird		
Year	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total
1987	5333	567	5899	8353	198	8551	0	0	0	0	0	0
1988	1515	1631	3146	10734	977	11711	0	0	0	0	0	0
1989	2430	606	3037	12646	657	13303	0	0	0	0	0	0
1990	1437	1952	3389	817	1157	1974	0	0	0	0	13	13
1991	917	1267	2184	6151	478	6629	0	62	62	0	0	0
1992	5938	1447	7385	7157	1219	8375	0	0	0	0	7	7
1993	2501	1557	4058	1322	423	1745	0	0	0	0	0	0
1994	4955	837	5792	6447	1381	7828	0	0	0	0	31	31
1995	2668	1204	3872	1420	233	1653	0	0	0	0	0	0
1996	787	4323	5110	2471	1634	4105	0	0	0	0	0	0
1997	475	652	1126	2008	931	2939	0	0	0	0	0	0
1998	283	2668	2951	1198	687	1885	0	38	38	0	0	0
1999	8379	3918	12297	4674	793	5468	0	0	0	0	0	0
2000	7658	914	8572	2983	15	2999	0	0	0	0	0	0
2001	9554	682	10236	2891	129	3021	0	18	18	0	0	0
2002	8985	4624	13609	6870	2836	9706	0	0	0	0	0	0
2003	8053	5188	13241	12835	7016	19851	0	33	33	0	0	0
2004	5342	715	6056	8906	376	9282	0	0	0	0	21	21
2005	19698	606	20303	5922	168	6089	0	0	0	0	9	9
2006	11368	1014	12382	12443	1350	13794	0	64	64	0	167	167
2007	11149	365	11514	13151	446	13597	0	309	309	0	912	912
2008	197	67	264	18111	127	18238	0	28	28	0	326	326
2009	15	14	29	19022	132	19153	0	0	0	0	742	742
2010	6166	846	7012	3889	314	4204	0	0	0	0	32	32
2011	5009	904	5913	0	0	0	0	0	0	0	0	0
2012	12570	143	12713	0	0	0	0	271	271	0	0	0
2013	7530	147	7677	0	0	0	6	164	170	0	0	0

**Table 9: Catches taken by the purse-seine fishery within 20 nm of the islands.**

Data provider: Jan van der Westhuizen (DAFF)

20nm	Dassen			Robben			St Croix			Bird		
Year	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total
1987	55122	7280	62401	37283	1733	39016	0	0	0	0	0	0
1988	37539	11539	49077	47413	3222	50635	0	0	0	0	0	0
1989	30498	5038	35536	32766	2653	35419	0	12	12	0	0	0
1990	10028	12548	22575	6224	6784	13008	0	163	163	0	40	40
1991	11977	5285	17262	17309	3092	20400	0	471	471	0	16	16
1992	46421	7886	54307	35917	4465	40382	0	231	231	0	58	58
1993	16144	11818	27961	8960	3757	12718	0	143	143	0	0	0
1994	35678	7638	43316	26707	5594	32301	0	355	355	0	31	31
1995	24930	13536	38467	9911	3087	12998	0	509	509	0	0	0
1996	8353	28978	37331	4665	6147	10812	0	614	614	0	0	0
1997	3672	9730	13402	8351	10168	18519	0	36	36	0	0	0
1998	3635	25706	29341	3595	9301	12896	0	2660	2660	0	0	0
1999	41325	33526	74851	18767	9588	28355	0	1482	1482	0	0	0
2000	35551	8916	44467	14096	2112	16208	0	668	668	0	0	0
2001	57509	8518	66027	13282	3982	17263	0	1100	1100	0	20	20
2002	39423	27062	66485	18975	21328	40303	0	4105	4105	0	12	12
2003	36957	21528	58486	35309	25545	60853	0	14818	14818	0	0	0
2004	30179	2911	33091	20957	2336	23293	0	3976	3976	0	90	90
2005	61371	1862	63233	12943	486	13430	0	1071	1071	0	125	125
2006	43067	4004	47071	23764	2760	26523	0	9485	9485	0	5570	5570
2007	45981	5278	51260	40881	2036	42917	0	2606	2606	0	5854	5854
2008	21071	3324	24395	53327	802	54129	0	491	491	2	3600	3602
2009	5256	420	5676	34991	1315	36306	0	320	320	1	3214	3215
2010	22264	5337	27601	20145	2487	22632	0	1736	1736	0	2028	2028
2011	14888	5355	20243	2558	1143	3701	0	678	678	0	68	68
2012	45743	2071	47814	21049	983	22032	5	4466	4471	0	205	205
2013	10668	831	11499	0	18	18	21	3283	3303	0	420	420

**Table 10: Catches taken by the purse-seine fishery within 30 nm of the islands.**

Data provider: Jan van der Westhuizen (DAFF)

30nm	Dassen			Robben			St Croix			Bird		
Year	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total	Anchovy	Sardine	Total
1987	86864	14422	101286	66013	3702	69715	0	0	0	0	0	0
1988	95111	18313	113425	70147	7524	77672	0	0	0	0	0	0
1989	66531	10620	77152	53854	4961	58815	0	12	12	0	12	12
1990	21891	17610	39501	10671	10960	21631	0	220	220	0	144	144
1991	23440	9409	32849	24133	7098	31232	0	500	500	0	211	211
1992	69627	12602	82228	64193	8619	72812	0	778	778	0	351	351
1993	20260	17881	38142	18919	10385	29303	0	244	244	0	60	60
1994	49627	15499	65126	41629	9778	51407	0	1271	1271	0	194	194
1995	35136	21854	56990	22973	8126	31099	0	1548	1548	0	281	281
1996	15911	42300	58211	8806	20291	29096	0	1596	1596	0	326	326
1997	7072	27355	34427	12393	23327	35720	0	209	209	0	8	8
1998	6575	48784	55360	4546	31819	36365	0	3272	3272	0	694	694
1999	59061	55403	114465	37722	34134	71855	0	2796	2796	0	825	825
2000	50397	26860	77257	31168	13687	44855	0	875	875	0	196	196
2001	76641	19972	96613	34875	18082	52958	0	2333	2333	0	20	20
2002	56635	52559	109195	34561	53139	87700	0	5706	5706	0	74	74
2003	59216	47771	106987	66775	59125	125900	0	15754	15754	0	483	483
2004	44065	7107	51172	41472	13944	55416	0	7666	7666	0	936	936
2005	74423	2241	76664	49668	1742	51410	0	7029	7029	0	2851	2851
2006	62184	6033	68218	49640	6035	55675	0	21855	21855	0	15895	15895
2007	72429	10618	83047	83681	6403	90083	0	7353	7353	0	8339	8339
2008	60033	8284	68317	91143	3468	94610	2	3471	3473	2	5529	5531
2009	34281	1608	35888	54009	5380	59390	1	3366	3367	1	5346	5348
2010	34357	13290	47647	48946	9879	58825	0	3974	3974	0	3235	3235
2011	23924	10640	34564	17291	5939	23229	0	1982	1982	0	350	350
2012	68824	3791	72615	85268	5200	90469	8	5067	5075	9	752	761
2013	10737	1612	12349	16394	1360	17754	33	3703	3736	6	1839	1844
1987	86864	14422	101286	66013	3702	69715	0	0	0	0	0	0

**Table 11: Biomass of anchovy and sardine measured during the October-December acoustic survey to the west and east of Cape Agulhas (tonnes).**

Data provider: Janet Coetzee (DAFF)

Year	Biomass West of Agulhas			Biomass East of Agulhas		
	Anchovy	Sardine	Total	Anchovy	Sardine	Total
1984	631327	48009	679336	734206	369	734575
1985	1014215	25457	1039672	352080	19556	371635
1986	1978652	238230	2216883	589968	61566	651535
1987	1866430	94165	1960595	242341	17120	259461
1988	1289624	128043	1417668	317436	6319	323754
1989	517293	198328	715622	234236	58327	292562
1990	342812	248855	591667	308899	41020	349919
1991	1254359	517180	1771539	1073476	80678	1154153
1992	1036580	247756	1284337	1051445	246401	1297846
1993	439121	480822	919942	477238	79198	556436
1994	309981	389730	699711	307294	128624	435918
1995	468678	363542	832221	132593	480402	612995
1996	29748	257763	287511	132300	271693	403993
1997	377663	964835	1342498	1104969	259797	1364767
1998	206586	1082547	1289132	1022547	524781	1547328
1999	741961	708029	1449990	1310195	927381	2237576
2000	1960122	726230	2686351	2693657	1566150	4259807
2001	2301999	669617	2971617	4418288	1639983	6058270
2002	2018570	1184713	3203283	1849079	3021538	4870617
2003	1181111	1343118	2524229	2447010	2221053	4668063
2004	736973	292522	1029495	1374701	2323193	3697894
2005	670730	75604	746334	2408227	973386	3381614
2006	1015882	177885	1193767	1099557	534667	1634225
2007	889676	57666	947342	1639971	199061	1839032
2008	1421593	211871	1633464	2325002	172209	2497211
2009	2098253	262853	2361106	1694294	239400	1933695
2010	354149	309465	663614	1723266	198927	1922193
2011	173390	182825	356215	580734	854235	1434970
2012	1022472	186109	1208580	2165493	158945	2324438
2013	1595320	654796	2250116	3558159	196757	3754916



**Table 12: Recruitment estimates (May/June) for the standard survey area up to Cape Infanta. Biomass data are in tonnes and numbers are in billions.**

Data provider: Janet Coetzee (DAFF)

Data corrected: 24 November 2014

Year	ANCHOVY			SARDINE		
	Biomass	CV	Numbers	Biomass	CV	Numbers
1985	344245.3	0.262	83.45	37635.61	0.397	3.592
1986	617424.9	0.171	139.31	43239.59	0.343	3.677
1987	687635.7	0.158	124.45	89502.3	0.393	7.352
1988	561356.6	0.155	129.02	4724.404	0.410	0.439
1989	162131.9	0.193	33.13	46238.81	0.277	2.129
1990	169586.7	0.217	51.14	28176.57	0.658	2.492
1991	521418	0.141	113.58	22769.21	0.228	1.915
1992	438584.1	0.153	93.68	69607.89	0.273	5.633
1993	445793.8	0.254	115.06	109591	0.234	15.238
1994	135022.7	0.174	30.55	57208.2	0.259	2.654
1995	391748.7	0.168	110.44	194506.3	0.216	25.388
1996	72076.83	0.212	25.77	48154.23	0.349	3.204
1997	402624.2	0.175	90.21	342362.8	0.262	36.856
1998	451211.2	0.150	136.52	129663.8	0.360	10.716
1999	812242.2	0.158	199.23	219249	0.376	10.378
2000	2474927	0.168	624.68	264452.3	0.390	20.002
2001	1946112	0.135	627.20	559078.7	0.287	60.065
2002	1543397	0.115	520.41	595913.3	0.182	49.153
2003	1396638	0.189	430.31	501623.6	0.209	36.448
2004	1058653	0.219	238.57	26002.97	0.342	4.089
2005	550234.9	0.273	176.92	16895.73	0.343	2.874
2006	263888.6	0.174	117.46	50067.02	0.381	9.564
2007	1505898	0.184	506.70	32777.26	0.343	2.937
2008	1426705	0.202	563.16	19610.14	0.266	3.852
2009	1306045	0.189	363.39	55111.23	0.776	9.207
2010	1667994	0.267	383.33	479609.5	0.473	35.569
2011	281260.2	0.283	104.17	53680.91	0.475	5.470
2012	990378.4	0.138	210.56	86088.65	0.321	8.103
2013	1164278	0.182	352.99	102169.3	0.416	12.124

**Table 13: Small scale acoustic survey estimates of pelagic fish biomass (tonnes) in the upper 50 m of the water column.**

Data provider: Janet Coetzee (DAFF)

Robben Island			Dassen Island			Bird Island			St Croix Island		
Date start	Biomass	CV	Date start	Biomass	CV	Date start	Biomass	CV	Date start	Biomass	CV
05/04/2009	1 703.5	0.62	02/06/2010	154 182.1	0.48	25/03/2010	16 315.7	0.23	16/01/2010	50 940.8	0.22
19/04/2009	1 004.0	0.65	20/07/2010	146 027.1	0.51	13/04/2010	47 795.3	0.30	13/02/2010	62 866.6	0.29
04/05/2009	4 879.6	0.38	07/09/2010	5 178.5	0.46	26/04/2010	16 225.2	0.47	05/03/2010	56 173.2	0.30
29/06/2009	4 456.5	0.27	28/02/2011	45 381.1	0.24				21/03/2010	44 355.3	0.29
27/07/2009	16 320.1	0.43	10/05/2011	28 608.4	0.23				14/04/2010	55 219.5	0.19
07/08/2009	12 996.3	0.42	05/07/2011	63 748.9	0.56				27/04/2010	26 637.9	0.15
03/02/2010	0.0	0.00	19/07/2011	19 172.2	0.50						
30/06/2010	64 846.7	0.36	10/08/2011	9 808.2	0.62						
02/08/2010	81 620.7	0.32	19/09/2011	3 906.6	0.49						
02/09/2010	41 309.0	0.32	28/02/2012	38 496.4	0.33						
06/10/2010	2 584.9	0.54	25/04/2012	20 252.8	0.37						
08/03/2011	49 289.0	0.30	15/06/2012	163 258.5	0.34						
16/05/2011	4 405.7	0.20	24/07/2012	42 778.8	0.47						
27/06/2011	48 962.2	0.70									
26/07/2011	548.6	0.25									
16/08/2011	7 556.3	0.84									
26/09/2011	657.2	0.35									
26/03/2012	41 705.0	0.38									
27/04/2012	72 711.2	0.35									
17/07/2012	159 039.0	0.28									
02/08/2012	187 249.4	0.32									
05/09/2012	31 692.8	0.58									
15/05/2013	7 159.2	0.32									

**Table 14: schedule of closures around breeding colony islands.**

Island	2008	2009	2010	2011	2012	2013	2014
Dassen Island	X	X					X
Robben Island				X	X	X	
St Croix Island		X	X	X			
Bird Island					X	X	X
X = closed							
In all instances a circle of 20km radius around the island (measured from the centre of the island) was closed to fishing. An additional area with a radius of 5km was closed around Riy Banks in Algoa Bay as part of the St Croix island closure).							

Appendix A. Small pelagic fishing block position reference maps.







