

Progress Report 1 for CSP Project New Zealand sea lion ground component 2015/16

BPM-16-Progress Report 1 for CSP Project NZ sea lion ground component 2015-16 v1.2
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1. Executive Summary

Blue Planet Marine (BPM) was contracted by the Conservation Services Programme (CSP) of the Department of Conservation (DOC) to provide services for the CSP Project New Zealand sea lion ground component 2015/16. The field component of the work is presently underway in the Auckland Islands. A major element of this field work (i.e. estimating pup production) has been completed. This preliminary report reports only on estimates of pup production for the Auckland Islands for 2015/16. A full report will be available once the field season is completed.

In summary:

- Pup production was estimated for New Zealand sea lion colonies at Sandy Bay (n=321), Dundas Island (n=1,347), Figure of Eight Island (n=59) and South East Point (n=0); with total pup production for the Auckland Islands in 2015/16 estimated as **1727**. This total represents a 10% increase from the 2014/15 estimate;
- With the exception of the Figure of Eight colony, preliminary estimates of pup mortality to the date of the pup production estimate are broadly comparable to previous 'non-epidemic' years. However, with the exception of Sandy Bay, these figures do not represent full season surveys prior to 2012/13, and so should be viewed as a minimum. Pup mortality estimates to the date of the pup production estimate are: Sandy Bay 4%, Dundas Island 9% and Figure of Eight Island 10%. Overall, the estimate of pup mortality to the date of the pup production estimate was 8%;
- Seven hundred and sixty seven pups were marked at the Auckland Islands including: Sandy Bay – 198 tagged and micro-chipped tagged, and 110 micro-chipped only; Dundas Island – 400 tagged only; and Figure of Eight Island – 49 tagged only;
- Direct daily counts were undertaken at Sandy Bay from 11 November 2015 until 22 January 2016 which is the first time that a full breeding season count has been undertaken since 2011/12;
- Pup weights were higher at Sandy Bay for 2015/16 than 2014/15 (i.e. males +10%, females +13%) but were lower at both Dundas Island (i.e. males -12%, females -8%) and Figure of Eight Island (i.e. males -2%, females -2%); and
- Preliminary provisional diagnosis of cause of death in pups at Sandy Bay based on gross necropsy examination (n=16) from 9 January to 3 February 2016 were Starvation (44%), Bacterial infection (probable *Klebsiella pneumoniae*) (25%), Trauma (13%), Bacterial infection (possible *Klebsiella pneumoniae*) (6%), Intestinal perforation (6%) and Open diagnosis (6%).

2. Methodology

Blue Planet Marine (BPM) was contracted by the Conservation Services Programme (CSP) of the Department of Conservation (DOC) to provide services for the CSP Project New Zealand sea lion ground component 2015/16.

A full description of methods used in this field study are available in Childerhouse (2015), which is available from DOC and the author upon request. The research outlined here follows almost exactly the same methods as undertaken previously by DOC and as described in Chilvers (2012). The only major difference with previous surveys is that the mark-recapture estimate on Dundas Island was undertaken one day earlier than previous years (i.e. 18 January rather than 19 January). The date of the Dundas Island mark-recapture had been set as the 19 January at the request of DOC and agreed to by the CSP Technical Working Group but was moved one day earlier due to helicopter availability following advice from DOC. Also, dead pups were removed at Sandy Bay whenever possible to allow for autopsy and the determination of cause of death.

A team of five sea lion researchers and one wildlife vet undertook the count and tagging work. Several researchers will remain on Enderby Island until approximately 25 February 2016 in order to collect resight information and necropsy deceased marked animals. All dead sea lions found at Enderby Island will be necropsied and assessed for cause of death.

A complete report on all data collected will be presented to the CSP Technical Working Group for review in mid-March 2015.

3. Results

3.1 Estimates of pup production

Annual estimates of pup production for each colony and for total Auckland Islands pup production from 1994/95 until 2015/16 are shown in Appendix 1. Figures showing annual estimates for pup production by colony are shown in Appendix 2.

3.1.1 Sandy Bay, Enderby Island

Table 1: Summary of pup production estimates for Sandy Bay for 2015/16.

Method	Date	Start/end time	Estimate (SE)
Mean direct live count	16 Jan 2016	08:33/10:15	285 (6)
Cumulative dead count to the day of the mark-recapture	16 Jan 2016	08:33/10:15	13
Mean mark-recapture estimate	16 Jan 2016	08:33/10:15	276 (6)
Total number pups individually marked	15-16 Jan 2016	N/A	308

Total pup production for Sandy Bay is estimated at **321** (308 live plus 13 dead pups) for 2015/16. This estimate uses the number of live pups tagged on the 16 January rather than the mark-recapture estimate of abundance as it is more accurate. This total is 12% higher than the estimate for previous season which was the lowest since consistent recording began in 1994-95. Figures showing annual estimates for Sandy Bay colony are shown in Appendix 2.

3.1.2 Dundas Island

Table 2: Summary of pup production estimates for Dundas Island for 2015/16.

Method	Date	Start/end time	Estimate (SE)
Mean direct live count	18 Jan 2016	08:49/09:54	1135 (23)
Mean direct dead count	18 Jan 2016	09:54/11:05	126 (0.0)
Mean mark-recapture estimate	18 Jan 2016	0854/10:41	1221 (19)
Total number pups tagged	17-18 Jan 2016	N/A	400

Total pup production for Dundas Island is estimated at **1347** (1221 live plus 126 dead pups). The estimate for 2015/16 was 10% higher than the estimate for 2014/15. Figures showing annual estimates for Dundas Island colony are shown in Appendix 2.

3.1.3 Figure of Eight Island

Table 3: Summary of pup production estimates for Figure of Eight Island for 2015/16.

Method	Date	Estimate (SE)
Mean direct live count	9 Jan 2016	53 (1.2)
Mean direct dead count	9 Jan 2016	6 (0.0)
Total number pups tagged	9 Jan 2016	49

Total pup production for Figure of Eight Island is estimated at **59** (53 live plus 6 dead pups). The estimate for 2015/16 was exactly the same as for 2014/15. Figures showing annual estimates for Figure of Eight Island colony are shown in Appendix 2.

3.1.4 South East Point, Enderby Island

Table 4: Summary of pup production estimates for South East Point for 2015/16.

Method	Date	Estimate (SE)
2Direct live count	12 Jan 2015	0
Direct dead count	12 Jan 2015	0
Total number pups tagged	12 Jan 2015	0

Total pup production for South East Point is estimated at **0** (0 live plus 0 dead pups). The estimate for 2015/16 is the same as for 2014/15. Figures showing annual estimates for South East Point colony are shown in Appendix 2.

3.1.5 Total pup production for the Auckland Islands

Overall, total pup production for the Auckland Islands in 2015/16 was estimated to be 1727 pups (1582 live pups and 145 dead pups). This total represents an overall increase of 10% from the 2014/15 estimate. The estimate for 2015/16 is 15% higher than the lowest ever estimate for pup production of 1501 pups seen in 2008/09. Overall pup production for the Auckland Islands since 1994/95 is shown in Figure 1.

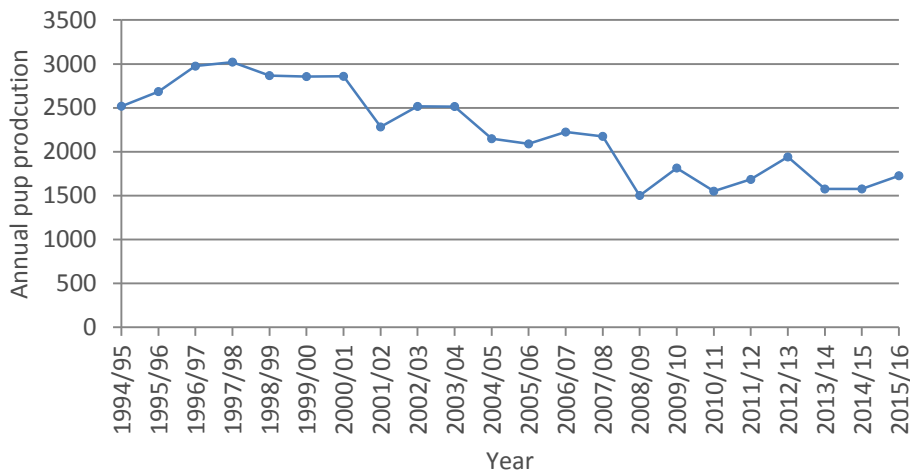


Figure 1: Total estimated pup production for New Zealand sea lions at the Auckland Islands 1994/95 – 2015/16. (Data prior to 2012/13 from Chilvers (2012)).

3.2 Tagging and micro-chipping

Flipper tagging and subcutaneous micro-chipping were also undertaken. Summary of pup tagging was:

- Dundas Island – 400 pups tagged (comprising 100 males and 300 females);
- Figure of Eight Island – 49 pups tagged (as many as could be tagged in the time available); and
- Sandy Bay – All live pups on 16 January. 198 pups both tagged and micro-chipped and a further 110 pups micro-chipped only. This is the second time since 1998 that all pups at Sandy Bay have not been tagged although they were all micro-chipped.

3.3 Pup weights

Table 5: Summary of mean pup weights for the Auckland Islands for 2015/16

Location	Mean female weight		Mean male weight	
	Kg (SE)	Change from 2014/15	kg (SE)	Change from 2014/15
Sandy Bay	11.7 (1.9)	10%	12.5 (1.9)	13%
Dundas Island	10.0 (1.7)	-12%	11.3 (2.0)	-8%
Figure of Eight Island	10.2 (1.1)	-2%	11.0 (1.4)	-2%

100 pups (50 of each sex) were weighed at both Sandy Bay and Dundas Island on the same day of the mark-recapture count (16 and 18 January 2016 respectively). For the second year time, pup weights were also collected from pups (n=49) at Figure of Eight Island. Mean pup weights from previous surveys at Sandy Bay, Dundas Island and Figure of Eight Island are show in Figure 2, Figure 3 and Figure 4.

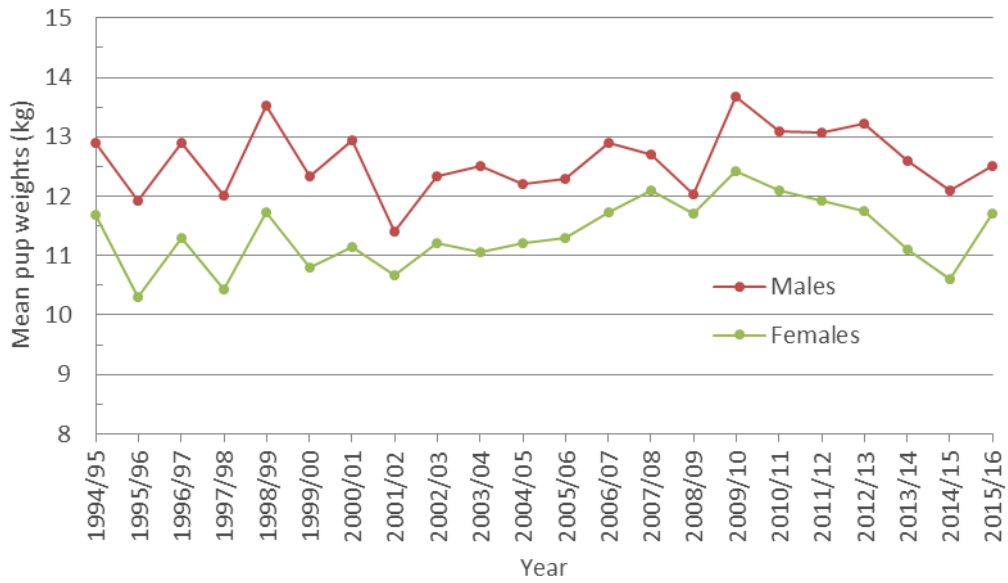


Figure 2: Mean pup weights for Sandy Bay colony by sex 1994/95 – 2015/16. (Data prior to 2012/13 from Chilvers (2012)).

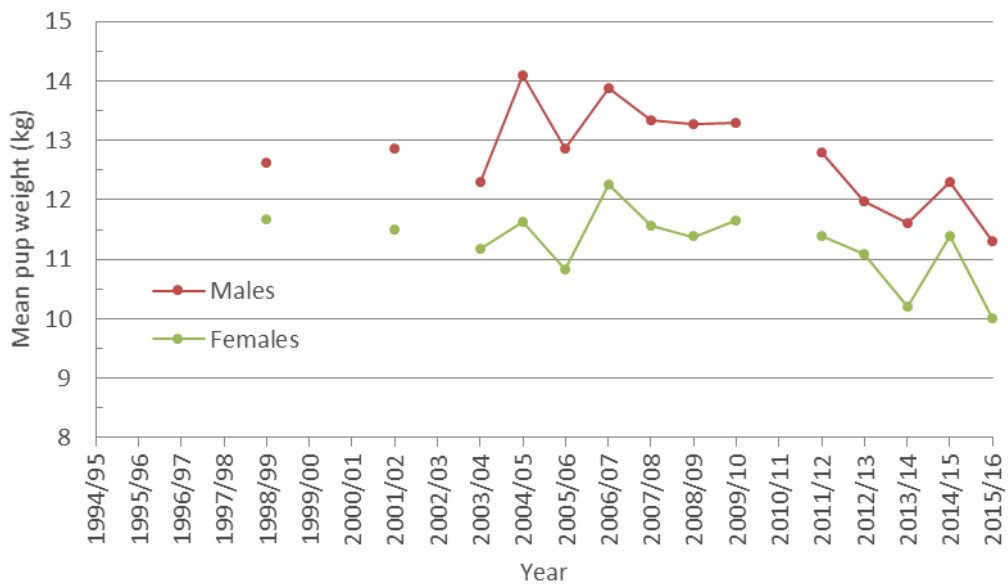


Figure 3: Mean pup weights for Dundas Island colony by sex 1994/95 – 2015/16. (Data prior to 2012/13 from Chilvers (2012)).

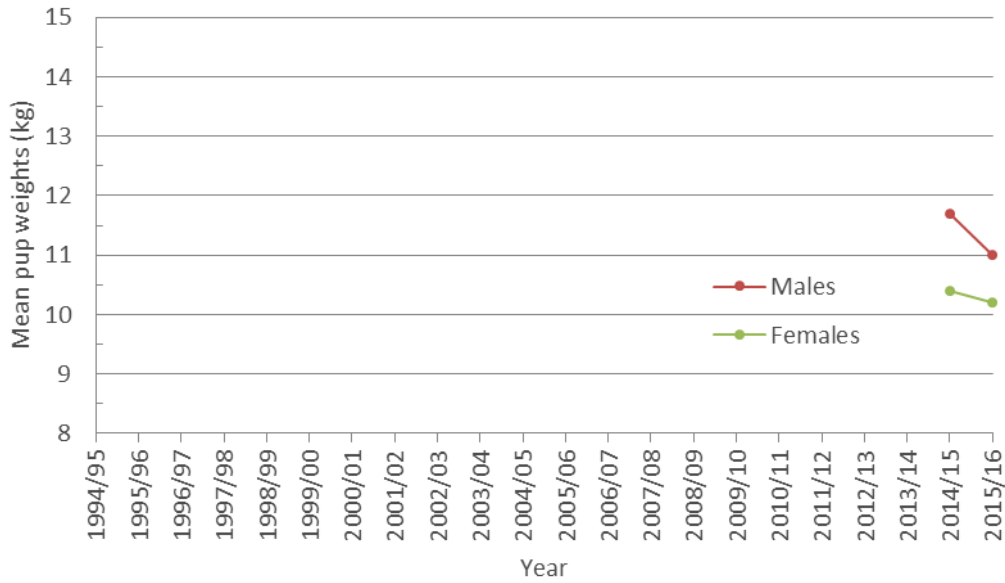


Figure 4: Mean pup weights for Figure of Eight colony by sex 2014/15 – 2015/16.

3.4 Direct counts at Sandy Bay

Direct counts of live and dead pups, adult females, adult and sub-adult males were made at Sandy Bay from 11 November to 22 January 2016 (Figure 5). This is the first year since 2011/12 that there has been a complete count at Sandy Bay since the beginning of the breeding season which includes a cumulative count of dead pups.

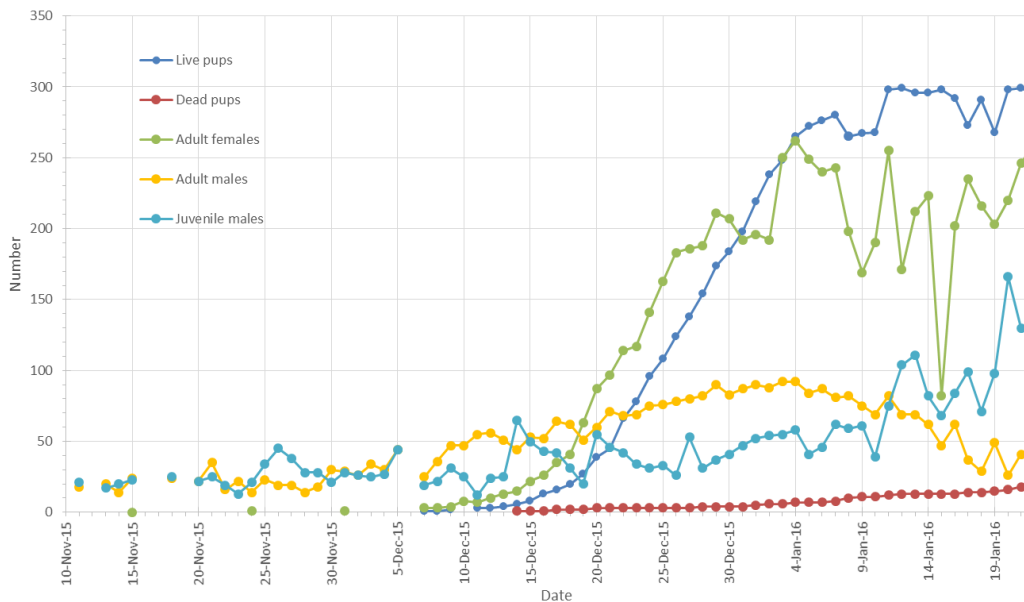


Figure 5: NZ sea lion counts at Sandy Bay, Enderby Island 2015/16

3.5 Preliminary assessments of cause of death in pups

Autopsies have been undertaken on all dead pups at Sandy Bay after the team arrived on 9 January. Details of pups autopsied are summarised in Table 6. It is important to note that these diagnoses are provisional and will be refined and/or confirmed once histopathology and microbiology analysis has

been completed at Massey University (funding dependent). All autopsies were undertaken by a Massey University vet, following protocols developed for previous years.

Table 6: Preliminary provisional diagnosis of cause of death in pups at Sandy Bay based on gross necropsy examination from 9 January to 3 February 2016

Provisional diagnosis of cause of death for pups	n	%
Starvation	7	44%
Bacterial infection (probable <i>Klebsiella pneumoniae</i>)	4	25%
Trauma	2	13%
Bacterial infection (possible <i>Klebsiella pneumoniae</i>)	1	6%
Intestinal perforation	1	6%
Open diagnosis	1	6%
TOTAL	16	100%

4. Acknowledgements

This project is funded by the Department of Conservation’s Conservation Services Programme through levies on the commercial fishing industry. This research would not have been possible without the support of many people, and for which we are very grateful:

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- Danielle Sijbranda and Richie Robinson; and
- Members of the CSP Technical Working Group who provided useful feedback on this project.

5. References

- Childerhouse SJ (2015) Methodology for New Zealand sea lion population monitoring 2015/16. Unpublished paper presented to the Conservation Services Programme, Department of Conservation, New Zealand. BPM document number: BPM-15- Methodology for New Zealand sea lion population monitoring 2015/16 v1.0. 9 p.
- Chilvers BL (2012) Research to assess the demographic parameters of New Zealand sea lions, Auckland Islands 2011/12 Contract Number: POP 2011/01 Final Research Report, November 2012. Report prepared for the Conservation Services Programme, Department of Conservation. 11 p.

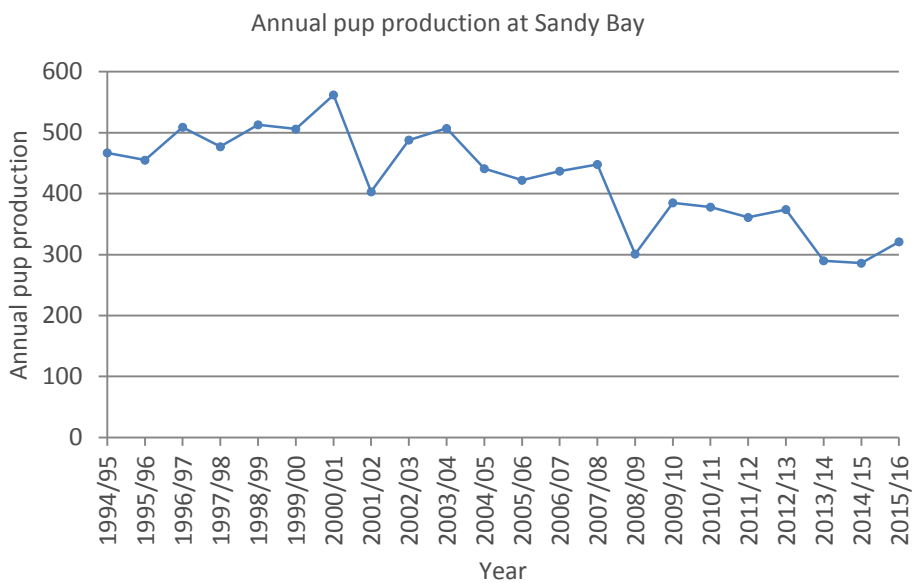
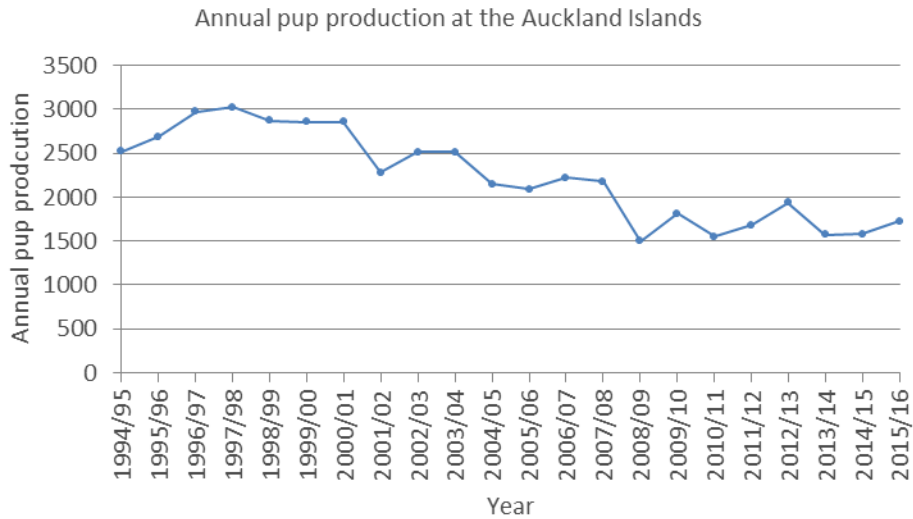
Appendix 1: Annual estimates of live, dead and total pup production for each colony and for total Auckland Islands pup production 1994/95 – 2015/16

(NB. Data prior to 2012/13 from Chilvers (2012))

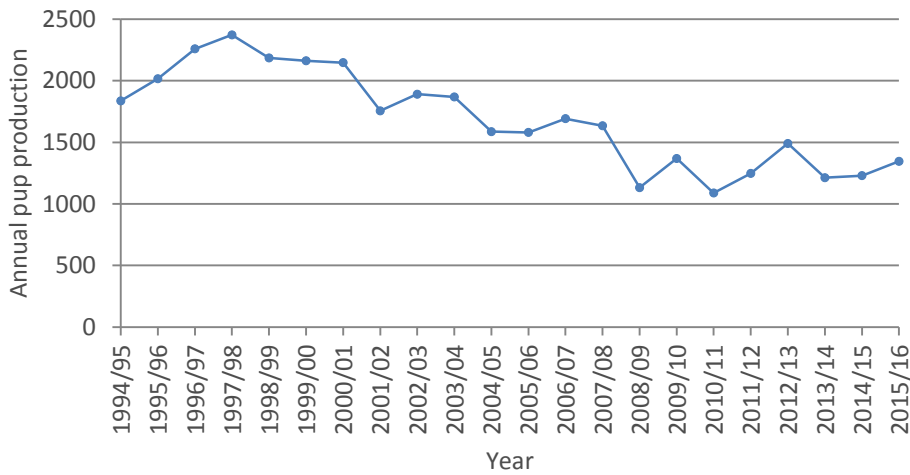
Year	Sandy Bay			Dundas Island			Figure of Eight Island			South East Point			Total Auckland Islands		
	Total	Live	Dead	Total	Live	Dead	Total	Live	Dead	Total	Live	Dead	Total	Live	Dead
1994/95	467	421	46	1837	1603	234	143	123	20	71	59	12	2518	2206	312
1995/96	455	417	38	2017	1810	207	144	113	31	69	49	20	2685	2389	296
1996/97	509	473	36	2260	2083	177	143	134	9	63	39	24	2975	2729	246
1997/98	477	468	9	2373	1748	625	120	97	23	51	37	14	3021	2350	671
1998/99	513	473	40	2186	1957	229	109	100	9	59	42	17	2867	2572	295
1999/00	506	482	24	2163	2039	124	137	131	6	50	37	13	2856	2689	167
2000/01	562	527	35	2148	1802	346	94	92	2	55	47	8	2859	2468	391
2001/02	403	320	83	1756	1395	361	96	90	6	27	21	6	2282	1826	456
2002/03	488	408	80	1891	1555	336	94	89	5	43	26	17	2516	2078	438
2003/04	507	473	34	1869	1749	120	87	86	1	52	39	13	2515	2347	168
2004/05	441	411	30	1587	1513	74	83	79	4	37	31	6	2148	2034	114
2005/06	422	383	39	1581	1349	232	62	55	7	24	20	4	2089	1807	282
2006/07	437	414	23	1693	1587	106	70	67	3	24	19	5	2224	2087	137
2007/08	448	425	23	1635	1512	123	74	72	2	18	13	5	2175	2022	153
2008/09	301	289	12	1132	1065	67	54	48	6	14	8	6	1501	1410	91
2009/10	385	364	21	1369	1218	151	55	48	7	5	1	4	1814	1631	183
2010/11	378	359	19	1089	952	137	79	71	8	4	2	2	1550	1384	166
2011/12	361	343	18	1248	1189	59	74	72	2	1	0	1	1684	1604	80
2012/13	374	357	17	1491	1364	127	75	70	5	0	0	0	1940	1791	149
2013/14	290	284	6	1213	1141	72	72	62	10	0	0	0	1575	1487	88
2014/15	286	279	7	1230	1163	67	60	47	13	0	0	0	1576	1489	87
2015/16	321	308	13	1347	1221	126	59	53	6	0	0	0	1727	1582	145

Appendix 2: Annual estimates of total pup production for each colony and for total Auckland Islands pup production

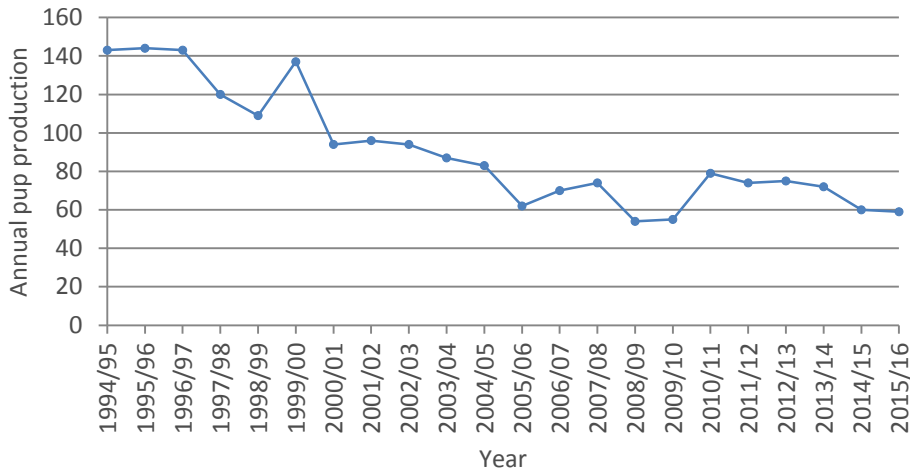
(NB. Data prior to 2012/13 from Chilvers (2012))



Annual pup production at Dundas Island



Annual pup production at Figure of Eight Island



Annual pup production at South East Point

