

**Research to assess the demographic parameters of  
New Zealand sea lions, Auckland Islands  
Contract Number: POP 2010/01**

**NZ sea lion research trip, Auckland Islands, December 4<sup>th</sup> 2010 to February 17<sup>th</sup> 2011**

**Progress Report**

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This progress report outlines key findings from the 2010/11 New Zealand sea lion research field trip to the Auckland Islands. The field trip covered the period from December 4<sup>th</sup> 2010 when the first team arrived on Enderby Island through to the departure of the second team from the Island on February 17<sup>th</sup> 2011, and continues annual surveys of the Auckland Island breeding sites of the New Zealand sea lions (*Phocarctos hookeri*). Full findings will be reported at a later date.

**Objectives**

The objectives of the project were:

1. To collect field data that will allow quantification and estimation of:
  - pup production,
  - survival of previously marked New Zealand sea lions,
  - reproduction by known-age female New Zealand sea lions;
2. To maintain and update the New Zealand sea lion database; and
3. To make available field data for relevant modelling work;

**Logistics**

The scientific trip was split into two parts to allow changes in personnel: December 4<sup>th</sup> - January 10<sup>th</sup>, and January 10<sup>th</sup> - February 20<sup>th</sup>. The first science team comprised of three people: Nathan McNally (DOC, Otago), Elaine Leung (University of Otago) and Andy Maloney (Contractor). The second team comprised of six people: Louise Chilvers (DOC, MCT), Kerri Morgan (Massey University), Amelie Auge (Otago University), Chris Muller (Contractor), Myles Riki (DOC, West Coast Tai Poutini) and Dave Johnson (DOC, Te Anu). Transport during the season was aboard the Tiamu and Evohe under charter to DOC R&D. All personnel were accommodated in the two huts at Sandy Bay.

## Pup production estimate

Estimates of pup production were calculated for the breeding sites in the Auckland Islands between 10 January to 6<sup>th</sup> February (Tables 1 and 2, Figure 1). Mark recapture estimates have been used as the estimates of pup production from Sandy Bay and Dundas Island, while Figure of Eight Island and South East Point areas were estimated using direct counts. Mean estimates are presented here  $\pm$  standard error for total pup production at each site. Methods used follow those described by Chilvers (2011). The total pup production estimate for 2011 was  $1542 \pm 41$  for 2011 (Figure 1).

On the 16<sup>th</sup> of January, the mark-recapture estimate at Sandy Bay was undertaken. The mark-recapture estimated 359 pups  $\pm$  7, there were 19 dead pups at that date giving a total pup production of  $378 \pm 7$ . 360 pups were tagged and PIT tagged by the 17<sup>th</sup> of January. Comparison between M-R estimates and absolute pup numbers tagged on Sandy Bay showed a difference 1 pup, confirming the techniques accuracy for use of M-R estimates of pup production on Dundas Island. By the end of the season at Sandy Bay 30 pups were recorded dead.

The mark recapture estimate at Dundas Island was completed on February 6<sup>th</sup>, 17 days later than planned, due to a severe storm event on 17 January that impacted on transport logistics. The mark-recapture estimated 944 live pups  $\pm$  40 and 137 dead pups were counted giving a total pup production  $1081 \pm 40$ . The logistical constraints also meant no team could be left on Dundas Island over night for safety reasons. This meant no pups were tagged on Dundas Islands, the mark-recapture was conducted on a single day rather than over two days as planned and only 200 caps were placed out on pups rather than 400 as planned. However, all M-R assumption were met i.e.

1. All pups were born by mark-recapture dates;
2. All pups were accessible for marking;
3. All pups were mobile and mixed well after being marked;
4. Marks were not lost before M-R counts; and
5. Mortality was negligible in the time between marking and recapturing.

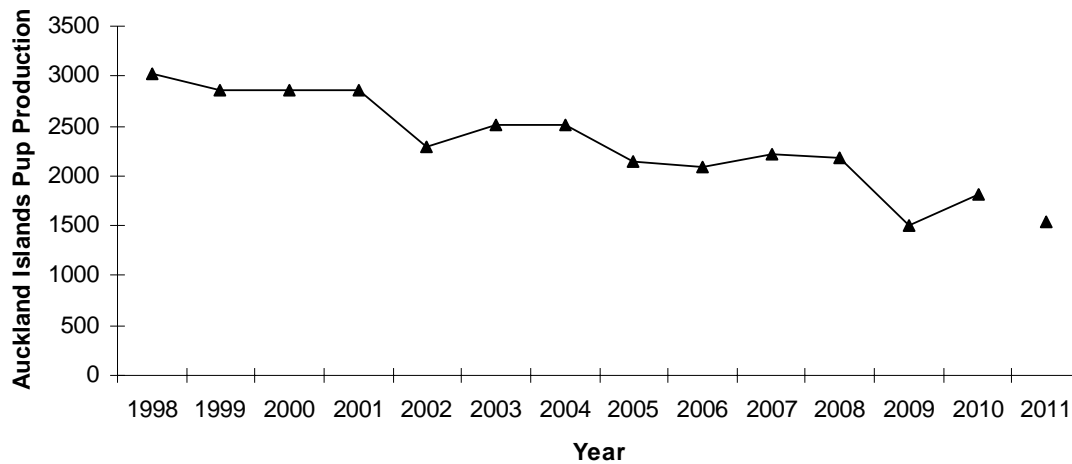
The standard error of the estimate was of similar magnitude to previous years (Table 1).

For the purposes of this progress report no attempt has been made to make any adjustment to estimates of pup production due to these differences in methodology.

A direct count was made at Figure of Eight Island on the 10<sup>th</sup> January. 71 live pups  $\pm$  2 and 8 dead pups were counted giving a total of  $79 \pm 2$  pups.

Counts were conducted at South East Point throughout the season. 4 pups (2 confirmed dead, two absent) had been counted at SEP giving a total of 4 pups.

The estimate of pup production from the Auckland Islands was 15% lower between 2009/10 and 2010/11 (Figure 1, Appendix 1).

**Figure 1. Annual pup production for the Auckland Islands 1997/98 to 2010/11.**

Note: 2011 methodology varies from previous years

**Table 1:** Pup production estimates for Auckland Islands ( $\pm$  standard error for total pup production at each site)

Season	Sandy Bay			Dundas Island			Figure of Eight Island			South East Point		
	total	alive	dead	Total	alive	dead	total	alive	dead	total	alive	dead
98/99	513	473	40	2186	1957	229	109	100	9	59	42	17
99/00	506	482	24	2163	2039	124	137	131	6	50	37	13
00/01	562	527	35	2148	1802	346	94	92	2	55	47	8
01/02	403	320	83	1756	1395	361	96	90	6	27	21	6
02/03	489	408	80	1891	1555	336	95	89	5	43	26	17
03/04	507	473	34	1869	1749	120	87	86	1	52	39	13
04/05	441	411	30	1587	1513	74	83	79	4	37	31	6
05/06	422	383	39	1581	1349	232	62	55	7	24	20	4
06/07	437	414	23	1693	1587	106	70	67	3	24	19	5
07/08	448 $\pm$ 5	425	23	1635 $\pm$ 44	1512	123	74 $\pm$ 1	72	2	18	13	5
08/09	301 $\pm$ 2	289	12	1132 $\pm$ 16	1065	67	54 $\pm$ 1	48	6	14	8	6
09/10	385 $\pm$ 6	364	21	1369 $\pm$ 35	1218	151	55 $\pm$ 1	48	7	5	1	4
<b>10/11</b>	<b>378 <math>\pm</math> 7</b>	<b>359</b>	<b>19</b>	<b>1081 <math>\pm</math> 40</b>	<b>944</b>	<b>137</b>	<b>79 <math>\pm</math> 2</b>	<b>71</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>2</b>

**Table 2:** Total pup production from the Auckland Islands (NB. These estimates do not include an estimate of pup production from Campbell Island).

Season	Annual pup production			% Annual change in no. pups born	% Mortality at mark recapture estimate date		% Mortality at end of season (SB only)
	Total	Alive	Dead		Total	SB only	
98/99	2867	2572	295	-5.1%	10%	8%	9%
99/00	2856	2689	167	-0.4%	6%	5%	11%
00/01	2859	2468	391	0.1%	14%	6%	10%
01/02	2282	1826	456	-20.2%	20%	21%	33%
02/03	2518	2078	438	10.3%	17%	16%	21%
03/04	2515	2347	168	-0.001%	7%	8%	15%
04/05	2148	2034	114	-14.6%	5%	7%	12%
05/06	2089	1807	282	-2.8%	14%	9%	16%
06/07	2224	2087	137	6.4%	6%	5%	16%
07/08	2175±44	2022	153	-2%	7%	5%	14%
08/09	1501±16	1410	91	-31%	6%	4%	12%
09/10	1814±36	1631	183	+21%	10%	5%	15%
10/11	1542±41	1376	166	-15%	10%	5%	8%
Actual number of pups recorded as dead 10/11					166	19	30

### Pup tagging

Pups have been tagged to provide a pool of known age individuals for the estimation of parameters such as survival, recruitment and reproductive rate as part of the long-term study. Tags applied were 'coffin' shaped Dalton 'Jumbo' tags with a letter and three-digit number combination. All pups were tagged in both flippers. All live pups at Sandy Bay (360 by the 17<sup>th</sup> January) and 31 pups on Figure of Eight Island were tagged with yellow coffin shaped Dalton 'Jumbo' tags. The 360 pups at Sandy Bay were also PIT tagged.

### Resighting of previously marked individuals

Daily counts of all animals and resights of tags and brands on NZ sea lions were undertaken on Enderby Island to understand the composition of animals at this breeding site and to enable the calculation of survival, recruitment and fecundity of animals. Daily checks were undertaken at Sandy Bay with approximately 7000 resights made on >1100 animals previously tagged or branded (including 278 individuals identified from a chip).

### Acknowledgements

We are grateful for the significant logistical support provided throughout the whole trip from DOC Southland, particularly Sharon Trainor, Pete McClelland, Gilly Adams and Andy Roberts. We also appreciate the helpful and friendly radio schedules coordinated by Stewart Island staff. As always huge thank you to all of the crew of Tiama and Evohe.

### Reference

Chilvers, BL 2011. Research to assess the demographic parameters and at sea distribution of New Zealand sea lions, Auckland Islands. Draft final research report POP2007-01. Department of Conservation, Wellington.

**Appendix 1 Raw mark-recapture values (for Sandy Bay and Dundas) and direct counts (for Figure of Eight) for the 2010/11 season**

	2010/11	
<b>Sandy Bay</b>	Marked	Unmarked
Pups capped / marked	148	
Counter 1a	56	87
1b	57	93
1c	68	82
Counter 2a	58	76
2b	62	94
2c	63	101
Counter 3a	94	121
3b	87	123
3c	92	131
<b>Dundas</b>		
Pups capped / marked	199	
Counter 1a	70	244
1b	100	379
Counter 2a	82	376
2b	98	371
Counter 3a	134	411
3b	117	453
<b>Figure of Eight</b>	Alive	Dead
Count 1	74	8
Count 2	72	8
Count 3	66	