

**Aerial survey of NZ sea lions
Auckland Islands
DOCDM-872849**



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background

— only endemic NZ pinniped &
world's rarest sea lion

— 76% of pups born Auckland Islands at
4 sites

Sandy Bay, Enderby Island

South East Point, Enderby Island

Dundas Island

Figure 8 Island

- sea lions have been monitored on Auckland Islands since early 1990s
- estimates derived from direct on-ground counts or use of M-R experiments
- considerable decline in pup production over last decade
- in January 2012 we undertook a study to trial alternative method to previous surveys - aerial photography

- work confined to 2 of the 4 Auckland Island breeding sites:
 1. Sandy Bay, Enderby Island
 2. Dundas Island
- other two sites either were unsuited to aerial photography (Figure of Eight Island) or contained few pups (South East Point)

methods

- aerial platform Squirrel Helicopter
- field work 11 – 15 January 2012 timed to occur at close to the time of ground & M-R counts
- colonies documented using digital cameras
- 2 groups of photos
- overall scenic shots of colonies to assist later when building photomontages of sites
- series of overlapping photos of all areas with pups (200 mm focal length)
- close-up photos of puppy piles (500 mm lens)

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methods

- photos taken as raw or fine scale JPEG digital files of minimum 9 MB size
- ideal flight height 1000 ft directly over colony
- each colony photographed on 4 separate days to investigate temporal effects
- All photography carried out between 0900 & 1500 hours

counting protocols

- photomontages constructed using Adobe Photoshop software
- paintbrush tool mark off counted sea lions



data assessment

- all pups counted
- all images counted by one observer
- repeat counts of randomly selected montages by 2 other observers confirmed no evidence of observer bias in counting

NZSL age classes





ground counts

- direct counts carried out at Sandy Bay every day
- Mark-Recapture experiments:
 - Sandy Bay 16 January
148 pups marked
 - Dundas Island 21 January
380 pups marked
- results of each recapture were used to calculate a modified Petersen estimate
- dead pups added to estimates

results

- weather suitable for photography on 11, 12 & 14 January
- low cloud to sea level prohibitive to good photography on 13 January
- quality of photos taken generally excellent
- photos taken by both photographers on one day for one site photographic were consistently soft in focus
- not possible to determine life-status of pups

Sandy Bay comparative counts

Area / Date	Ground count	Aerial count	Lens	Difference
11 Jan	337	358	200 mm	-2 (-1%)
12 Jan	341	353	200 mm	-7 (-2%)
14 Jan	340	293	200 mm	-67 (-19%)
14 Jan	340	304	500 mm	-56 (-16%)
16 Jan	361			

Dundas Island comparative counts

Area / Date	Ground count	Aerial count	Lens	Difference
11 Jan		1 269	200 mm	21 (2%)
12 Jan		1 207	200 mm	-41 (-3%)
14 Jan		1 222	200 mm	-26 (-2%)
21 Jan	1 248			

results

- In all but one case, the aerial counts underestimated the number of pups produced at both Sandy Bay and Dundas Island
- With the exception of one day, the aerial and mark-recapture counts were highly correlated and varied by less than 3%.
- For one day, 14 January, difference between aerial & ground count was 19%, or 16% if photos of puppy piles taken with 500 mm lens included in analysis

Sandy Bay – comparison of days 1 & 4 counts



discussion

- aerial photography appears to have great potential to provide robust, cost-effective estimates of NZSL pup production at the major pupping sites
- more work desirable to understand the disparity between Sandy Bay ground count and the one low aerial estimate,
- only plausible explanation is pups were missed because they were hidden deep in puppy piles

- to deal with this problem aerial counts may need to be undertaken on more than one day to achieve counts comparable with existing longitudinal dataset. Use maximum count obtained for this purpose
- pups & puppy piles are not static. Large piles that present counting difficulties one day likely to break up over a day or two
- dead pup issue needs further consideration
- future aerial surveys should be timed to occur as close as possible to the dates historically used for mark-recapture estimates

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