

Aerial survey of NZ sea lions, Auckland Islands 2012/13



Barry Baker, Katrina Jenz & Louise Chilvers
Latitude 42 Environmental Consultants
Department of Conservation

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 of Eight 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
- in January 2012 we trialled alternative method to previous surveys - aerial photography
- in January 2013 to again used aerial photography to estimate NZSL pup production at Enderby & Dundas islands, building on the work carried out in 2012

2011/12 results

- in all but one case, 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 difference between aerial & ground count was 16%

- to deal with these 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 & pup piles are not static. Large piles that present counting difficulties one day likely to break up over a day or two
- future aerial surveys should be timed to occur as close as possible to the dates historically used for mark-recapture estimates

methods for 2012/13

- work confined to 2 of the 4 Auckland Island breeding sites:
 1. Sandy Bay, Enderby Island
 2. Dundas Island
- aerial platform Squirrel Helicopter
- field work 12 – 21 January 2013 concurrent with the time of ground counts
- colonies documented using Nikon digital cameras

methods used 2012/13

- photos taken as raw or fine scale JPEG digital files of minimum 35 MB size
- flight height 1000 ft directly over colony
- each colony photographed on at least 4 separate days to investigate temporal effects
- all photography carried out between 0900 - 1500 hours





Extent of sealion colony
Sandy Bay, enderby Island

counting protocols

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



data assessment

- all pups counted
- other age classes not counted
- all images counted by one observer
- repeat counts of randomly selected montages by 2 other observers undertaken to investigate evidence of observer bias in counting

NZSL age classes

Pups

Cow and pup

Bull

Cows

ground counts

- direct counts carried out at Sandy Bay every day
- Mark-Recapture experiments:
 - Sandy Bay 16 January
 - Dundas Island 21 January
- results of each recapture will be used to calculate a modified Petersen estimate
- dead pups added to estimates, as applicable

photographic data storage

- photographs submitted to
 - Ministry of Primary Industries
 - Department of Conservation
- photos will be provided in one directory
NZ Sea lions 2013 with three sub-directories
 - *Original photos*
 - *Stitched images*
 - *Counted images*
- set of photographs also retained by Latitude 42

results

- weather suitable for photography on 12, 14, 15, 16 & 18 January
- low cloud to sea level prohibitive to good photography on 13 January
- quality of photos taken excellent and an improvement on 2012
- possible to determine life-status of some pups

Sandy Bay comparative counts

Area / Date	Ground count	Aerial count	Lens	Difference
12 Jan	337	333	300 mm	-32 (-8.8%)
14 Jan	341	338	300 mm	-27 (-7.4%)
15 Jan	340	343	300 mm	-22 (-6.0%)
16 Jan	340	349	300 mm	-66 (-4.4%)
16 Jan	365			

Dundas Island comparative counts

Area / Date	Ground count	Aerial count	Lens	Difference
12 Jan		1 390	300 mm	-101 (6.8%)
14 Jan		1 410	300 mm	-81 (-5.4%)
15 Jan		1 464	300 mm	-27 (-1.8%)
18 Jan		1 398	300 mm	-93 (-6.2%)
21 Jan	1 491			

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

discussion

- aerial photography provided robust, cost-effective estimates of NZSL pup production with good precision at major pupping sites
- aerial & mark-recapture counts were highly correlated & varied by less than 9% at any one time
- aerial counts always lower than M-R estimate
- ‘best’ estimate for Sandy Bay - 4.4% of M-R
- ‘best’ estimate for Dundas - 1.8% of M-R

- we recommend aerial counts are undertaken on more than one day to achieve counts comparable with existing longitudinal dataset. Use maximum count obtained for this purpose
- 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

Acknowledgements

Scientific & Technical Support:

Simon Childerhouse & ground crew

Mark Holdsworth

Helicopters

Southern Lakes Helicopters &

Mark Deaker

Deepwater Group

Richard Wells

DOC:

Pete McClelland, Sharon Trainor,

Doug Veint, Igor Debski

Ministry of Agriculture & Forestry:

Martin Cryer, Aoife Martin

Funding:

DOC, DPI, Deepwater Group