Methodology for CSP Project 4426 New Zealand sea lion ground component 2012/13

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1. Introduction

Blue Planet Marine (BPM) is pleased to submit this proposal for research methodology to the Conservation Services Programme (CSP) of the Department of Conservation (DOC) for the provision of services for CSP project 4426 - New Zealand sea lion ground component.

2. Understanding of the Work

The specific requirements and outputs for Project 4426 New Zealand sea lion ground component are:

Items	Description
Requirements	• To conduct ground-based estimates of New Zealand sea lion pup production at Enderby and Dundas Islands using established techniques, timed in such a way as to ground truth aerial-based methods deployed in relation to CSP Project 4427. • To conduct a ground-based estimate of New Zealand sea lion pup production at Figure of 8 Island using established techniques. • To mark New Zealand sea lion pups at the Auckland Islands following established techniques, and conduct a three to five week period of resighting previously marked animals at Enderby Island.

Outputs	• A technical report (or reports) detailing:
	  ○ the methods used and a summary of data collected.
	  ○ estimates of New Zealand sea lion pup production at the Auckland Islands based on ground methods.
	• Data collected, in an electronic format suitable for upload into the New Zealand sea lion database.

3. Methodology

The following is an outline of BPM's proposed methodology. As a general statement, the research outlined here will follow exactly the same methods as undertaken previously by DOC and as described in Chilvers (2012) and with reference to the aerial survey methods in Baker *et al*. (2012).

3.1 Area of Operation

The Area of Operation for the work is the Auckland Islands (50°S, 166°E), New Zealand, with research being undertaken on Enderby, Dundas and Figure of Eight Islands. The team will travel aboard the *RV Tiama* departing and returning to Bluff.

3.2 General approach and timing of field work

As a general statement, the research outlined here will follow exactly the same methods as undertaken previously by DOC and as described in Chilvers (2012) and with reference to the aerial

survey methods in Baker *et al.* (2012). To ensure consistency with previous work, the following key dates will used in development of the timing of the field programme:

- 10th January – pup count at Figure of Eight Island
- 16th January – mark-recapture at Sandy Bay, Enderby Island
- 21st January – mark-recapture at Dundas Island

Based on these critical dates, the following dates for the field component are estimated as:

- 7th January – Depart Bluff for the Auckland Islands
- 1st February – Depart Auckland Islands for return to Bluff around 3 February

These transport dates may change subject to discussions with the vessel provider.

3.3 Field techniques

3.3.1 One-off direct live counts (Requirements 1 & 2)

AIM: to provide an estimate (including an estimate of variance) of number of live pups in the colony at that time.

DESCRIPTION: This method will be used for the assessment of pup production at the following colonies: Sandy Bay and Figure of Eight Island. As per previous methodologies, three people will walk around the entire breeding area up to three times each, counting all visible live pups. All counts will be undertaken at the same time and at the same time of day for Sandy Bay whenever possible. The time and the person undertaking the count will also be recorded for each count. This will be done on a single day at Figure of Eight Island on the 10th January and on the 16th January at Sandy Bay to coincide with the mark-recapture estimate. Other direct counts can be made to coincide with helicopter assessments of Sandy Bay as required.

3.3.2 Daily direct live counts (Requirement 1)

AIM: to provide an estimate of the number of live pups, sub-adult males, adult males and adult females in the colony at that time.

DESCRIPTION: These will be undertaken every day while on Enderby Island at Sandy Bay and every 2-3 days at South East Point colonies. Counts will be undertaken at or as close to 09:30am as possible each day at Sandy to maintain consistency with previous data collection protocols. All live pups will be counted by a single person. These counts will be started as soon as arrive on Enderby on 11th January and continue until at least the 20th January when the movement of pups away from the colony starts and counts become unreliable.

3.3.3 Mark-recapture live estimates (Requirement 1)

AIM: to provide an estimate (including an estimate of variance) of the number of live pups in the colony at that time.

DESCRIPTION: These will be undertaken at Sandy Bay (i.e. marking late afternoon on 15th and resighting on 16th January) and Dundas Island (i.e. marking on the afternoon of the 20th January and resighting on 21st January). These timings are based on pup production curves developed by previous researchers and represent the optimal timing for the estimation of pup production. We will follow exactly the same methodology as previously reported for the 2011/12 season by Chilvers (2012), namely:

"*Pups were marked with circular, 5 cm-diameter, flexible vinyl discs that were glued to the crown of their heads with a fast-setting cyanoacrylic glue (Loctite 454). Pups are marked late afternoon on the 15th and 20th January each season (when weather and logistics allows). The number of pups marked was approximately 40% of previous pup production estimate at Sandy Bay (150 pups marked) and*

30% at Dundas Island (400 pups marked). Marking was spread as evenly as possible through the breeding area (based on pup density and distribution). Most discs were shed a few days to weeks after the experiment, and if found picked up and removed from the islands. Recaptures involved three observers moving systematically through the entire sea lion pupping area counting pups the morning after marking, with each observer conducting three replicate counts. Each pup was classified as either marked or unmarked and a tally of each was maintained by each observer using two hand-tally counters. Only pups where the entire head was visible were included in the counts, to minimise the risk associated with undercounting unmarked pups. As the discs were clearly visible on the heads of pups if only part of the head is viewed there is a greater probability that a marked pup would be correctly identified than an unmarked pup. Any greater probability of viewing marked caps would lead to an overestimate of the proportion of marked pups and underestimate of pup production. Consequently, any pups that could not be categorised as marked or unmarked, i.e., where the entire head was not visible, were excluded from the count".

The estimation of pup production using mark-recapture estimates will use the well-established methods developed in Gales and Fletcher (1999) and continued in Chilvers *et al.* (2007). Estimates and standard errors will be developed using Peterson-Lincoln index for a closed population(Chapman 1952) as per previous work by Chilvers (2012).

3.3.4 Direct dead counts(Requirements 1 & 2)

During live counts, counts of dead pups will also be undertaken at each of the three colonies. At Sandy Bay and South East Point, dead pups will be removed from the colony whenever possible to ensure that they are not double counted. A single count of dead pups will be undertaken each day for Sandy Bay but only every 2-3 days at South East Point and only once on the 21st January on Dundas Island. At Dundas Island four people will walk around the entire breeding area up to two times with the whole group counting all visible dead pups. One possible change is that dead pups may be left in place (but still counted each day) following discussions with researchers undertaking the helicopter survey work to allow them to survey a 'pristine' and unmodified site.

3.3.5 Pup marking (Requirement 3)

This will occur exactly as per previous survey work by Chilvers (2012), namely:

"To continue the ability to track demographic parameters within the NZ sea lion population at the Auckland Islands, all pups at SE Point and Sandy Bay on Enderby Island and 400 at Dundas Island (weather permitting) will be sexed and tagged with uniquely numbered plastic Dalton coffin shaped tags. Pups at Sandy Bay, on Enderby Island will also be PIT (Passive Integrated Transponder) tagged as recent analysis of data has identified this to be an extremely valuable marking system to allow quantification of tag loss and therefore allow for more accurate estimations of demographic parameters. All tags will be checked for faults before application. Attempts will be made to tag pups at Figure of Eight Island if logistically possible. Tags will be applied to both pectoral flippers approximately 10cm from body. As many pups as can be found will have their tags and PIT tags checked [test deleted] to allow estimation of early tag loss rate."

Note: Some text has been deleted from the original text as it makes reference to the longer field season starting in early December, as has been undertaken previously for this work.

3.3.6 Tag, brand and PIT tag resighting (Requirement 3)

This will occur exactly as per previous survey work by Chilvers (2012), namely:

"Daily tag resightings were conducted at Sandy Bay. Daily resighting took 2 to 6 people, typically five hours a day to complete. All other areas around Enderby Island were surveyed at least once a week during December and early January and then surveyed at least once every second day from late January until the end of the field season. Resighting were undertaken at Dundas Island on 20th to

24th of January 2012 when field staff were on the island. Resightings consisted of the date and place of sighting, the animals tag number, colour, shape and number of tags in which flippers, PIT presence (therefore alphanumerical series)or absence, animal sex and breeding status or behaviour. Breeding status of males is determined by location in harem, breeding status for females is recorded in the form of whether they are with pup or not. PIT tag checking was undertaken throughout the season. Given the need for close approach to scan for PIT tags (~10cm), there was a higher likelihood of getting access to all animals after mid-January, because until then the animals in the harem were packed so tight, with large territorial males defending areas, that many animals could not be accessed. All animals, whether they have tags or not are checked for PIT tags by passing the PIT reader over the hind quarters of a sleeping or otherwise distracted animal."

Note: Some text has been deleted from the original text as it makes reference to the longer field season starting in early December, as has been undertaken previously for this work.

3.4 Resighting and tagging data management

A key element of this research is to ensure that the data are collected in an accurate and robust fashion and furthermore that these data are provided in an electronic format suitable for upload into the New Zealand sea lion database [Requirement 3].

This will occur exactly as per previous survey work by Chilvers (2012), namely:

"All sighting field data were verified, entered into the NZ sea lion field spread sheet and data made available for upload to the NZ sea lion database. Data verification was performed both during the season and at the end of the season. End of season verification involved the following procedures:

- *all data is sorted by individual animal (current tag) and duplications (same animal on the same date) deleted,*
- *number of tags checked and assessed (during the season if animals were still identified as having only one flipper tag seen, notification was given to field staff to try and determine true tag number while the team were still in the field),*
- *colour and tag number matches checked,*
- *previous and original tag information entered where necessary for adult females, and*
- *class, tag year, age, tag location and status entered for all animals."*

Resighting data will also be collected from any dead sea lions that are encountered.

BPM have already been in discussion with CSP and Dragonfly (who are developing a new version of the New Zealand sea lion data base) about the exact format requirement for data collection that will be consistent with uploading into the New Zealand sea lion database. This also includes the exact fields and data formats that will be used.

3.5 Transport

We will use the vessel *RV Tiama*, a 15m sailing vessel, which has considerable experience with transporting teams and operations in the sub-Antarctic and Antarctic. The vessel would depart Bluff and head directly to Figure of Eight Island to undertake the pup count there, then onto Enderby Island where the team would offload. The *Tiama* would return in early February to pick up the team and return them to Bluff.

We propose to use a helicopter, which will come down as part of other CSP aerial survey work, to transport the team from Enderby Island to Dundas Island and back. This is likely to require the helicopter to spend some additional time in the Auckland Islands as the aerial survey work may have been completed before we need to be on Dundas Island. This will have to be negotiated with the aerial survey researchers and the helicopter pilots. If we are unable to use the helicopter for Dundas

transportation for any reason (i.e. logistics), then we propose to use the *Tiama* for transport options, which will require them to stay longer in the Auckland Islands after the drop-off trip.

3.6 Personnel

Simon Childerhouse will lead the project as well as the field component. We will be using a four-person rather than the normal six-person team for several reasons:

(i) we are planning to use a helicopter for transport to and from Dundas Island, which means we will not need two boat teams, one of which normally returns to Enderby with two people;
(ii) We are not going to be involved in the capture and handling of any adults or sub-adults, which generally requires six people; and
(iii) Salary costs are reduced accordingly to be consistent with the available budget.

A reduced team size of four will mean that with only two full days on Dundas Island, the work programme (i.e. mark and tag ~400 pups, undertake the mark-recapture experiment and multiple dead pup counts) will be extremely busy. An option, depending on the work schedule of the aerial survey helicopter team, the availability of the helicopter, and the budget is an additional trip out to Dundas Island (i.e. 19th in addition to the 20th and 21st) may be possible to spread the tagging (but not marking) across three days rather than two. This may come at an extra cost for the additional helicopter time and will also need to be discussed with the aerial survey researchers to ensure that it does not impact on their study.

4. References

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