Long-tailed Bat Monitoring Report, Iris Burn Valley, Fiordland

2017

The monitoring of long-tailed bats in the Iris Burn Valley, Fiordland

By Bex Jackson

Long tailed bat showing transmitter and band. Photo by Jackie Spencer

Summary

A population of critically endangered long tailed bats (*Chalinolobus tuberculatus*) was discovered in the Iris Burn Valley in 2011. Roost emergence counts were initially used in 2011 and 2012 to determine the status of the population. This evolved into roost catches banding individuals which have been conducted yearly since 2013. Rodent control was initiated in 2014, with ground control and two aerial 1080 operations in 2014 and 2016. The outcome target of the pest control is to detect a stable or increasing trend in adult female survival/population size, and no declines relating to pest numbers, using minimum number alive (MNA) of adult females. Females are best to monitor as they make up the majority of bats in a communal roost, males spend a lot of time in solitary roosts. Monitoring shows the population of female bats in the Rocky Point colony is increasing steadily and has doubled in size since 2014 and now has a MNA of 65 females.

1. Introduction

Bats are New Zealand's only native land mammals. Long-tailed bats (*Chalinolobus tuberculatus*) are ranked by the Department of Conservation as "nationally critical" and are the highest priority for protection (O'Donnell et. al, 2018). Rats and stoats are known predators of bats, particularly in plague years following beech tree mast events (Pryde et. al, 2005; Hill 2011). Due to their sensitivity to these predators, bat populations are a good outcome measure for rodent and stoat control. Translocation of both bat species has not been successful to date and extinction is likely if no management is carried out (Ruffel et. al, 2006). In the Eglinton Valley bat populations have stabilized with adequate predator control (Pryde et. al, 2005). Bats may be an indicator species for rodent management due to their sensitivity to predation.

The long-tailed bat population at the Iris Burn Valley appears to be of considerable importance, as there are few viable sites for the recovery of the South Island long tailed bats, and preliminary genetic analyses indicate that the Iris Burn Valley bats have some distinctive genetic haplotypes not represented in the nearest managed population in the Eglinton Valley (O'Donnell, pers. comm).

Annual predator control in the Iris Burn Valley consists of a network of double set DOC 150 traps every 200m along the Kepler track. In March 2014, a 100x100 pindone bait station grid for rat control was established in a 550ha area surrounding known long-tailed bat roosts. In August 2014 an aerial 1080 operation, using a sowing rate of 2 kg per ha was conducted over 11,200ha in the Iris Burn Valley. In September 2016, an aerial 1080 operation using a sowing

rate of 2 kg per ha was conducted over 20,311ha in the Kepler area, including the Iris Burn Valley.

Roost emergence counts were conducted in 2011 and 2012. In 2011 the highest count was 69, and in 2012, 42. Roost emergence counts are often an underestimate of the population due to the difficulty of counting fast moving bats in increasing darkness, therefore a concerted effort was made from 2013 to catch bats at roost trees to individually mark them. Individually marking a population is a more robust method to detect changes in populations. Mark-recapture analysis of banded long-tailed bats in the Eglinton Valley detected changes in populations that other monitoring methods failed to pick up (Pryde et. al. 2005; Pryde et. al, 2006).

2. Objectives

The objectives of monitoring long tailed bats in the Iris Burn Valley has, initially been to assess the size of the population and map maternity roost trees. Now that pest control has been established in the area, annual monitoring of the bat population will be an essential component of this work, at least for the first few years. The monitoring objectives are:

- Catching and banding bats at roosts in November/December
- Gathering more information regarding location of roost trees each year

The outcome target of the pest control operation is:

- Detect a stable or increasing trend in adult female survival/population size, and no declines relating to pest numbers

3. Study site

The Iris Burn Valley is in the Kepler Mountains, Fiordland National Park. The forest community is made up of indigenous upland/montane beech forest, with silver and mountain beech dominating the valley sides, with silver beech on the valley floor in the river delta. The altitude of the area ranges from approximately 240m a. s. l on the valley floor, to approximately 1600m on the adjoining ridge tops. The Iris Burn Valley is part of the Kepler Great Walk track, receiving approximately 10,000 overnight visitors per year. It also boasts the Kepler Challenge, an internationally renowned mountain running event. The Kepler

Challenge Organising Committee in partnership with the Department of Conservation maintains stoat traps around the length of the Kepler track.

4. Methods

4.1 Catching bats

Bats are caught during the evening using free standing harp traps. A harp trap consists of a metal frame that supports two rows of fine monofilament with a catch bag at the base (Figure 1). Traps are checked at midnight and dawn to ensure minimum stress on any pregnant or lactating bats that may be feeding young.

Figure 1. Free standing harp trap at "pond site"

All bats caught in harp traps are fitted with individual identification bands (Figure 2). Information about the bat is recorded: age, sex and reproductive status. Transmitters are attached to adult lactating females as they are more likely to return to a maternal roost. The transmitter (model: BD2A, weight <0.6g) is attached to its back between the shoulder blades with contact adhesive.

Figure 2. Long-tailed bat showing band and transmitter

4.2 Roost emergence counts

During the day transmittered bats are tracked to their roost trees using a receiver and a three element hand held Yagi antennae. Once the roost tree is found, a roost description form is filled out including: GPS co-ordinates, information on tree height, diameter, type of tree and a sketch of tree and the location of the possible cavities where the bats may be roosting.

If roosts are unable to be trapped, emerging bats may be counted on dusk, however as more information is gained from roost catches, nights with untrappable trees are general used for the bat team to catch up on sleep. If roost emergence is counted, observers position themselves on the ground and watch for bats to emerge. A hand held bat detector is used to help detect bats when they begin to emerge.

4.3 Capture at roosts

Trees located by radio tracking are "pinged" with fishing line and cord and the roost cavity attempted to be located, either via climbing or raising a TR4 on a line up the tree. Climbing is undertaken by trained climbers using single rope techniques, and roost cavities may be located using a TR4, visual bat sightings and/or smell. Using a system of ropes and guy lines a small harp trap is pulled into place over the roost cavity entrance in the afternoon or evening before bat emergence. The team then return to the roost tree in the evening and after all bats have flown out of the cavity the trap is lowered and the bats recorded, tagged and released.

4. Results

Long-tailed bat monitoring in the Iris Burn Valley took place from the 21st November to the 18th December 2017. Staff members were Warren Simpson, Em Oyston, Sanjay Thakur, Bex Jackson from DOC Te Anau , and Bronwyn Slack from DOC Greymouth.

The total of number of individuals caught this year was 107, from both roost catches and free standing harp traps. This number is made up of 89 adults (65 female) and 18 juveniles of which 57 were recaptures from previous years.

Table 1. Minimum number alive (adults) in Iris Burn Valley 2011-2017

Year	Method	Total	Females known subsequently to be alive that were not caught in that season
2011	Roost watches	69	NA
2012	Roost watches	42	NA
2013	Mark-recapture	48 (32 females)	0 (0%)
2014	Mark-recapture	61 (33 females)	3 (9%)
2015	Mark-recapture	70 (46 females)	4 (9%)
2016	Mark-recapture	85 (57 females)	3 (5%)
2017	Mark-recapture	89 (65 females)	NA

The MNA numbers from previous years have increased over time due to individual bats found in subsequent years, indicating they were in fact alive at that year, as minimum number alive is defined as the number of individuals caught in a capture session, plus those that were not caught at that time but were caught both previously and subsequently: actual number (Krebs, 1966).

Over the last three years the female bat population has steadily increased after an initial period of decline and stagnation in the early 2010s. The female population has gone from an estimated low of 27 in 2012 (from roost count data) to a MNA of 65 which will likely increase in the coming years.

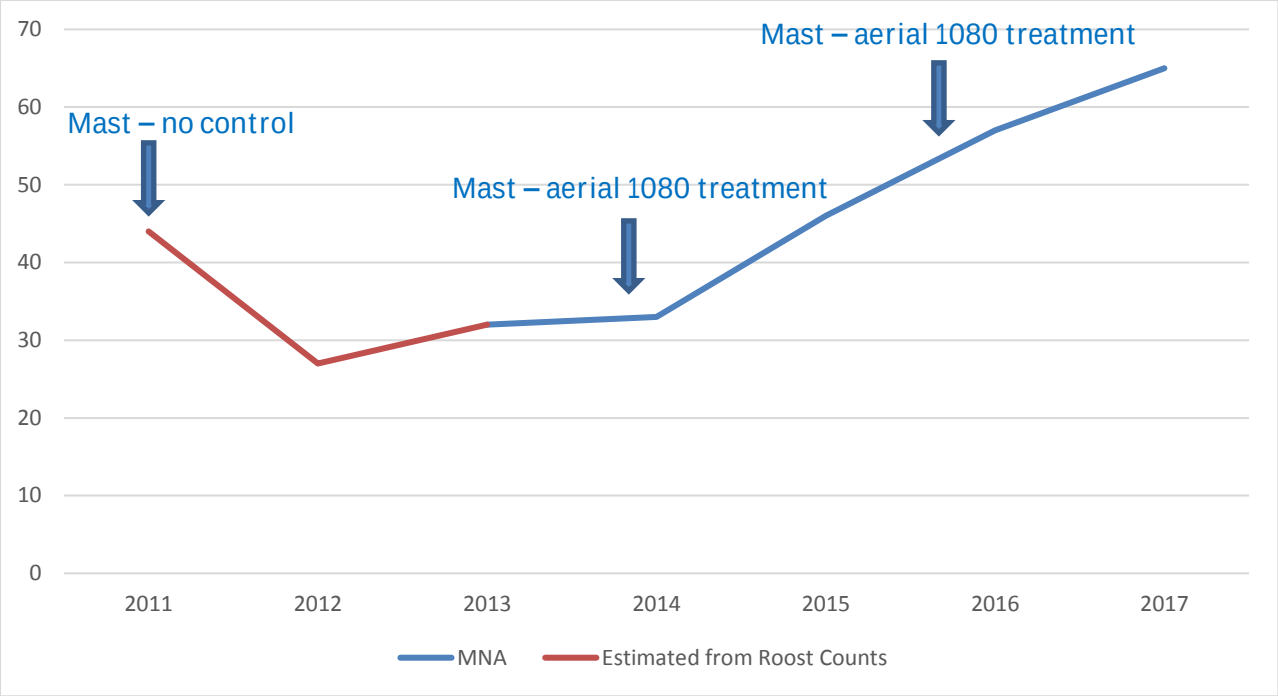

Figure 3. Trend of female long-tailed bats Rocky Point Colony, Iris Burn Valley 2011-2017

Seven substantial roost catches were achieved this season. The make-up of those catches can be seen in Figure 4 below. Juveniles started appearing in the last week of monitoring for the first time.

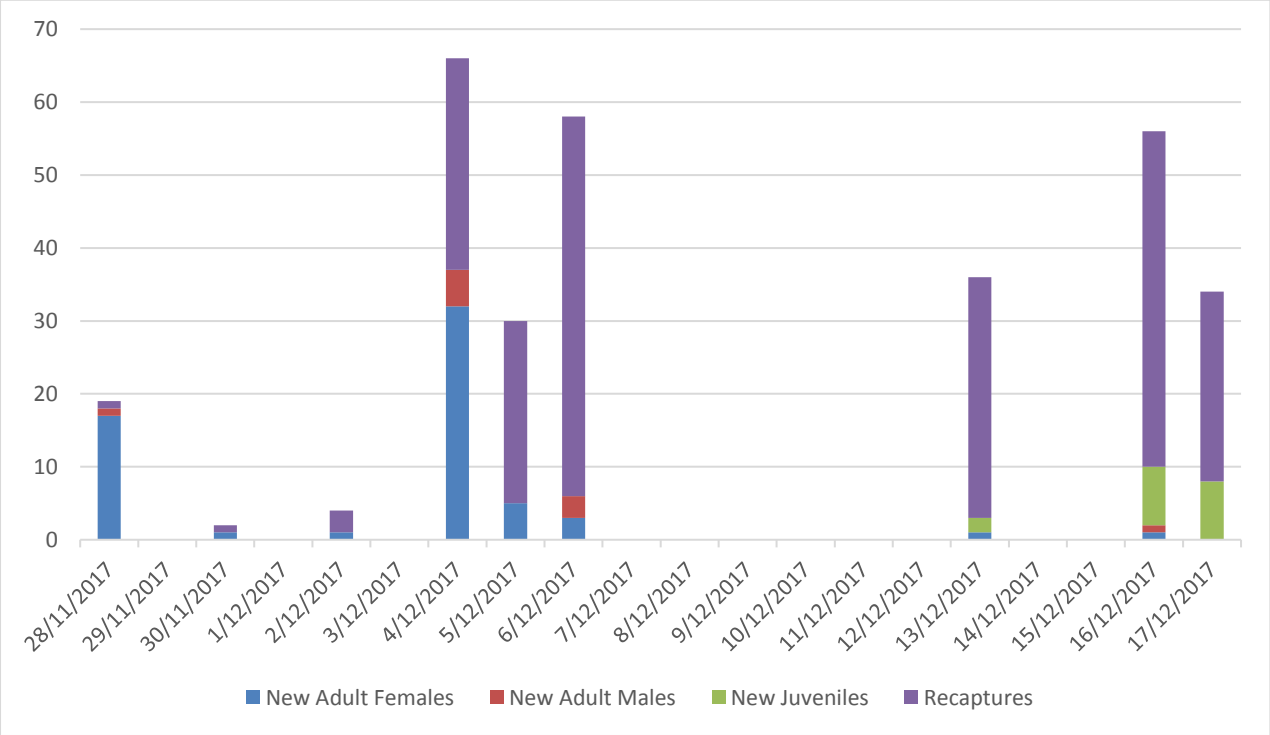

Figure 4. Roost catch make up throughout the season. "New" refers to an individual being caught for the first time this season.

5. Discussion

Since aerial 1080 treatment in mast years began in 2014 the Rocky Point long-tailed bat colony has had a steady increase in population, doubling the number of adult females in just 3 years despite there being two mast events. The monitoring results show that management actions are achieving the outcome target of detecting a stable population in female bats, with no decreases relating to pest numbers. However, given the population decline shown after the 2011 mast event (with no predator control) this result is dependent on on-going aerial control after mast events.

Based on the catch data per roost, it appears that 6 substantial roost catches are needed to capture most adult females in the population. During the 2013-2016 period an average of 6% (SE 2%) of adult females were missed each season but were subsequently caught in following years, and thus known to have been alive. Given the disproportionate amount of effort that would be needed to catch the last 6% of females this is a reasonable sampling effort though as the population grows more roost catches may be needed to obtain the same level of accuracy.

18 new roost trees were found this season and only one known roost was utilised. This is compared with 7 new and 4 known trees found last season (of slightly shorter monitoring duration). The high number of new roost trees this season may simply be due to our limited knowledge of roost trees in the area, however it may also be related to the abnormally high temperatures during the monitoring period, with 30C days not uncommon. As long-tailed bats choose roost cavities with specific thermal properties (Sedgeley, 2001) it is possible that the trees selected this season were chosen to complement the high temperatures.

During the last week of monitoring, juvenile bats started flying and were caught during roost catches. The 18 juveniles caught this year were only a portion of the juveniles as new ones would have continued to emerge after monitoring ceased. This is an unusual observation at this site, with juveniles typically emerging from roosts after the monitoring period has ceased. This may indicate that breeding occurred earlier than normal. As well as the unseasonably warm November/December, Fiordland had a mild winter and it is presumed these climatic anomalies contributed to the early breeding of the population.

The roster system was used again, where a team of two staff were in the field every night changing every 4-5 days. This has once again proved to be the most effective regime. The need for highly competent staff was highlighted, especially early in the season when using free standing harp traps. Transmitter attachment is the main bottle-neck in staff training due to the low numbers used throughout any season and the need for supervision whilst training. One staff member from a different office joined the team for a two week training period, which was beneficial to her and creates a knowledge exchange between regions.

MNA data has now been collected for five years, creating confidence in the effectiveness of aerial 1080 control during mast years for the protection of long-tailed bats at this site. As the monitoring of this population has only occurred over a limited time period - it is recommended to follow the population through one more mast event to provide further assurance that the management regime will achieve long term protection for the long-tailed bat populations in the area. A beech mast is predicted for 2019 and therefore monitoring in the years 2019 and 2020 is recommended. This leaves resources free for the 2018 season to extend monitoring into new areas, expanding our knowledge of long-tailed bat populations in Fiordland and potentially encompassing additional populations in aerial 1080 protection.

6. Recommendations

- Continue to have aerial 1080 operations covering large areas in response to high predator numbers
- Monitor the Rocky Point long-tailed bat colony throughout another mast event.
- Continue to use the roster system of four core staff over a period of 3 to 6 weeks, depending on captures
- Look for opportunities for our staff members to upskill on other bat projects whilst allowing others from outside the area to train with us

7. Acknowledgements

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9. Appendices

9.1 Roost capture data long-tailed bats, Iris Burn Valley 2017

Date	Roost no	Total bats caught	Recaptures	New bats banded	No of bats escaped	Total number
28/11/17	55	19	13	6	14	33
30/11/17	57	2	1	1	47	49
2/12/17	59	4	4	0	0	4
3/12/17	60	1	1	0	25	26
4/12/17	61	66	51	15	11	77
5/12/17	62	30	30	0	2	32
6/12/17	63	58	54	4	3	61
13/12/17	66	36	34	2	8	44
16/12/17	67	56	47	9	3	59
17/2/17	68	34	26	8	17	51

9.2 Map of known roost trees, Rocky Point Colony, Iris Burn Valley