# Eglinton Valley Lesser Short-tailed Bat Monitoring

2020-2021

Bex Jackson and Moira Pryde

Department of Conservation
*Te Papa Atawhai*

New Zealand Government

Cover: Radio tracking *Photo: Warren Simpson DOC*

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# Summary

1 The Eglinton Valley southern lesser short-tailed bat population is continuing to recover with high adult female survival recorded in 2019/2020 (92%). Survival results from 2020/2021 will need to be confirmed in the next monitoring period. This high survival follows an aerial 1080 operation in spring 2019 in response to a beech mast event driven rat plague. 1386 individually marked bats were recorded this season, the highest number to date, with 312 new bats receiving tags this season. Roost emergence counts continued to be low with 1697 the highest number on one night, obtained from two roost trees, however the overall population trend is increasing. This highlights that the emergence counts are a relatively coarse index but monitoring over an extended time period will show the trend of the population.

# Introduction

The population of southern lesser short-tailed bats (*Mystacina tuberculata tuberculata*) in the Eglinton Valley is the largest known of this species on mainland South Island. It was thought to be the only population still viable until the discovery of another population in the Murchison Mountains, Fiordland, 40km away. However, this site has no effective rat control in place.

The Eglinton Valley is an ecologically important site as it is one of the few sites that is a stronghold for both long-tailed bats (*Chalinolobus tuberculatus*) and lesser short-tailed bats. It is also a stronghold for populations of mohua, robin, kaka and kakariki. Continuous stoat control and periodic rat and possum control is in place in the valley to protect these species.

The southern lesser short-tailed bat is ranked under the New Zealand Threat Classification System as at risk – recovering (O'Donnell et al, 2017), however this is due to most known populations having gone extinct and out of those remaining two of the three are under protection. Both species of bats in New Zealand are vulnerable to introduced predators (rats, stoats, feral cats and possums) throughout the year; in summer when they congregate in large colonies, and during winter when they may remain inactive (in torpor) within roosts.

The Bat Recovery Group recognises the lesser short-tailed bat (STB) population in the Eglinton Valley as a priority for management, with the aim of maintaining long term security of the population. The STB programme is a long-term project and compliments the suite of monitoring in the valley, resulting in a unique project with one of the longest histories and broadest scope in the country. Informal monitoring began in 1997 when the bats were first discovered in the valley. Initially bats were monitored in an ad hoc fashion by conducting roosts counts using infra-red video cameras to gain roost emergence counts. Sampling effort varied considerably from year to year, but a focused video monitoring programme began in 2005. Roost emergence counts is a useful monitoring tool; however, it has limitations as it is almost certainly an underestimate of the population and varies considerably between years due to chance. Roost exit counts are therefore not thought to be as sensitive at detecting changes in populations as mark-recapture analysis.

Mark-recapture analysis requires animals to be individually identified in order to calculate estimates of populations size and survival. After an initial study to see if passive integrated transponders tags (PIT tags) were suitable for marking and monitoring populations trends in lesser short-tailed bats (Sedgely and O'Donnell 2007) the focus of the project is now long-term monitoring of the population trends. As bats only give birth to a single young once a year recovery is slow and difficult to detect in the short term, hence requiring a long-term commitment. PIT tagging sessions are conducted at communal roost trees throughout the month of January in order to continually have a high proportion of the population marked. Recapture data is obtained using antennae and data loggers on roost trees throughout the season. At the same time the existing video monitoring programme is also being continued to evaluate the relative merits of each technique.

The size and scope of predator control has varied greatly over time. An 100x100m bait station grid has been in place for several years and over time was expanded to now cover 4800ha of the valley. In recent years aerial 1080 operations have become the focus of predator control and have significantly increased the area under management. There have been three large scale 1080 operations since 2014 as part of the Tiakina Nga Manu/Battle for our Birds campaign in response to beech mast events. Bait station pindone operations have

also been undertaken as a secondary measure in response to high rat numbers outside of the beech mast cycle. Additionally, the valley has 433 stoat traps and approximately 20 cat traps.

# 2 Objectives

## 2.1 Aim

To estimate lesser short-tailed bat survival and population size in the Eglinton Valley from year to year, with a focus on the correlation with the current pest control regime.

## 2.2 Outcome measures

1. Record PIT tagged bats via dataloggers at communal roosts
2. Insert new PIT tags into at least 300 bats
3. Analyse population data to gain survival estimates between years
4. Film and count roost emergence as a secondary monitoring method

# 3 Methods

## 3.1 Estimate annual survival

a) Mist net bats and attach radio transmitters
b) Follow radio tagged bats to roost trees, set up antennae and data loggers
c) Monitor for a minimum of three weeks throughout January
d) Calculate survival using mark recapture

## 3.2 Insert new Passive Integrated Transponder (PIT) tags

a) Catch bats at active communal roosts and insert PIT tags into new unmarked bats as per the Best Practice Manual for Conservation Techniques for Bats (Sedgeley et al, 2012)
b) Record the age and sex for all bats caught and reproductive status for all females caught
c) Aim to tag 300 unmarked bats each year

## 3.3 Undertake roost emergence counts as a secondary monitoring method

a) Follow radio tagged bats to roost trees, set up cameras and recorders to film for 2 hours during emergence
b) Count recorded emergent bats from videos
c) Compare and graph results with previous counts

# 4 Results

## 4.1 Estimated annual survival

A good number of recaptures were able to be obtained during the season.

Table 1. Captures of short-tailed bats in the Eglinton Valley 2006-2021

| Year | Total Recorded | Recaptures | New | Adult Female | Adult Male | Juv Female | Juv Male | Unknown |
|---|---|---|---|---|---|---|---|---|
| 2021 | 1386 | 1074 | 312 | 122 | 83 | 46 | 61 | 0 |
| 2020 | 1358 | 1021 | 337 | 143 | 110 | 38 | 46 | 0 |
| 2019 | 1264 | 956 | 308 | 52 | 45 | 89 | 122 | 0 |
| 2018 | 1170 | 944 | 226 | 71 | 49 | 38 | 68 | 0 |
| 2017 | 699 | 544 | 158 | 66 | 29 | 24 | 38 | 1 |
| 2016 | 1030 | 777 | 244 | 54 | 13 | 87 | 90 | 0 |
| 2015 | 965 | 734 | 228 | 42 | 21 | 80 | 85 | 0 |
| 2014 | 892 | 648 | 246 | 78 | 71 | 45 | 52 | 0 |
| 2013 | 756 | 550 | 206 | 124 | 31 | 25 | 26 | 0 |
| 2012 | 831 | 607 | 221 | 70 | 35 | 45 | 71 | 0 |
| 2011 | 663 | 436 | 226 | 91 | 41 | 49 | 45 | 0 |
| 2010 | 559 | 309 | 249 | 91 | 44 | 56 | 58 | 0 |
| 2009 | 375 | 229 | 141 | 50 | 53 | 16 | 14 | 8 |
| 2008 | 238 | 90 | 146 | 50 | 48 | 22 | 26 | 0 |
| 2007 | 283 | 6 | 279 | 133 | 59 | 48 | 39 | 0 |
| 2006 | 12 | 0 | 12 | 5 | 2 | 4 | 1 | 0 |
| Total PIT tagged | | | 3564 | 1242 | 734 | 712 | 842 | 9 |

Annual adult female survival from the 19/20 season was confirmed to be high (92%), this year's survival data will need to be confirmed next year.

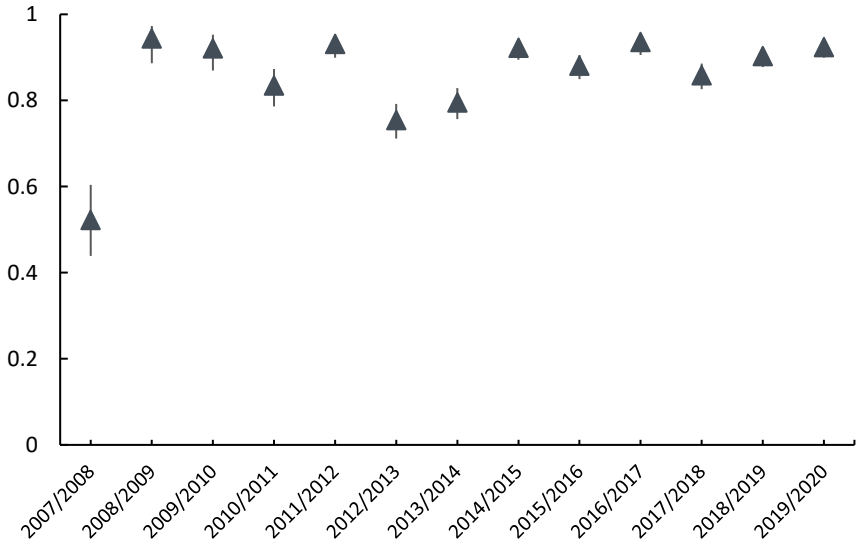


Figure 1. Annual survival of adult females with 95% confidence intervals.

## 4.2 New PIT tags

312 new bats were tagged this year. The new RFID scanners and apps developed for smart phones by the DOC electronics team were used this year and the old Archer devices retired. This worked well as a time efficient method to input records for captured bats directly into the database.

## 4.3 Roost emergence counts

Roost counts were again not particularly high this season due to the colony occupying multiple roosts, which changed often, and with some roost trees presumed to be unlocated. The highest emergence count this year was 1697, made up of roost counts from two separate trees on the same night.

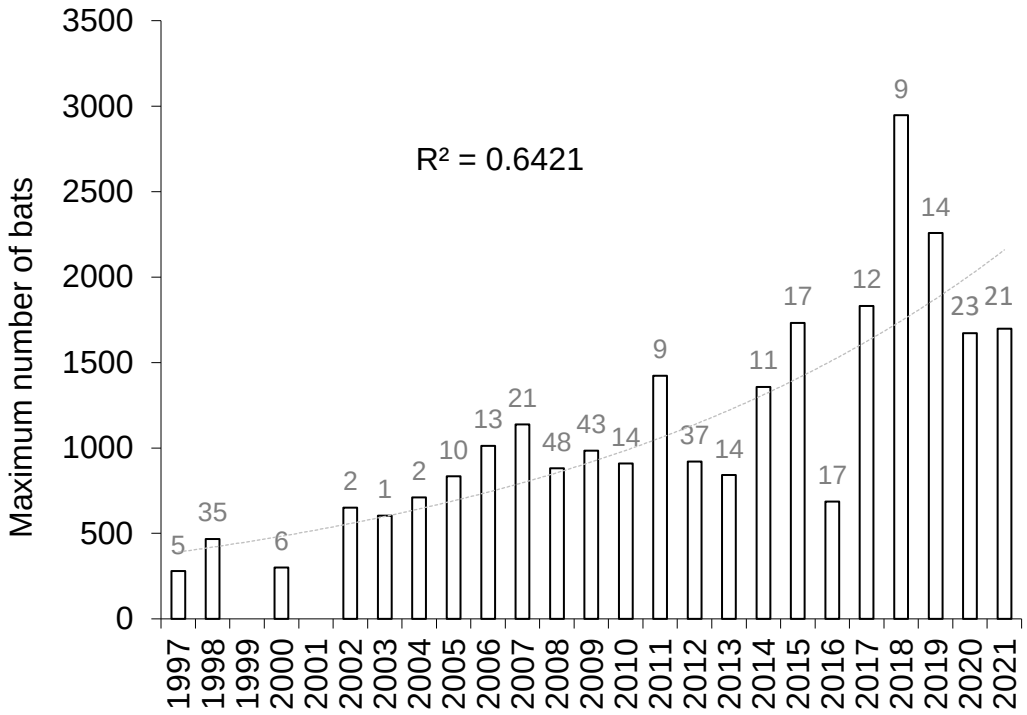


Figure 2. Highest annual roost emergence counts with trend line. Note this method is an index only, it is not a true representation of the population

Table 2. Summary of communal roost tree occupancy 2021

| Roost tree | Known dates occupied | Minimum days occupied | Highest emergence count |
|---|---|---|---|
| M102 | 11/1/21-12/1/21 | 2 | 445 |
| M116 | 13/1/21-14/1/21 | 2 | 419 |
| M115 | 13/1/210 | 1 | Not counted |
| M43 | 15/1/21-22/1/21 | 8 | 502* |
| M52 | 15/1/21-16/1/21 | 2 | 1273 |
| M97 | 25/1/21-30/1/21 | 6 | 1068 |

*Crèche tree, with very difficult counting conditions

# 5 Discussion

Survival data shows the population is recovering well and indicates that the current pest management regime is working well for lesser short-tailed bats.

Finding all roost trees during the monitoring period continues to be difficult due to a likely combination of malfunctioning transmitters, difficulties picking up transmitter signals and tricky bat behaviour. Of seven transmitters fitted throughout the season, two were never heard of again and were suspected to have malfunctioned. On at least 6 occasions transmitters which were presumed to be working well were not heard when radio tracking, meaning some roost trees occupied over the monitoring period were not located. The highest emergence count comes from a night when there was at least one unknown roost tree meaning an unknown proportion of the population was not counted.

Further the behavioural patterns of having multiple communal roosts occupied on the same night and short residency times at each roost tree continued. These factors are contributing to the difficulties of gaining an accurate minimum population size gained from the emergence count data. This deviation between the survival data and roost emergence counts shows there should be caution when using emergence counts as the sole indication of population health.

It is interesting that for the second year in a row there appeared to be a dedicated "Creche tree" where many juvenile bats roosted without their parents, a previously unseen phenomenon. The behaviours of using many communal roosts on the same night, short residency times and the use of a creche tree are anecdotally different than 10 years ago. One possible reason for these behaviours could be that the population has outgrown the cavity size of available or known trees.

Technology went fairly smoothly this year. A new replacement camera unit was made with different technology to the old as required by the constantly changing availability of electronics. Multiple dual data loggers failed for unknown reasons and are now with the electronics team for problem solving.

There were several successes of the season including mainly excellent weather, ample staff and time, and complete integration of the new smart phone apps. Having a large team of trained handlers and PIT taggers that supplements the core team is crucial for the success of the project. Additionally we were joined by a volunteer for the whole season as well as having a member of the kakapo team on staff development.

# 6 Recommendations

1. Continue sexing all captured bats and recording reproductive status for females
2. Allow four weeks for the work to be completed
3. Continue with the target of PIT tagging 300 new bats per year
4. Continue gaining long term data through the monitoring of this population

# 7 Acknowledgements

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