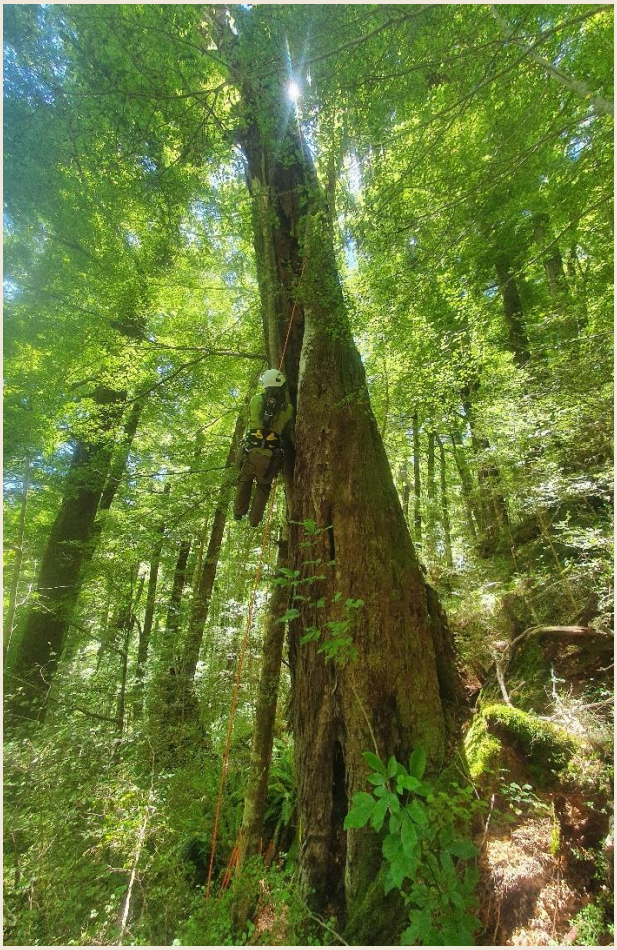
Eglinton Valley Lesser Short-tailed Bat Monitoring



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Bex Jackson, Moira Pryde and Louise McLaughlin

Department of Conservation
Te Papa Atawhai

New Zealand Government

Cover: Bex Jackson checking out M122 *Photo: Louise McLaughlin DOC*

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Summary

1 The Eglinton Valley southern lesser short-tailed bat population is continuing to recover with moderate adult female survival recorded in 2020/2021 (81%). Survival results from 2021/2022 will need to be confirmed in the next monitoring period. 1589 individually marked bats were recorded this season, the highest number to date, with 294 new bats receiving tags this season. Roost emergence counts continued to be low until the night of the 30th Jan with a record 4179 bats emerging from one tree on one night. The overall population trend is still increasing.

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
2022	1589	1295	294	63	32	101	98	0
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 20/21 season was slightly lower than the previous year (81%). This could be due to the higher rat and stoat numbers in the Eglinton Valley in 2020 during the COVID-19 outbreak when the second treatment of 1080 was delayed by two months. This year's survival data will need to be confirmed next year.

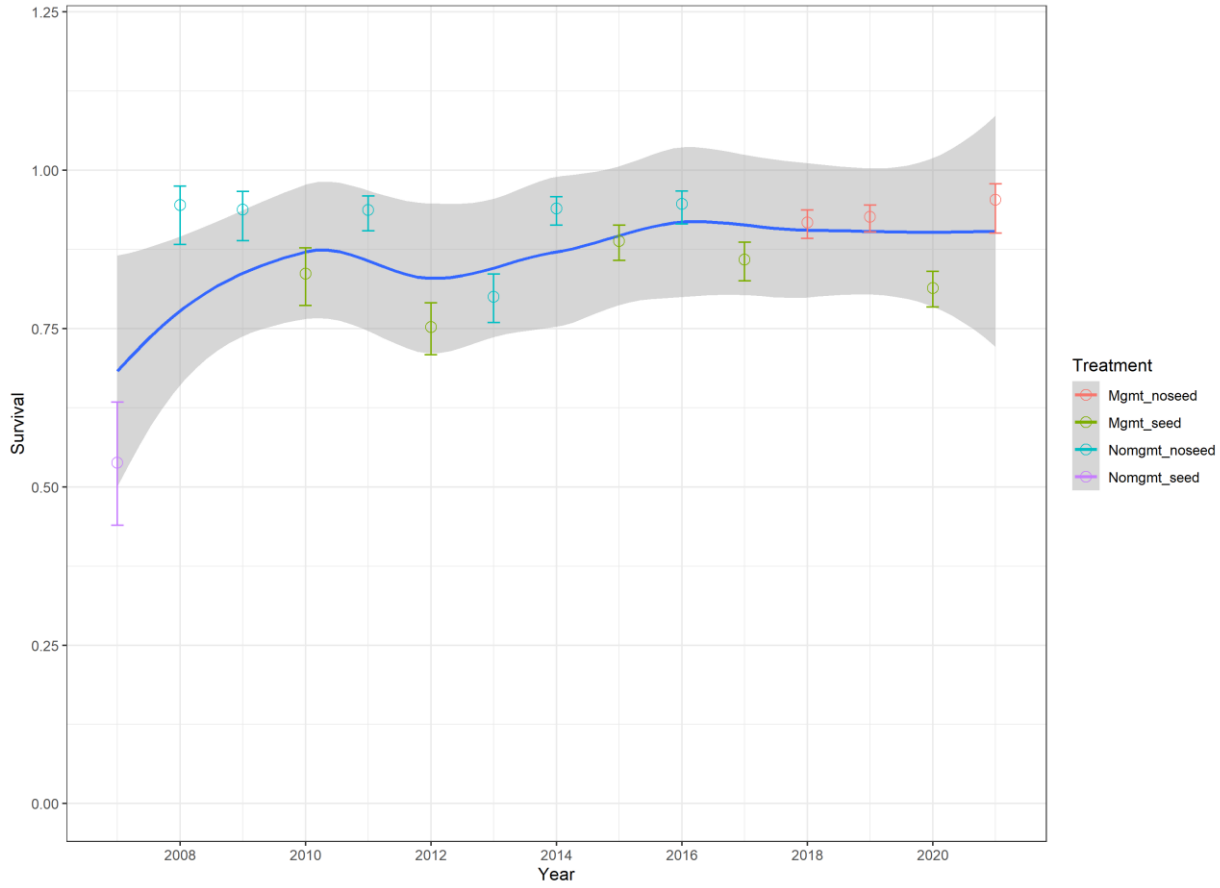

Figure 1. Annual survival of adult females with 95% confidence intervals. Note "Year" is referring to survival throughout that year. I.e. monitoring data from Jan 2021 correlates with survival in 2020

4.2 New PIT tags

294 new bats were tagged this year. The RFID scanners and apps developed for smart phones by the DOC electronics team in 2021 were still used this year. There have been some teething problems with the software on the new DOC phones, but it was fixed with a software update on the apps. This is still working well as a time efficient method to input records for captured bats directly into the database.

4.3 Roost emergence counts

Roost counts were very low for most of the monitoring season, however in the last days of the season the highest emergence count on record was obtained, 4179 from M72. M72 is the same roost tree that had the highest roost count in 2018.

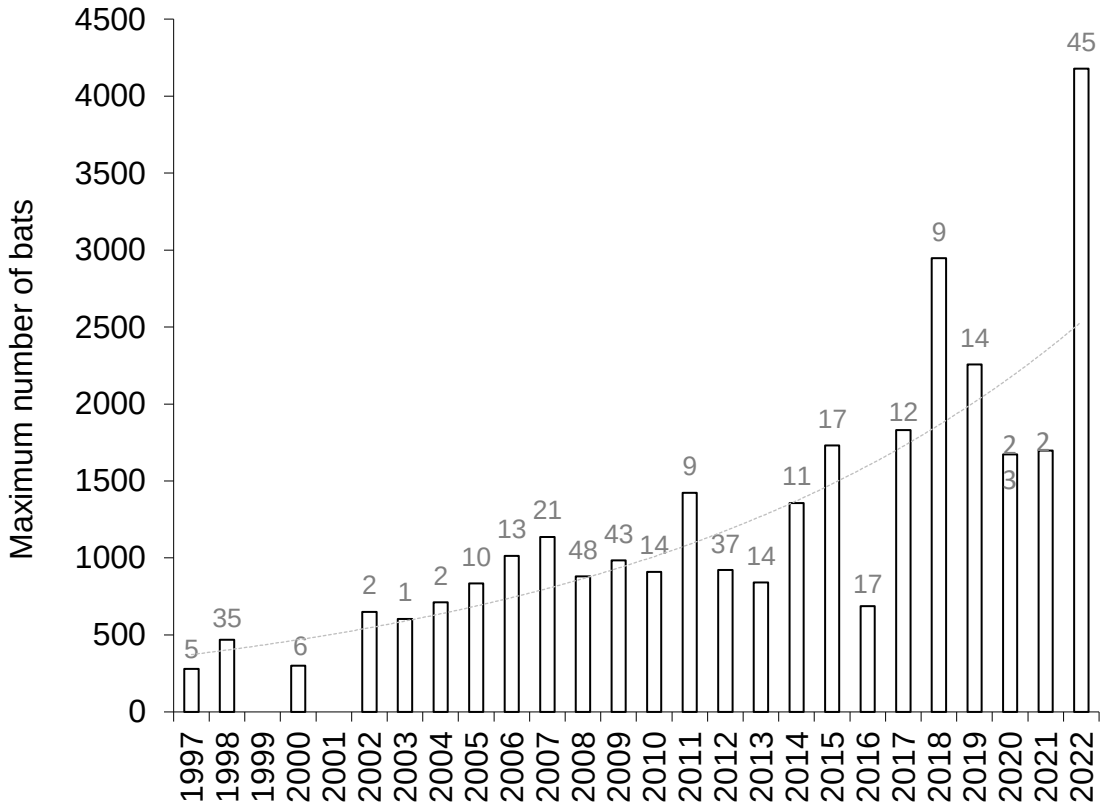

Figure 2. Highest annual roost emergence counts with trend line. Note this method is an index only, it is not a true representation of the population

Table 2. Summary of communal roost tree occupancy 2021

Roost tree	Known dates occupied	Minimum days occupied	Highest emergence count
M117	7/1/22	1	117
M49	10/1/22 – 14/1/22	5	817
M109	10/1/22 – 13/1/22	4	729
M120	14/1/22 – 20/1/22	7	812

M122	20/1/22 – 23/1/22	1	258 but had a camera malfunction for the other 3 nights.
M121	17/1/22 – 18/1/22	1	207
M80	20/1/22	1	29
M39	20/1/22 – 22/1/22	3	289
M102	24/1/22 – 26/1/22	3	215
M72	26/1/22 – 31/1/22	6	4179

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. Seven transmitters were fitted throughout the season, and we didn't have too many issues with them this year.

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.

This year the juveniles were fledging earlier than usual. Our first capture night on the 11/01/22 had juveniles, with some being quite small. There could be a variety of factors contributing towards this, particularly around spring/winter weather conditions, but it is unsure exactly what influences early breeding.

This year the highest ever emergent count data was recorded with 4179 bats in M72 on the night of the 30/01/22. This tree is the same tree that had the last highest count in 2018 and presumably has a very large cavity or other properties that allow for such high numbers of bats to roost in it. Given that all other known roost trees in the valley have much lower roost counts it raises the possibility of a very limited supply of cavities able to house these large numbers of bats.

Technology went fairly smoothly this year. Two older antenna on roost trees were corroded to the point of no longer working though from the outside they appeared in good condition. More old antenna failures can be predicted in the future as the copper wire continues to corrode over time. This year mini PIT tags were used as the manufacturer ceased making the original model. This required modification to our metal applicator guns and overall went well, though it should be noted that the needles did not attach perfectly to the applicators. The smaller tags were harder to feel inside bats which is presumed to be beneficial for animal welfare but also meant taggers could not so easily feel if the tag was inserted into the correct position. It is unknown yet if the smaller PIT tags will have an impact of survival data through less detections, but lab trials indicated little difference between the two types of tags and the repeated opportunities for bats to pass over the antenna should mean that over the course of a monitoring season most individuals are detected.

There were several successes of the season including mainly excellent weather, ample staff and time. 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 2 volunteers for a week and utilised the long-tailed bat team when they were not catching bats.

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

Thank you to all who were involved in this season's fieldwork: the lessor short-tailed bat monitoring team of Warren Simpson, Louise McLaughlin and our volunteers Holly and Angus; thank you to our extra PIT taggers Hannah Edmonds, Colin O'Donnell and Moira Pryde, handlers Maddie van der Wetering, Jane Tansell, Jo Filmer, Sina Sibler, and Monique Jansen van Rensburg, , and to all the others who came out to help in the evenings, too many to name.

To the Eglinton long-tailed crew and the Milford Road rangers thanks so much for your support and tolerance. Thanks also to all the pest control teams who worked in the valley over the last year. Thank you to the DOC electronics team and Stu Cockburn for their ongoing technological support and gadgets to help us out. Lastly thanks to Moira Pryde, our team member from afar for all her expertise and support.

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