Eglinton Valley Lesser Short-tailed Bat Monitoring

2019-2020

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Cover: Tree climbing training. *Photo: Bex Jackson DOC*

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Summary

The Eglinton Valley southern lesser short-tailed bat population is continuing to recover with high adult female survival recorded in 2018/2019 (90%) and 2019/2020 (preliminary data 91%). This follows aerial 1080 operations in spring 2016 and 2019 following beech mast event driven rat plagues and two pindone operations due to high winter rat tracking in spring 2017 and 2018. Passive Integrated Transponder (PIT) tags were inserted into 337 new bats this season with an additional out of season tagging session undertaken in March as part of the Australasian Bat Conference field trip. 1358 individually marked bats were recorded this season, the highest number to date. No particularly high roost emergence count was captured this year with 1672 being the highest obtained from three roost trees filmed on the same night.

1 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 under estimate 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 33 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 Pracise 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 despite roost trees not being located for adults on many nights throughout the period. This was able to occur due to a nursery tree where young were located being monitored throughout the season and picking up adult's PIT tags as they visited this tree. Adult roost trees were difficult to locate due to a combination of faulty transmitters and because adults moved trees often.

Table 1. Captures of short tailed bats in the Eglinton Valley 2006-2020

Year	Total Recorded	Recaptures	New	Adult Female	Adult Male	Juv Female	Juv Male	Unknown
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			**3252**	1120	651	666	781	9

Annual adult female survival from the 18/19 season was confirmed to be high (90%) and preliminary data from 19/20 also indicates high survival (91%) though this will need to be confirmed next year.

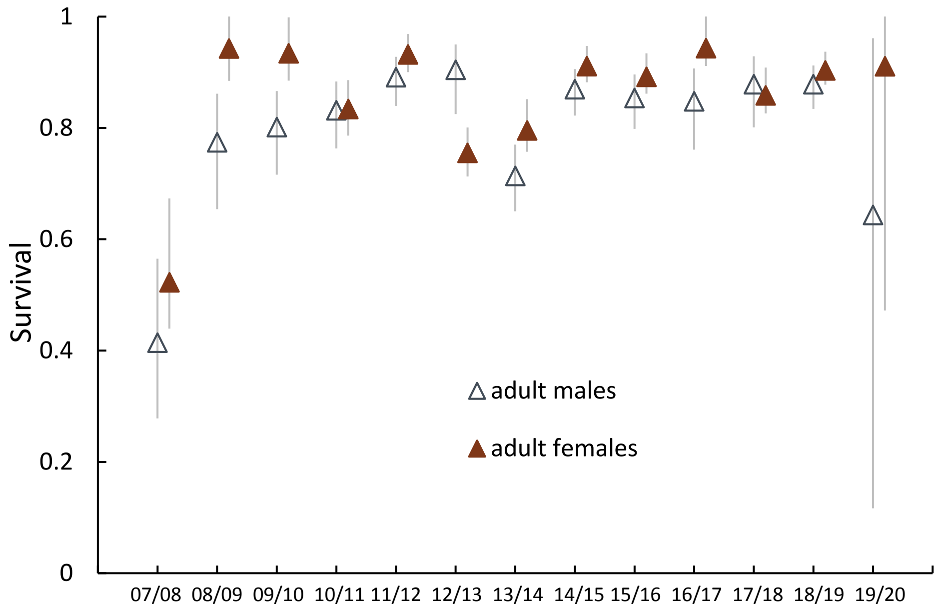

Figure 1. Annual survival of adults with 95% confidence intervals.

4.2 New PIT tags

337 new bats were tagged this year, 321 during the monitoring season and 16 extra during the Australasian Bat Conference field trip. Juveniles appeared to fly late in the season causing the reduction in new juveniles tagged (see Table 1.).

A new RFID scanner and app developed for smart phones by the DOC electronics team was used this year in addition to the Archer devices to input records for captured bats directly into the database.

4.3 Roost emergence counts

Roost counts were not particularly high this season due to the colony occupying multiple roosts, which changed often, and many roosts were not found. The highest emergence count this year was 1672, made up of roost counts from three separate trees on the same night.

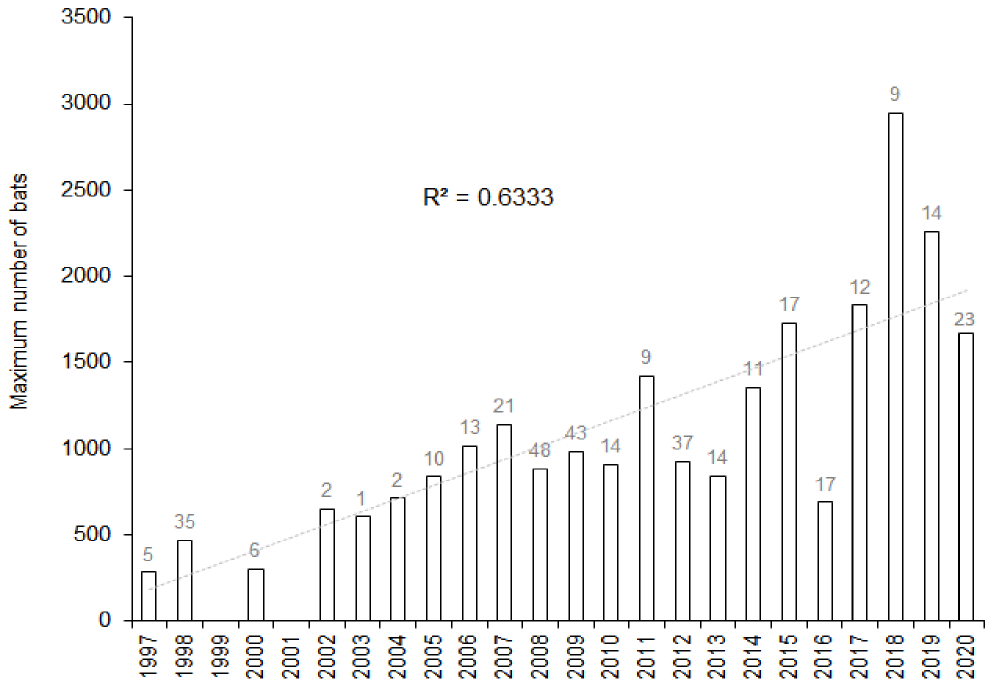

Figure 2. Highest annual roost emergence counts with trend line. Note this method is an index only, it is not a true representation of the population

Table 2. Summary of roost trees

Roost tree	Known dates occupied	Minimum days occupied	Highest emergence count
M43	9/1/20-27/1/20	19	732
M112	16/1/20-19/1/20	4	685
M113	16/1/20	1	558
M101	22/1/20	1	21 *
M35	23/1/20-24/1/20	2	979
M52	24/1/20-25/1/20	2	683

*The roost had a second unknown entrance that was not filmed

5 Discussion

The season went well with good data being produced despite several technological issues – smart phone app, battery and transmitter failures were a strong feature of the season. Survival data shows the population is recovering well and that the current pest management regime is working well for lesser short tailed bats. Whilst lower than the previous two years the highest roost emergence count still fits the general upwards trend in population size.

Of seven transmitters fitted throughout the season only two or three worked properly and those which were consistently heard were attached for a maximum of seven nights before being found dropped. This hampered our efforts to find roost trees and extensive local knowledge was crucial to the success of the season. The lack of ability to find many roost trees likely impacted the highest emergence count for the season and demonstrates why it is a coarse measure subject to extreme fluctuation.

The revised target of marking 300 new bats (up from 200) was easily achieved. This will continue to ensure that a high proportion of the population is PIT tagged and improves survival estimates. Juveniles were late flying this year resulting in a lower proportion of new bats tagged being juveniles. After the first few nights of tagging when it became apparent that this year's juveniles were late emerging the last capture sessions were delayed slightly to increase the number of juveniles caught.

A new hand scanner and associated smart phone app was developed by the Department of Conservation's electronics team with the aim of replacing the old handheld PC devices currently in use by the team, or paper records used in other districts. Overall the system worked well however one thing of note, also applicable to the data logger app, was problems between the apps and newer versions of the android operating system on the new DOC Samsung S10e phones. Progressively over the course of the season android systems updated and put phones out of action.

There were several successes of the season including excellent weather, ample staff and time allocated. Having a large team of trained handlers and PIT taggers that supplements the core team is crucial for the success of the project. Additionally much training took place during the season both amongst our own team and with a DOC staff member from another district.

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

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