Mason Bay Rat Project Report 2021

New Zealand Deerstalkers Association – Southland Branch in collaboration with the Department of Conservation.

Scope

The New Zealand Deerstalkers Association – Southland Branch and the Department of Conservation – Rakiura are in partnership to deliver targeted pest control at Mason Bay. This collaboration is formalised under a 10-year Management Agreement (2013 to 2023) which captures the spirit of the partnership and roles and responsibilities of each party. DOC has undertaken to analyse the field data returned from NZDA trapping teams and produce a report which summarises the season and provides interpretation of the results.

This report covers the 2021 trapping season.

Background

The Mason Bay rat trapping project covers approximately 300ha of coastal forest situated amongst a broader dune ecosystem. The project has been underway since 2006 and was further formalised in 2013 with a Management Agreement which outlines the roles and responsibilities of the NZDA volunteers and the Department of Conservation.

Mason Bay represents some of the only intact temperate dune system in the southern hemisphere, stretching inland up to three kilometres and reaching over 200m in height. It is home to a range of locally endemic plants and animals, including many threatened species. The location is a key wintering site for the critically endangered Southern New Zealand Dotterel which rest here during the high tides before flying across to places like the Freshwater River mouth mudflats to feed during the low tides. It is home to one of the largest and most visible populations of Kiwi in New Zealand as well as a range of forest bird species such as red-crowned parakeet, kereru, kaka, tui, bellbird, tomtit, fantail and more.

NZDA members maintain and rebait a network of 309 victor rat traps every year (see map below). Trapping trips are targeted to spring and summer and generally range from August to December.

The primary aim of the project is to increase the productivity of nesting forest birds during their vulnerable breeding season by reducing rat density and therefore rat predation of

eggs, chicks and disturbance of incubating adults. Volunteers also use live capture cage traps and kill traps to target feral cats in the area, further reducing predator numbers during the nesting season.

Field data is provided to the Department of Conservation staff based on Rakiura to analyse and collate into an annual report.

Mason Bay Rodent Control Project
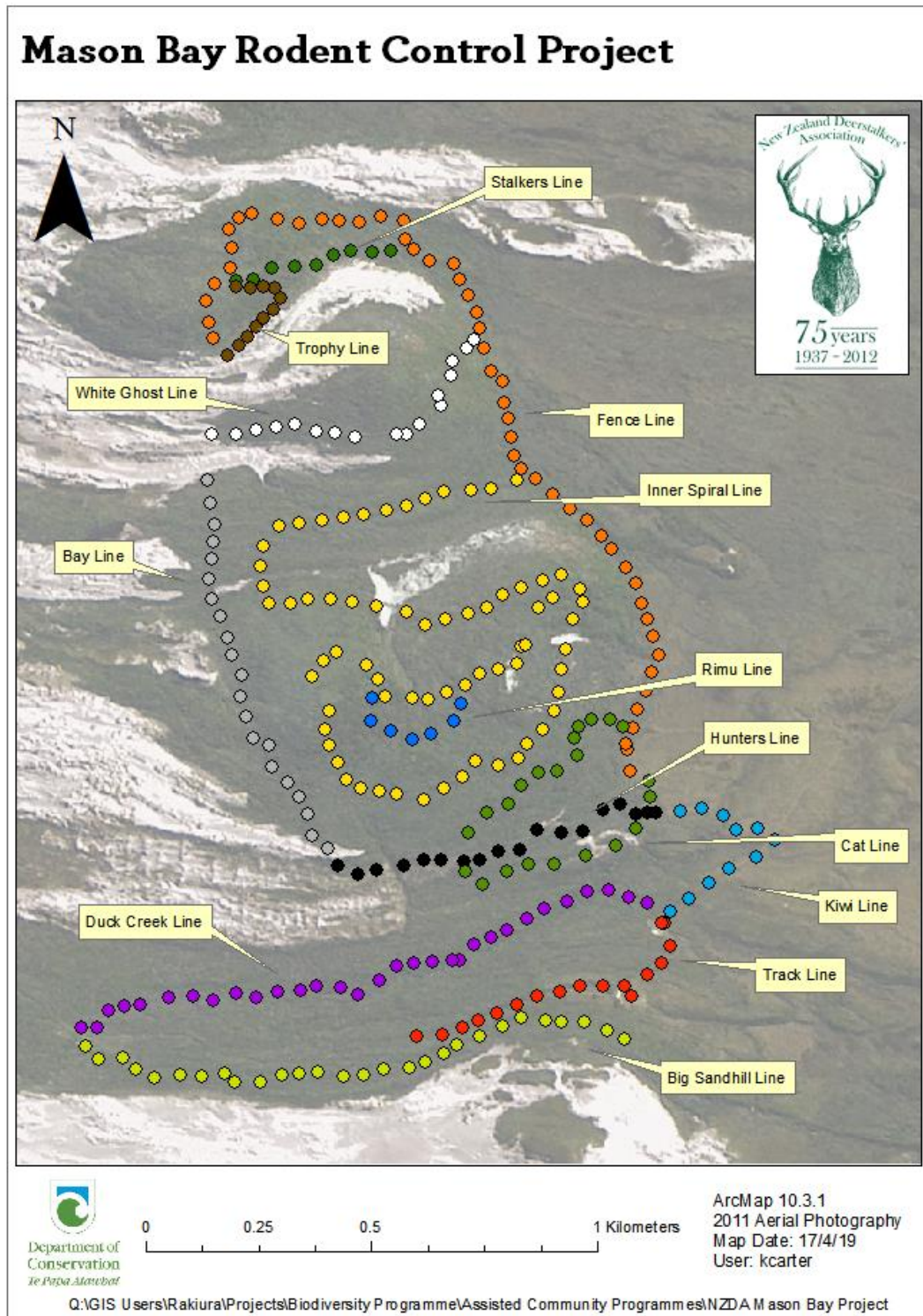
Introduction

Rats are widely recognised as a key predator of vulnerable nesting birds through both raiding nests and directly targeting incubating adults, especially so with smaller bird species such as fantail and tomtits. Rat impacts are twofold in that they also compete with birds for food sources such as seeds and fruit. Rats are also known to eat invertebrates and reptiles.

All three species of rat present in New Zealand are present on Rakiura including the Norway, Ship and Pacific (kiore) rats. The dominance of different rat species depends on the habitat (eg: kiore are often out-competed by more aggressive ship and Norway rats) and each behave in different ways. Norway rats are generally known as swimmers and are often associated with water bodies whilst ship rats are normally more plentiful in forested areas and are known climbers. These characteristics make ship rats of particular concern as they are more likely to prey on bird nests.

In ideal conditions of good habitat and plentiful food, every female rat has the potential to give birth to dozens of pups per year. As rats reach sexual maturity after just a few months, a population can grow from 2 to 2,000 in just twelve months, exacting a heavy toll on the ecosystem.

Rat population sizes naturally cycle over the course of any given year, increasingly rapidly through spring and summer after breeding and in response to increasing food availability with plants producing flowers, fruits and seeds. Rat plagues can occur in years when food availability is greater than average. In these years rat pups are more likely to survive through until adulthood which provides a larger breeding population when the cycle starts again.

Bird count data continues to be collected since the first observations in 2012. This has been targeted to monitor 4 specific bird species that are most susceptible to rat predation; bellbird, robin, tomtit and kakariki, which act as a series of indicator species to help us understand and quantify the benefits of the rat trapping programme in terms of increasing bird counts as our overall aim for the project.
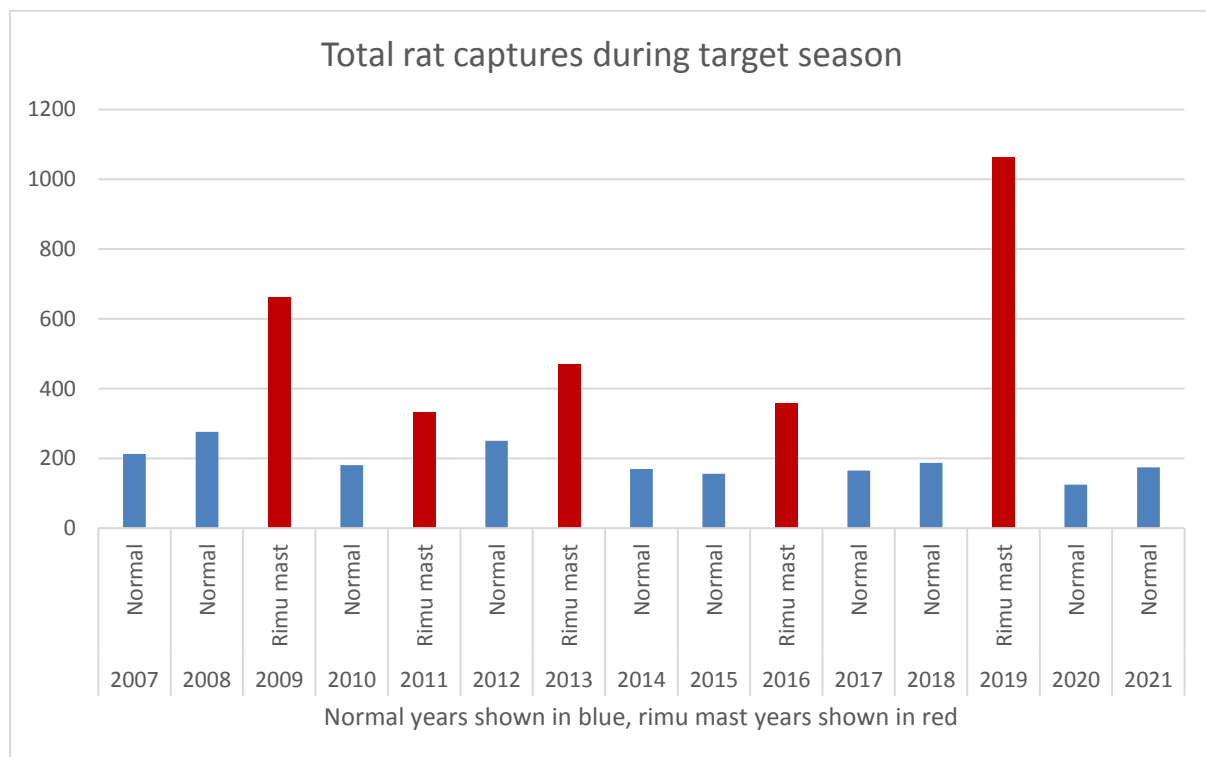
2021 results

Cat catches

10 cat cage trap nights and 201 kill trap nights were run this season, with a total of 2 feral cats caught.
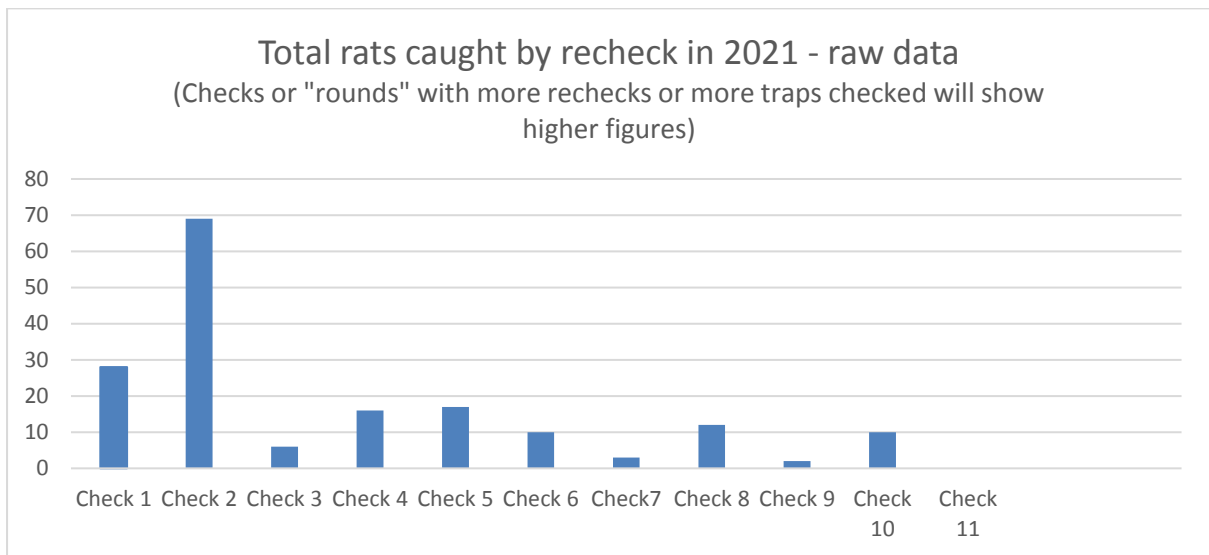
Rat catches

This year saw a similar rat numbers to 2020 as forest food resources similar to the 2020 season. Volunteers trapped a total of 173 rats which is a fairly average result for a non Rimu mast year.

The 2021 season total has been plotted on the graph below against the previous season totals over the course of the project. It's important to note that this raw data graph hasn't been corrected for trapping effort and so should be interpreted with caution.

Total rat captures during target season

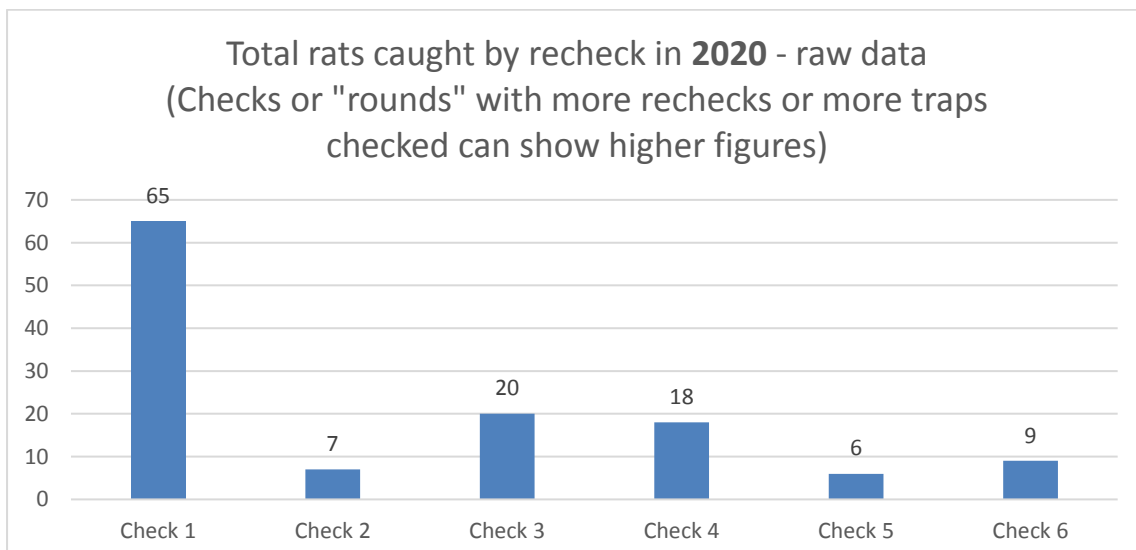Normal years shown in blue, rimu mast years shown in red

Rat catch results in non-mast years generally show a high catch at the start of the trapping season following by a tailing off and the rodent population declines. This trend is apparent in the 2021 season.

Total rats caught by recheck in 2021 - raw data
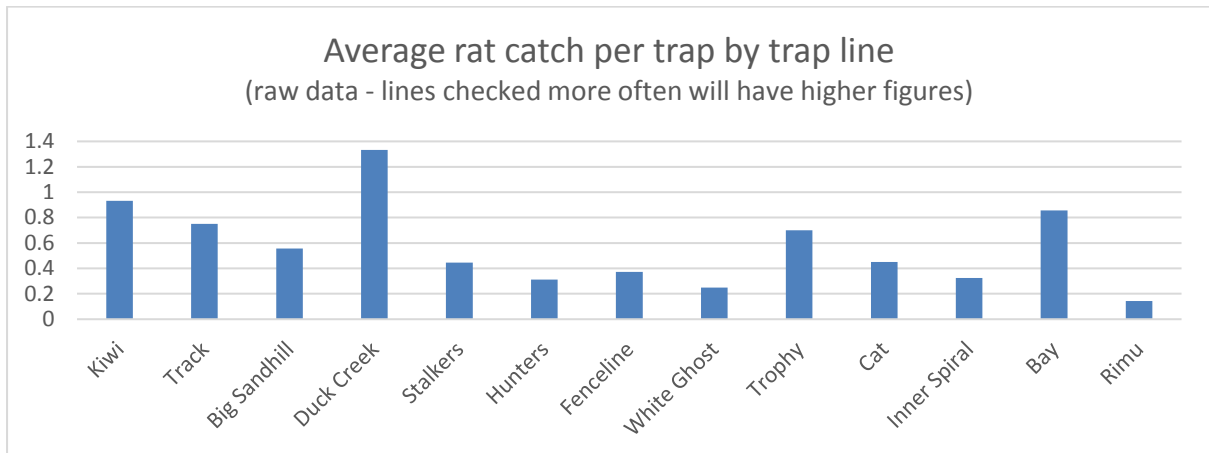(Checks or "rounds" with more rechecks or more traps checked will show higher figures)

In the graph above showing number of rats caught per check, we see that rat captures spiked during the second check then remained relatively low and stable throughout the rest of the trapping season with some smaller peaks and troughs. This pattern is fairly typical of a non Rimu mast season in this area.

Approximately 3151 trap checks were done in the 2021 season with a total of 173 rats caught. This gives about 18.21 trap checks per rat caught or an overall catch rate of approximately 5.5%. 2020 saw 2862 trap checks resulting in 125 rat catches or 22.89 trap checks per rat catch and an approximate 4.4% capture rate, a change of only around 1%

Total rats caught by recheck in 2020 - raw data
(Checks or "rounds" with more rechecks or more traps checked can show higher figures)

It's important to note that the interval between rechecks can affect the capture rates for any given recheck/round. Longer gaps between rechecks will mean that active traps have been out for more trap nights and so the next recheck is likely to find that more rats have been caught.

Average rat catch per trap by trap line
(raw data - lines checked more often will have higher figures)

Average rat capture per trap for each trap line has been broken down on the graph below. Duck Creek line saw the most rat catches per trap on average at 1.33 rats per trap for a total of 40 rats caught in 30 traps over the entire season.

Multiply the number of traps (30) by the number of nights (109) gives us 3270 trap nights divided by 40 rats caught gives us approximately 82 trap nights per rat caught.

The grand total of trap nights, 309 traps set over 109 nights is 33681 trap nights. Dividing this number of trap nights by the 173 rats caught gives us an approximate average of 195 trap nights per rat caught over the entire season.
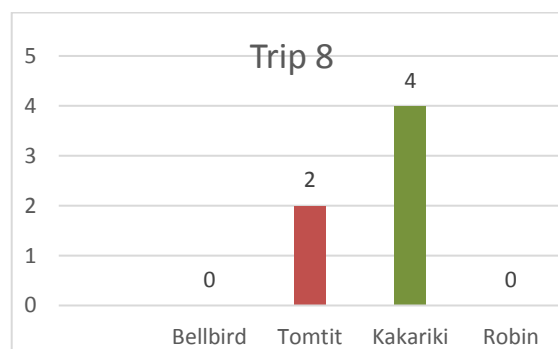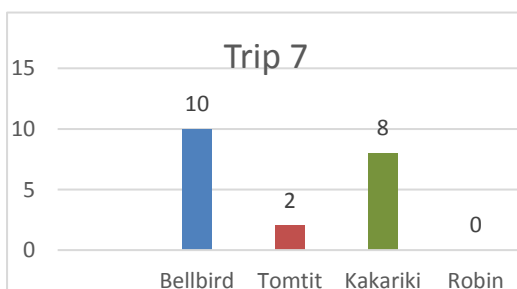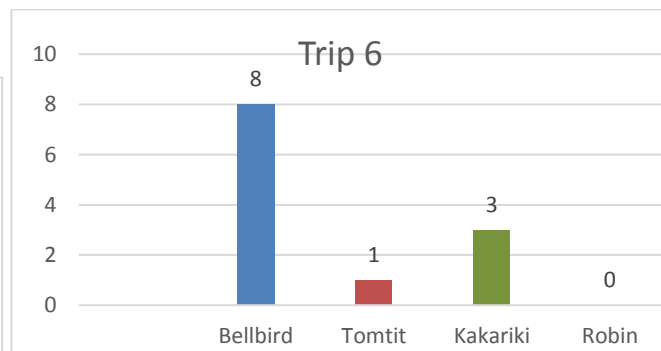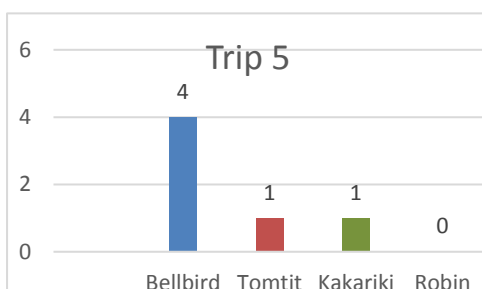
Bird encounters

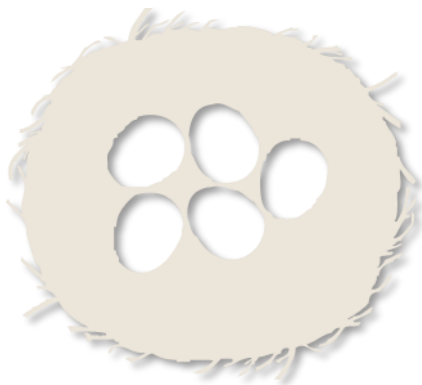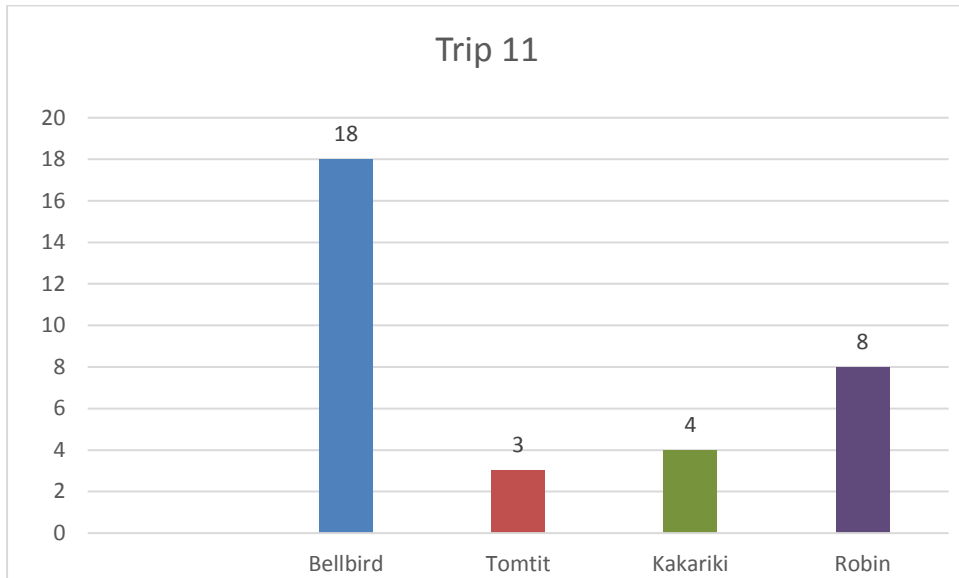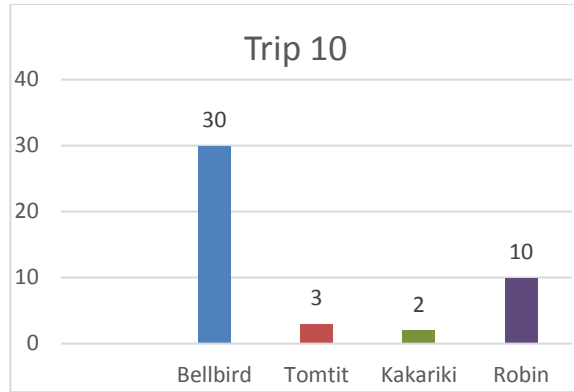Four key indicator bird species were used to compare the number of birds encountered on rat trapping lines each season. The bird species chosen were Bellbird, Kakariki (Parakeet), Tomtit and Robin.

These four bird species are deemed to be sensitive to predation by mammalian predators such as rats, cats and possums so are a good indication of the impacts these predators are having on their populations.

The numbers of each of these bird species encountered per trip is shown in the bar graphs below. There no birds recorded for trips 1 & 3. Robins were only recorded for trips 10 & 11

Trip 2

Trip 4

Trip 5

Trip 6

Trip 7

Trip 8

Trip 9

	Bellbird	Tomtit	Kakariki	Robin
	0	1	2	0

Trip 10

	Bellbird	Tomtit	Kakariki	Robin
	30	3	2	10

Trip 11

	Bellbird	Tomtit	Kakariki	Robin
	18	3	4	8
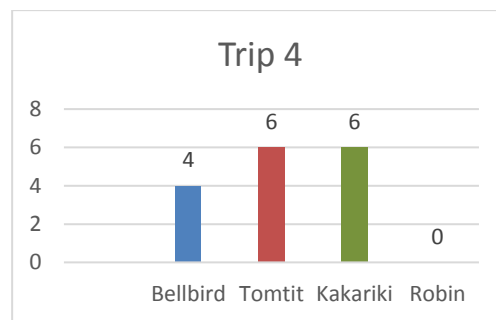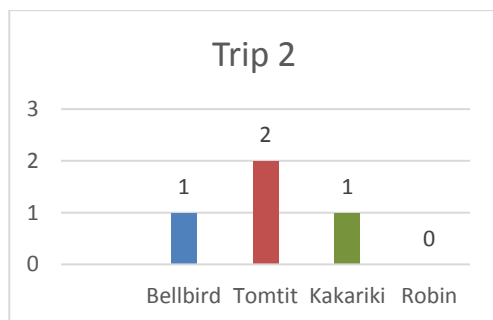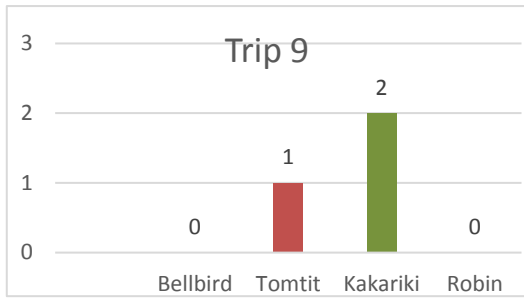
The total number of individual birds per species encountered this season is shown in the bar graph below.

2021

Species	Count
Bellbird	75
Tomtit	21
Kakariki	31
Robin	18
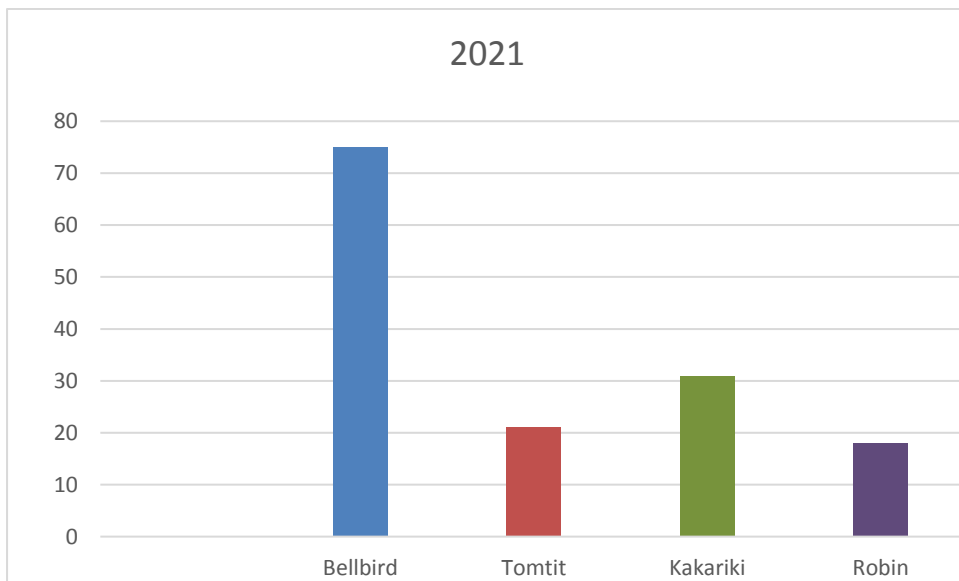
The total proportion of each indicator bird species is shown on the pie graph below.

Bird encounters by proportion

- Robin, 18, 12%
- Kakariki, 31, 21%
- Tomtit, 21, 15%
- Bellbird, 75, 52%
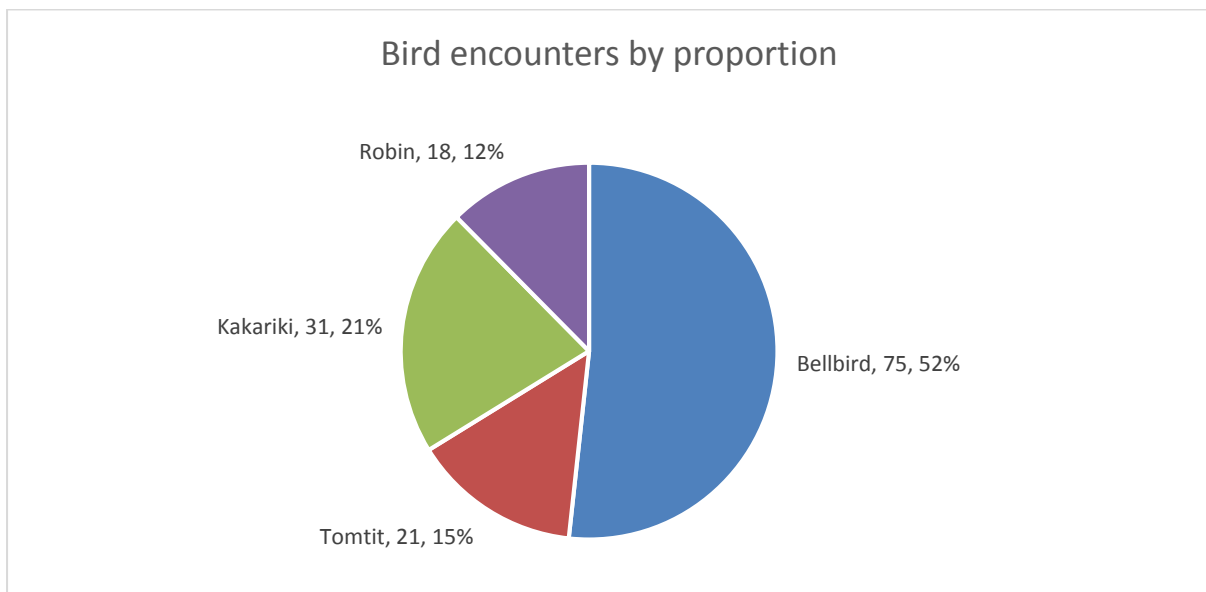
A comparison of the numbers of each key bird species per year from 2016 to 2020 is shown in the graphs below.

Total encounter rates by season
(raw data - years with more rechecks will show higher figures)
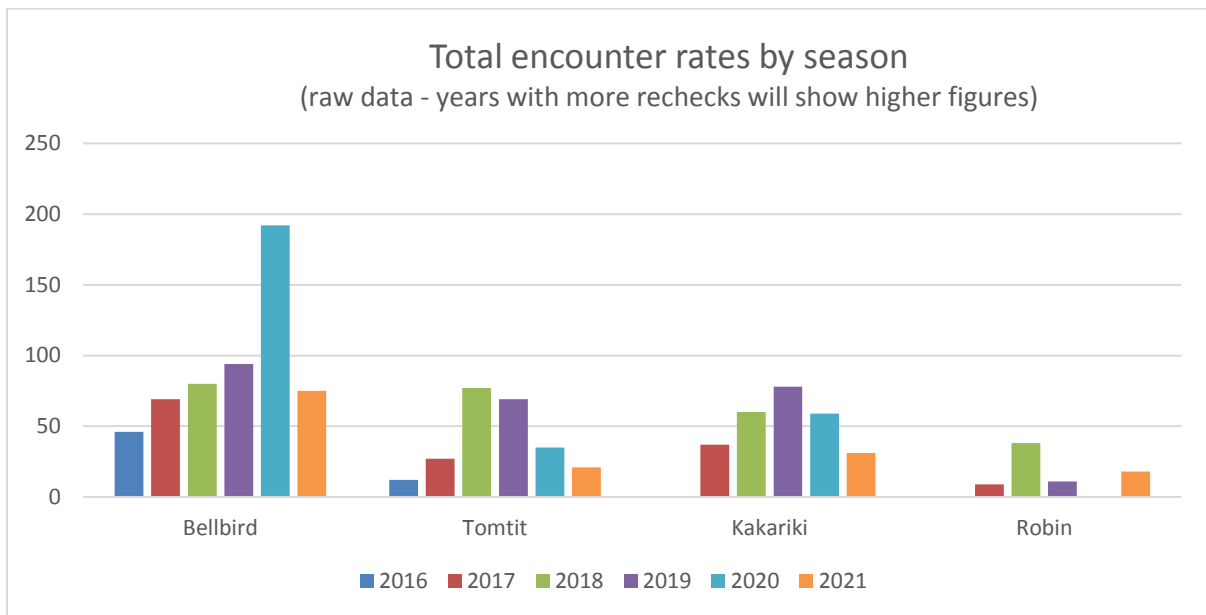
Discussion points

Observational variation

There are several variables when recording bird observations like the individuals ability to identify similar species like Robin and Tomtit, the speed in which the particular trap line is walked, the slower a trap line is completed the more likely it is that the trapper will encounter a greater number of birds. Weather conditions also play a large role in how many birds are seen or heard on a given trap line check.

Average encounter rates appear to increase as the season progresses. This could be attributed to increased food availability in the localised areas as seasons progress. The abundance of juveniles after successful breeding attempts.

Robins were encountered in increasing numbers this year. It is possible that female and/or juvenile Tomtits could be mistaken for Robins? As we build a longer-term data set we will be able to more reliably determine trends over time. Although different observers can return different results.

Data sheets

A big thank you to those who digitised their trapping and bird monitoring records via Excel. This made the analysis and reporting much quicker and reduced the likelihood of transcription errors.

Please remember to fill out the total trap nights for cage and kill traps (number of traps set x number of nights they were set for eg. 2 traps set for 4 nights = 8 trap nights) so that we can compare how well the various traps are doing.

Start and finish times can also really help calibrate the bird encounter data by allowing for the effect of slower going resulting in more bird sightings.

The quality of the trapping data we received this season was a great improvement from previous years. It's important that we know which traps were checked and which ones weren't and how many rechecks were done on the traps that were serviced. We didn't have complete information from the field data sheets this year and so had to make some best guesses in a few places so that we could run the analyses. As such please take the report as a rough guide to how things are going out there.

Conclusion

The NZDA have completed another successful year of rat and cat trapping at Mason Bay during a period where our native birds are particularly vulnerable to the effects of predation.

Comparing the number of key indicator birds (Bellbirds, Kakariki, Tomtits and Robins) encountered each trip over a number of years gives us an idea of the effectiveness of the NZDA trapping program. The data from the 2021 season showed relatively low numbers of birds which isn't surprising given the huge numbers of feral cats across Stewart Island the previous season.

The rat trapping data for the 2021 season showed a considerable decline in the number of rats caught compared with previous years and this reflects that the underlying rat population is much smaller than 2019. This data, when combined with amount of trapping effort (number of traps x number of checks) gives a good index of rat numbers.

I would expect high numbers of rats next season as the amount of fruit available in the forest this autumn is going to fuel an "Mast Year" so by spring 2022 we could expect to see similar rat numbers to 2019.

We'd like to thank the hard work of the NZDA members and their continued enthusiasm for protecting our native fauna and flora. We look forward to another season of good results.

We would like to make special thanks to Invercargill Hunting & Fishing for the generous financial support which covers about half the transportation costs of the project.

We would also like to thank the NZDA hunters and volunteers who cover the remaining associated costs and carry out the annual trap checks and monitoring.