Forest & Bird Central Otago Lakes Branch

&

The Southern Lakes Sanctuary Trust

Makarora A24 Surveillance & Effectiveness Study

01/02/2023 – 02/08/2023

1, Possums interacting with an A24.

Tom Reeves, Southern Lakes Sanctuary

Summary

In February 2023, trail cameras were placed on 7 Goodnature® A24 traps across Forest & Bird's Makarora trap network to better understand trap interaction rates, kill rates and predator behaviour. The cameras stayed in place for 6 months from 01/02/2023 until 02/08/2023. Initially traps were baited with Goodnature® rodent lure (chocolate) but on 02/06/2023 this was changed to Goodnature® Meat Lovers lure for the remainder of the study.

Due to the time periods both lures were deployed not being the same, issues with cameras, small sample size, and the beginning of a rodent plague in May 2023, it is difficult to obtain useful statistical data to inform trapping practices. However, useful information was obtained about trap-predator interaction and kill rates, predator behaviour, and presence of predator species.

Cameras recorded high numbers of interactions from mice, rats, and possums across both lure trials; several cameras were visited almost daily. However, these interactions rarely resulted in a kill with only 8 confirmed kills during the 6-month trial (6 mice, 2 rats). Very few stoats were recorded (2 interactions). Cats were observed in all locations and scavenged 5 of the 8 confirmed kills (37.5% scavenge rate). Overall, the high cost of maintaining the A24 network is not worthwhile for the minimal catch rates observed, especially since the majority of catches are mice. However, catches are difficult to accurately determine due to scavenging and this needs to be taken into consideration as many catches may go unrecorded. It might be worthwhile to use the A24 network at times of increased rat numbers, when our native species are most threatened, and maximum effort is needed to control predator numbers.

The unexpectedly high trap interactions suggest more effort should be put into finding ways to turn these high rates into multi-species catches, and finding ways to trap the large numbers of possums and cats recorded.

TrapNZ catch records across the Makarora network have also been analysed to help compare the effectiveness of A24s with other trap types. These records do have limitations as only non-scavenged carcasses can be recorded during trap clearances where counters are not present. Analysis shows that A24s have a higher catch rate per trap. However, if you discount mice catches (as they are not a target species for COLB) then other traps such as DOC200s have a higher overall catch-rate for target species, even if you consider approximate scavenger rates. This paired with the A24s high maintenance costs make them a less effective tool for predator control for the COLB network.

Introduction

The Central Otago Lakes Branch of Forest & Bird (COLB) began predator control work at Makarora in 1998, in a joint venture with the Department of Conservation (DOC) to protect a relict mohua population. COLB began installing their own traps in the area in 2002 and catch data has been recorded since 2006. As part of their trap network expansion, COLB received an Otago Regional Council Grant in 2006 for the purchase and installation of automatically resetting, gas powered, Goodnature® A24 Traps[1].

The traps are protected from potential kea interaction and by-kill with customised "Bissett cages" of steel mesh with openings small enough to admit mustelids and rodents, but not possums[2]. A24 traps on one trap line (Blue-Young) had counters installed; catch numbers there are significantly higher

[1] https://goodnature.co.nz/trap-kits
[2] Gillies et al., 2021

than on un-counted A24 traps. However, catch data from these are of doubtful reliability due to battery failure, incorrect fitting, concerns of inaccuracy and old age.

There are currently 146 A24 traps within the COLB network at Makarora. As of 12/09/23 the network contains 1521 traps of various types and is regularly serviced and maintained by COLB volunteers and Southern Lakes Sanctuary (SLS) staff.

2. F&B COLB trap network Makarora, September 2023

3. F&B COLB A24 network at Makarora, September 2023

COLB has been concerned in recent times that the A24 network is both expensive to maintain, and ineffective in terms of the catches they return. Gas cannister costs per annum are $2,580 and lure pouches $1920, a total of $4500 - $30 per trap. These ongoing costs are a significant percentage of COLB's annual budget and far exceed costs for other traps such as DOC 200s. TrapNZ historical catch rates also suggested that the A24s under-perform in comparison with DOC 200s for rat and stoat catches. Many A24 catches are mice which are not currently a primary target COLB, although the removal of these predators is still welcomed.

Due to kill-counter inaccuracy and kills probably being scavenged by other predators, it is difficult to measure how effective A24 traps are or to get any idea of the potential impact they have on predator numbers. Due to these concerns, a simple study using trail-cameras was proposed to:

1. **Better understand A24 predator interaction rates.**
2. **Better understand A24 catch rates.**
3. **Understand predator behaviour.**
4. **Understand to what extent catches are scavenged by other predators.**

These findings were to be assessed alongside TrapNZ catch records to determine:

1. **The overall impact of the A24 traps in comparison with other trap types.**
2. **If it is worth continuing spending significant resources to maintain these traps year-round.**
3. **Appropriate guidance for best utilising A24 traps at Makarora.**

Methods

Cameras were set at seven different and reasonably accessible A24 locations across the Makarora network, from Makarora village to Haast Pass. Cameras were spread out to try and get an understanding of the whole area. More remote traps were not considered due to logistical difficulties in servicing. Cameras were secured to an adjacent tree with a good view of the trap. Due

to the varying nature of terrain the cameras could not be set at consistent distances or angles to the traps.

Before commencing the study, all traps were serviced, test-fired and had their gas and lures changed. All traps were in good working order. The lure initially used was Goodnature® Chocolate lure which has been used consistently by COLB since the introduction of the A24s. Chocolate was later swapped with Meat Lovers lure to see if this attracted more stoats or performed differently.

Browning trail cameras were set to take 3 shots (photographs) per trigger with a 10 second camera delay. All cameras were in good working order at the start of the trial. Cameras were active and recording both day and night.

The cameras were initially set on 01/02/2023. On 13/03/2023 all cameras had their batteries and SD cards swapped. On 02/06/2023 lures were swapped for Goodnature® Meat Lovers lures, and the batteries and SD cards were again swapped. The cameras were retrieved on 02/08/2023. All cameras were set and serviced by COLB volunteers and SLS staff.

Locations

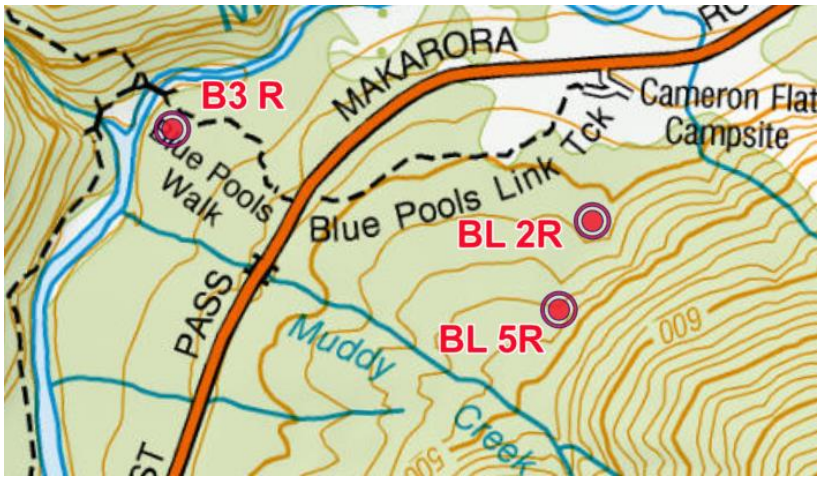
Cameras were placed across the network into areas with historically higher catch numbers, based on TrapNZ data.

At several sites alternative locations to those originally chosen had to be used, due to the lack of suitable trees to mount the cameras.

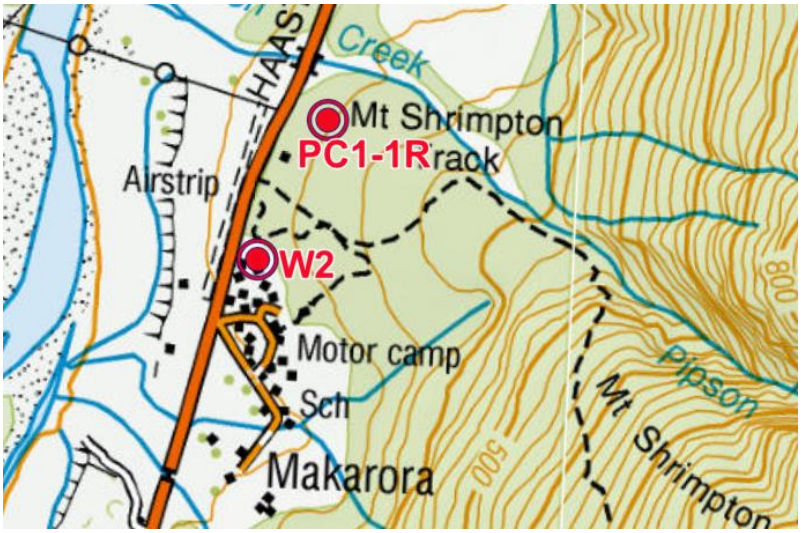
Trap location numbers and lines are:

- W2 – Wonder Line
- PC1-1R – Pipson Creek Grid
- B3 R – Blue-Young
- BL 2R – Boat Line
- BL 5R – Boat Line
- L1 R – Lookout
- BR 4R – Bridle Track

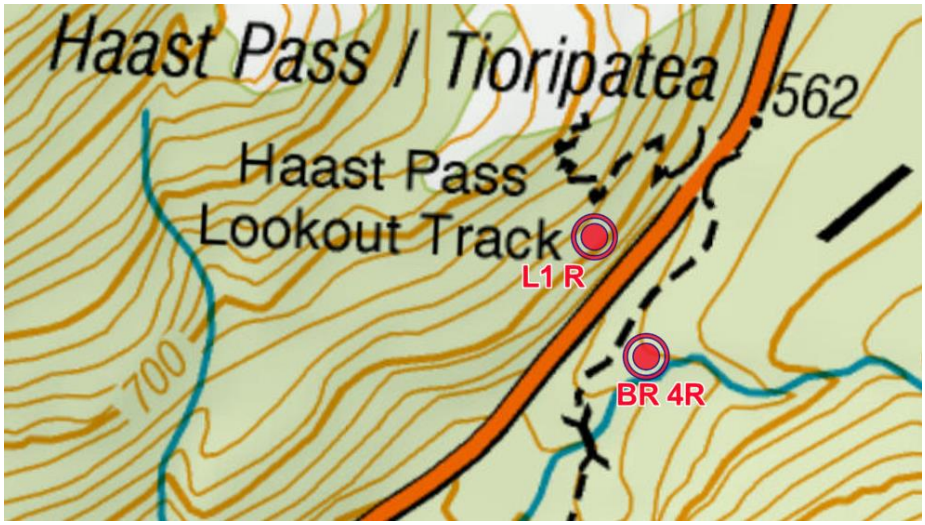
Camera locations were unchanged throughout the trial.



2, Camera locations - W2 and PC1-1R



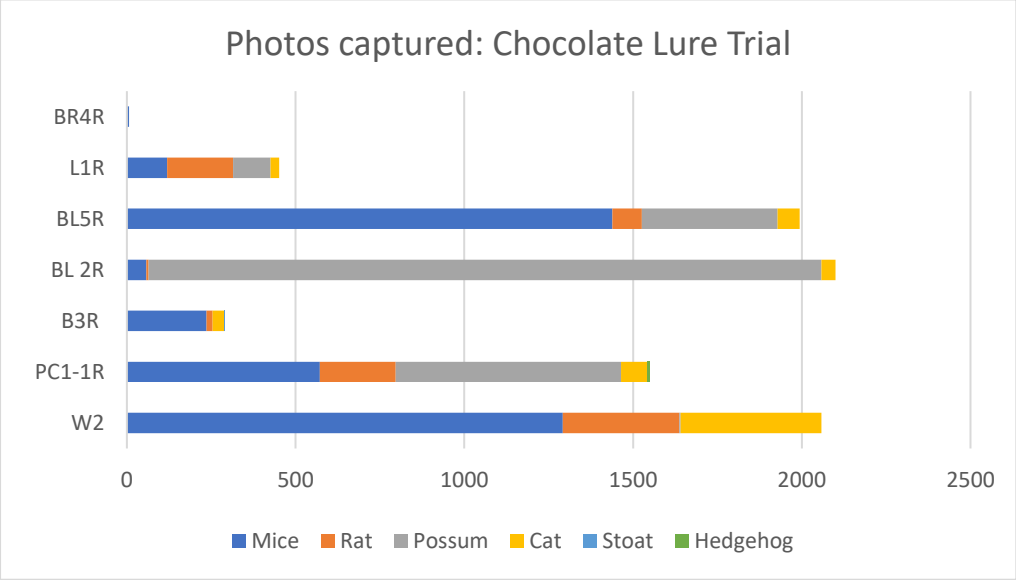
3, Camera locations - B3 R, BL 2R and BL 5R



4, Camera locations - L1 R and BR 4R

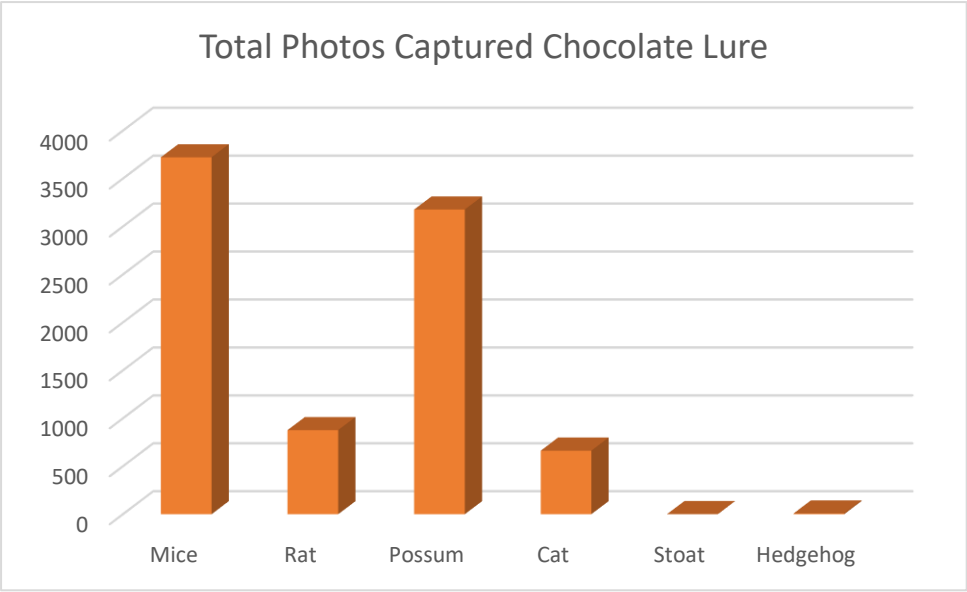
Results

Chocolate Lure:



Photos per species:

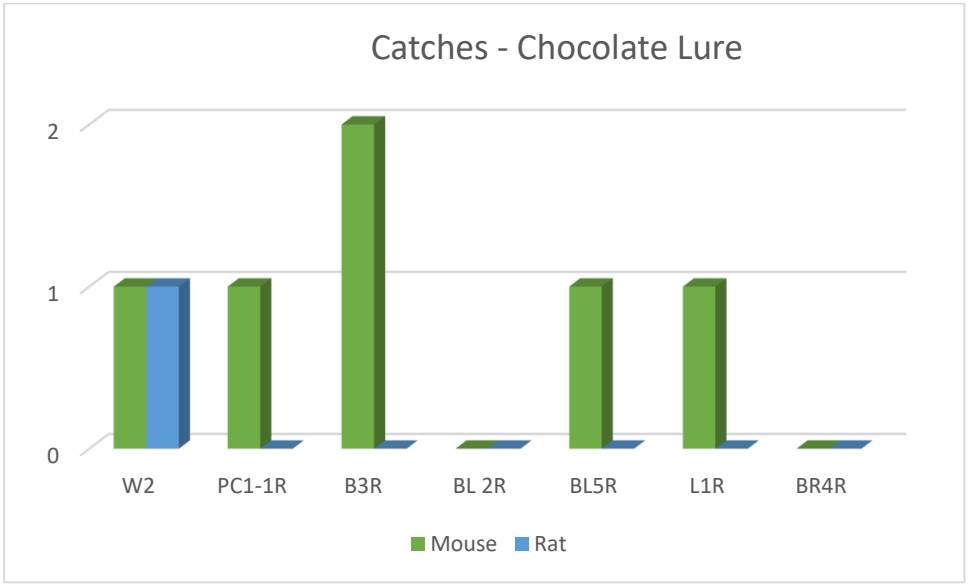
Species	W2	PC1-1R	B3R	BL 2R	BL5R	L1R	BR4R	Totals:
Mice	1292	572	236	58	1439	119	6	3722
Rat	345	225	18	6	87	196	0	877
Possum	4	667	0	1994	402	111	0	3178
Cat	417	78	35	42	66	25	0	663
Stoat	0	0	2	0	0	0	0	2
Hedgehog	0	8	0	0	0	0	0	8



The total number of photos of predators during the rodent trial was 8,348. Some cameras were being visited almost every day, and many were visited on multiple occasions in one day. The time spent interacting with traps was variable, but possums seemed to spend the most time investigating, and some individuals may have been returning to the same trap regularly.

Rodent Lure catches:

Species	W2	PC1-1R	B3R	BL 2R	BL5R	L1R	BR4R
Mouse	1	1	2	0	1	1	0
Rat	1	0	0	0	0	0	0

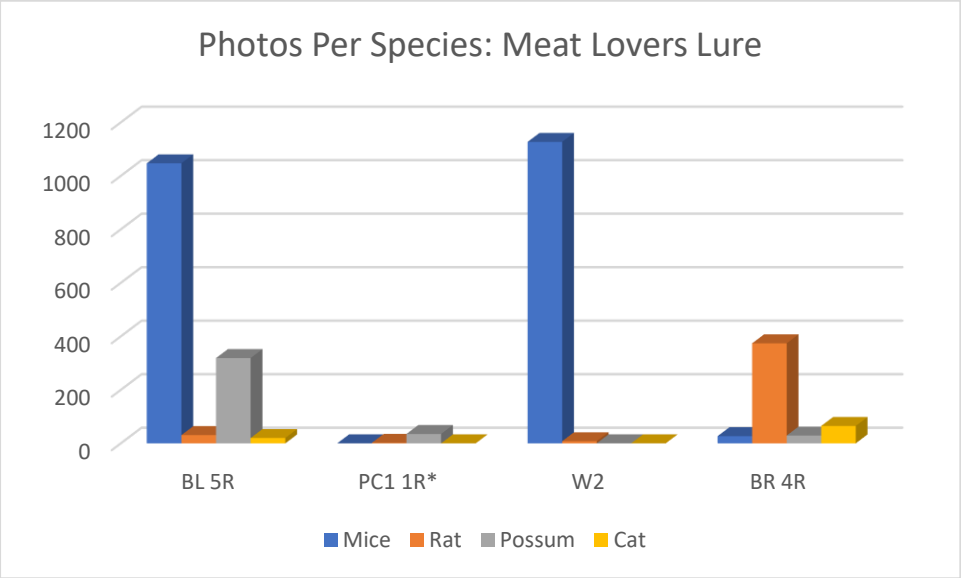


Meat Lovers Lure Trial:

Between 02/06/2023 and 02/08/2023 the traps were baited with Goodnature® Meat Lovers lure. The collection of data for this period of the trial suffered from numerous technical difficulties. Several of the cameras malfunctioned or stopped recording data. This could be due to extended time operating in native bush in inclement weather, or to issues with battery life. Several of the cameras

were waterlogged on collection. Results are only shown for the 4 cameras that remained functioning. Camera PC1-1R only recorded data for a short time (during the Meat Lovers trial).

Photos per species:



Species	BL 5R	PC1 1R*	W2	BR 4R	Total
Mice	1047	0	1127	27	2201
Rat	31	2	8	374	415
Possum	319	35	0	29	383
Cat	20	0	0	65	85

*PC1 1R only active for a short period of time.

No stoats or hedgehogs were photographed during this second trial.

Catches on Meat Lovers lure:

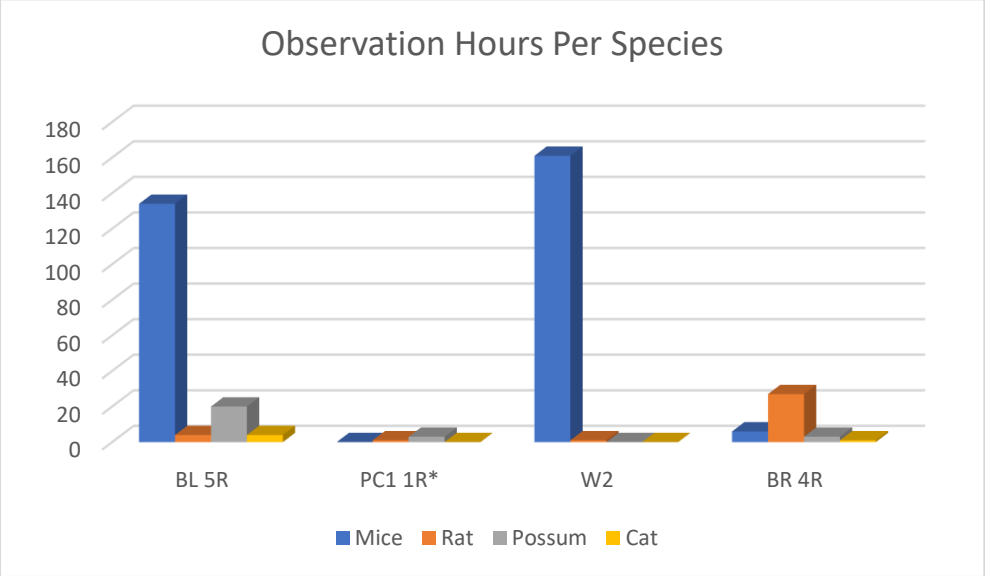
Species	BL 5R	PC1 1R*	W2	BR 4R
Mice	0	0	0	0
Rat	0	0	0	1

*PC1 1R did not record consistently

2 dead rats were found under B3R when collecting the equipment, but as that camera malfunctioned for the second trial, these are not counted.

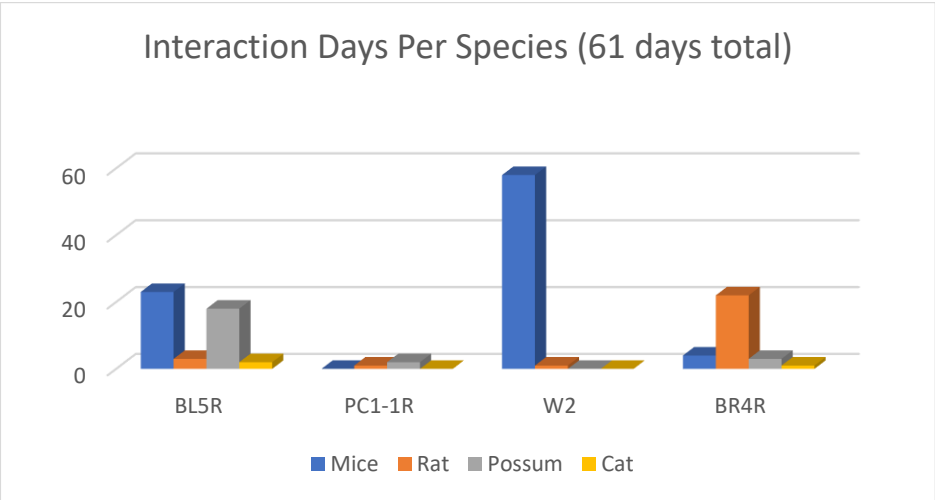
Observation hours & days with Meat Lovers lure

When analysing the data from this lure, observation hours and observation days were also recorded to see if there is a correlation between them. Observation hours refers to how many different hours across the study a species was seen in.



Observation hours

Species	BL 5R	PC1 1R	W2	BR 4R	Totals
Mice	134	0	161	6	301
Rat	4	1	1	27	33
Possum	20	3	0	3	26
Cat	4	0	0	1	5



Interaction days

Species	W2	PC1-1R	BL5R	BR4R	Totals:
Mice	58	0	23	4	85
Rat	1	1	3	22	27
Possum	0	2	18	3	23
Cat	0	0	2	1	3

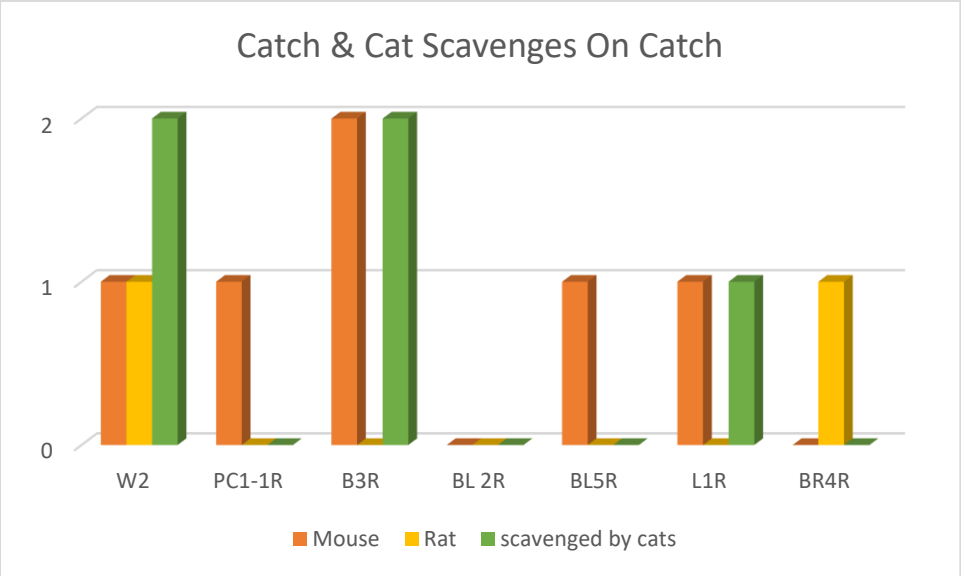
Cameras were in place and recording for 61 days.

Totals for photos captured, hours and days of trap interactions

Predator	Photos	Hours	Days
Mice	2201	301	85
Rat	415	33	27
Possum	383	26	23
Cat	85	5	3
Total:	3084	365	138

Cat scavenging across both trials

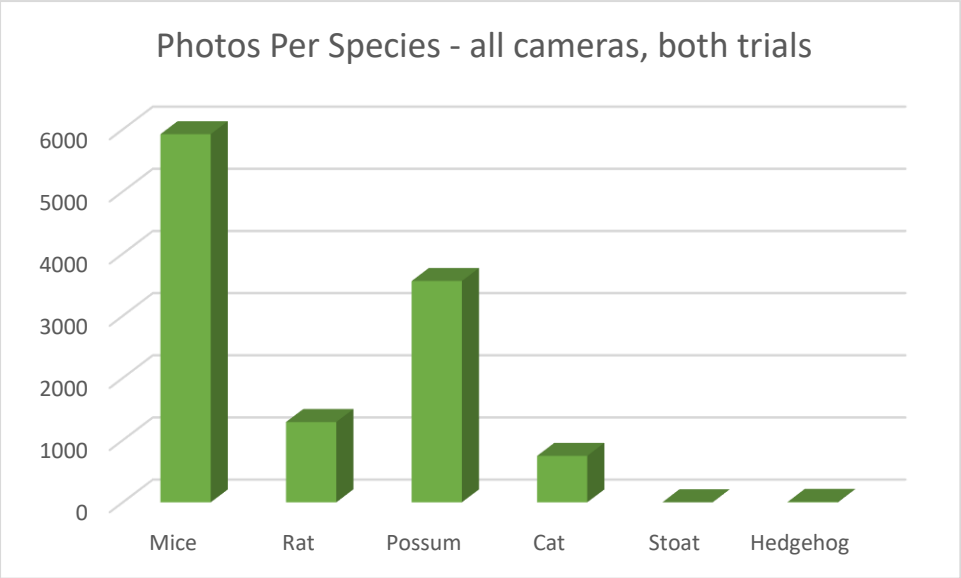
Numerous instances of cats scavenging on rat and mouse carcasses were recorded.



Percentage of catches that were scavenged by cats is 37.5%. This is a significant portion, however, note that this is from a small sample size and may not reflect reality.

The most visited trap was at W2 (Wonder Line) followed by PC2-2 (Pipson Ck grid). These are closest to Makarora village, raising the possibility that these cats are either strays, or domestic cats.

Photos per species, both trials:



Species	Totals:
Mice	5923
Rat	1292
Possum	3561
Cat	748
Stoat	2
Hedgehog	8

Predator Behaviour

Behaviours observed during the trials:

- High rate of possums, mice and rats checking out the traps, climbing on them, climbing on the kea proof cages, but not entering the kill-zone.
- Mice and sometimes rats were seen to climb all over the Bissett cages and put their heads into the mechanism without activating it. *Presumably they did not go far enough in. Are the anti-kea cages perhaps too low for them to get high enough into the trap?*
- Possums were very interested in the A24s and some individuals came back almost nightly. They were extremely interested in the lure.
- Possums also attempted to unscrew the gas cannisters. *This may result in leaking.*
- A high rate of scavenging of catches by feral cats, reaching into cages and removing dead mice or rats. Cats visited day and night, always checking cages for a catch. *It would appear that cats have become accustomed to feeding under A24s.*
- Cats were captured on all cameras *and should be considered as being present at all locations*.
- Rats were also widespread, investigating and climbing on both cage and A24. Rats were more abundant at certain sites.
- One hedgehog was seen walking by a trap, with no interaction.
- Mice tended to follow the same paths repeatedly (running along a certain log for example).
- Some native birds were seen (tui, tomtit and riflemen). Riflemen were the most curious.

- One camera also had a view into a DOC 200 and photographed a rat getting caught in the trap followed by a second rat and a mouse coming in and inspecting the ping-pong ball for a while before leaving.
- Only 2 stoats were photographed during the chocolate lure trial, both at B3R, with only a cursory look at the trap in one photograph. Only one photograph was obtained of each stoat, suggesting that they did not linger to inspect these traps.
- No stoats visited A24s during the Meat Lovers lure trial.

Limitations of data

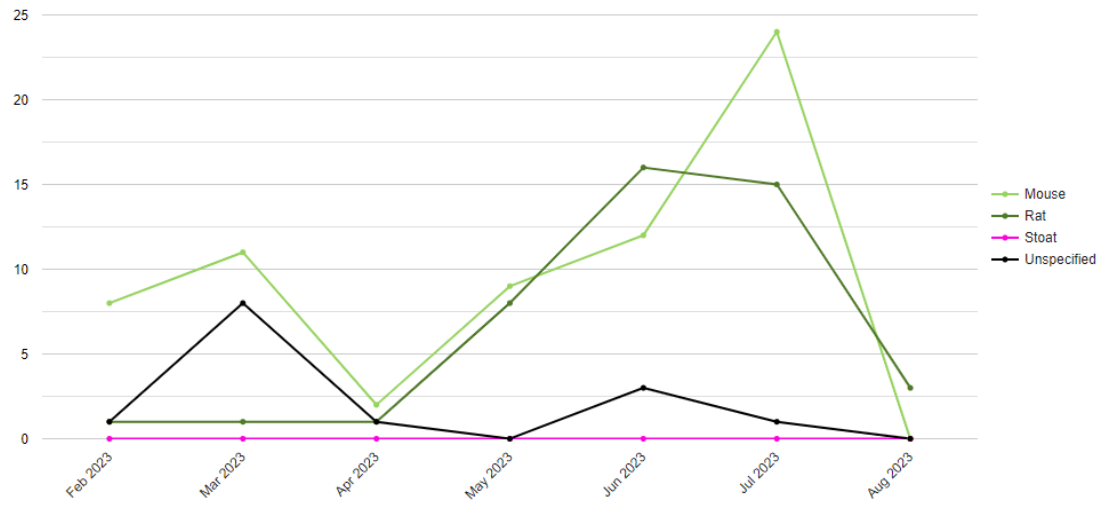
- Stoat catches during the study were low across the entire trapping network, so results may not reflect the relationship between stoats and A24s accurately.
- The cameras were left out in the bush for a long time, and several malfunctioned and were not recording properly by the end of the trial.
- Camera batteries went flat on several cameras at different times, so any data is not an accurate representation of interaction rates for the full duration of this study and should be taken as indicative data.
- Comparing the two different lures is difficult because the study was conducted at different times of the year, with a massive increase in rat numbers from May onward (TrapNZ data). Sample size and length were also different due to mechanical difficulties. A comparison of the lure's effectiveness, however, was not a major goal of the study.

Catch data from TrapNZ

Catch data has been taken from TrapNZ for our entire network to give context to the results from the trial and help establish the worth of the A24 network. Data from the duration of the trial has been analysed as well as from the last 3 years. A24 catch data older than this has not been used as catches were all listed as "unspecified".

Catch rates for all COLB A24s for the duration of the trial are based on captures recorded during trap checks; catches scavenged by cats were obviously not recorded. **Note that the trial ended on August 2nd.**

A24 catches during trial



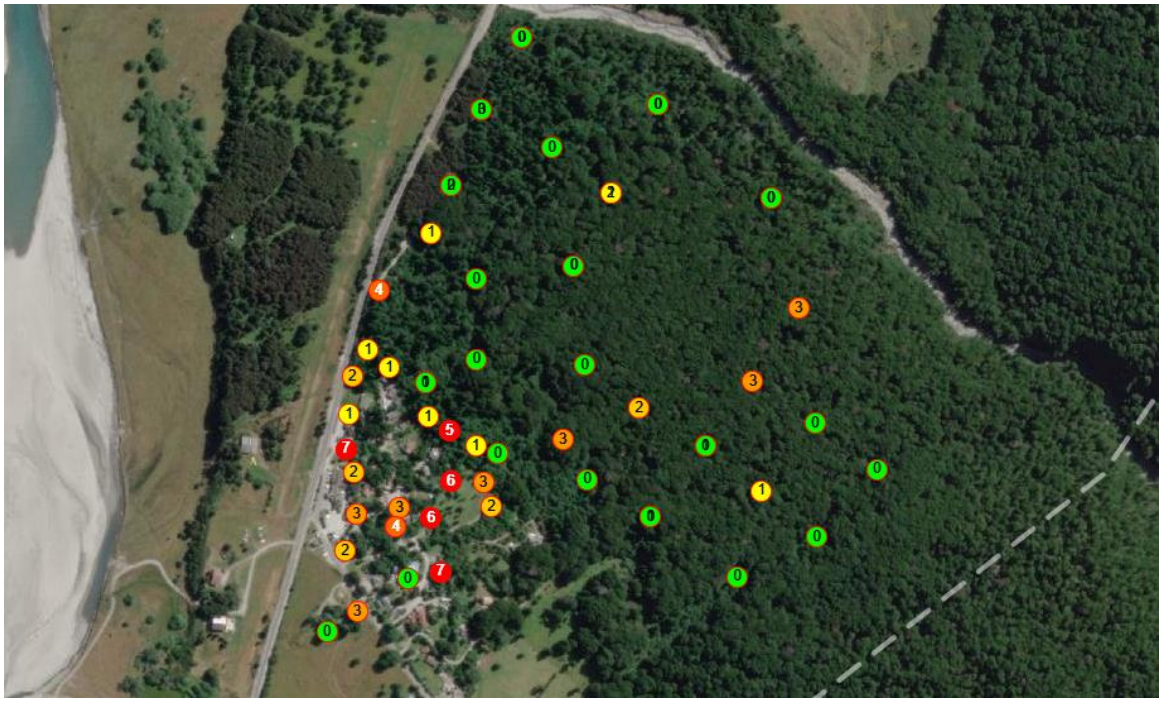
Month	Mouse	Rat	Unspecified	Total pests
Feb 2023	8	1	1	10
Mar 2023	11	1	8	20
Apr 2023	2	1	1	4
May 2023	9	8	0	17
Jun 2023	12	16	3	31
Jul 2023	24	15	1	40
Aug 2023	0	3	0	3
Total	**66**	**45**	**14**	**125**

“Unspecified” refers to kills recorded by counters on some A24s where no carcasses were left; they are assumed to be rodents. They could also refer to catches where trappers were unsure of the species caught.

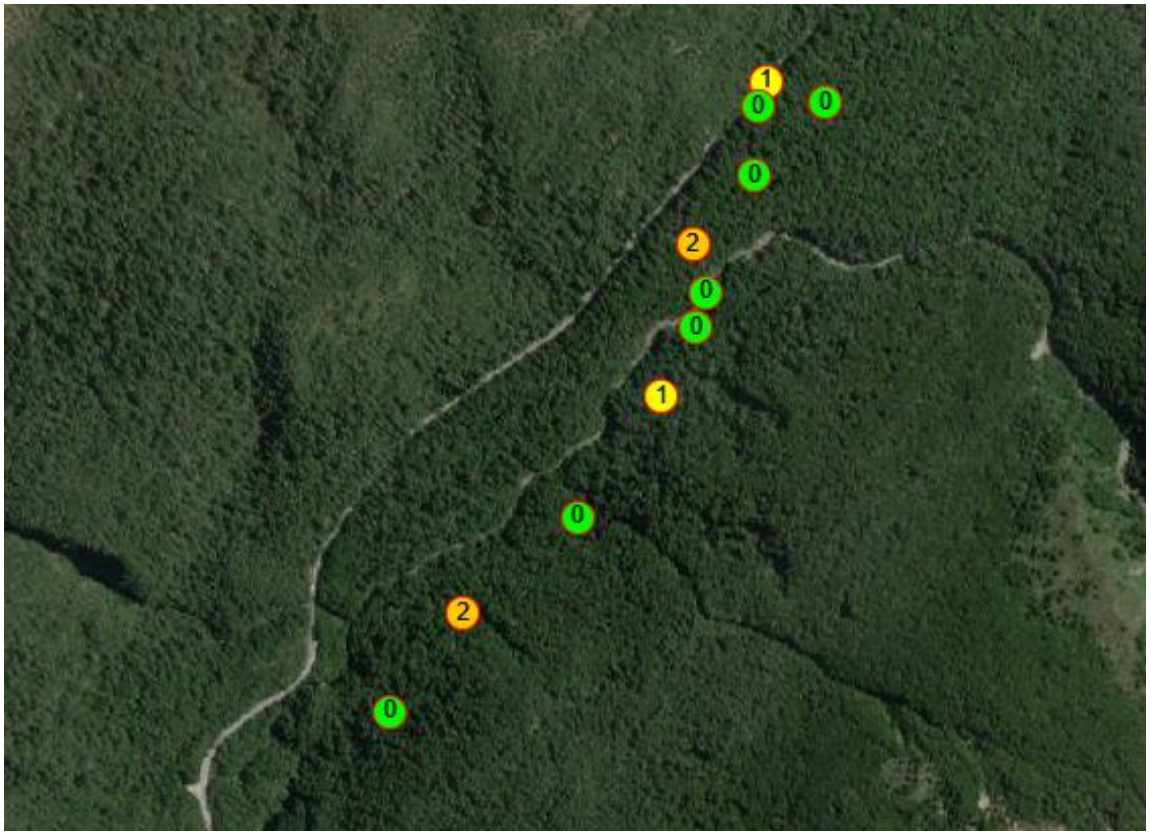
Catch numbers from all trap types for the duration of the trial

Month	Hedgehog	Mouse	Possum	Rat	Stoat	Unspecified	Total pests
Feb 2023	2	61	5	80	37	2	187
Mar 2023	1	26	5	75	13	10	130
Apr 2023	0	24	3	178	20	2	227
May 2023	0	19	0	152	1	0	172
Jun 2023	0	25	1	206	3	3	238
Jul 2023	0	93	6	392	0	1	492
Aug 2023	0	0	0	4	0	0	4
Total	**3**	**248**	**20**	**1,087**	**74**	**18**	**1,450**

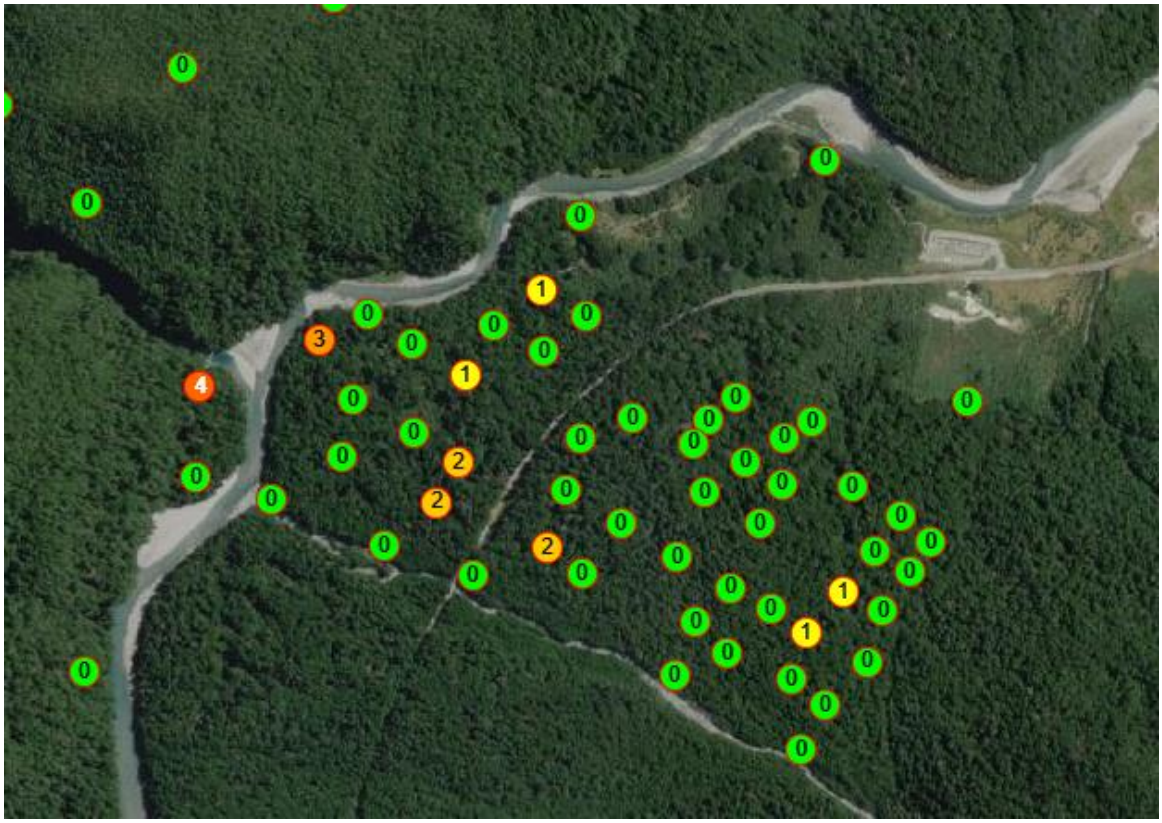
Catch numbers by specific trap during the trial



5. A24 Catch Numbers During Trial - Wonderland/Pipson

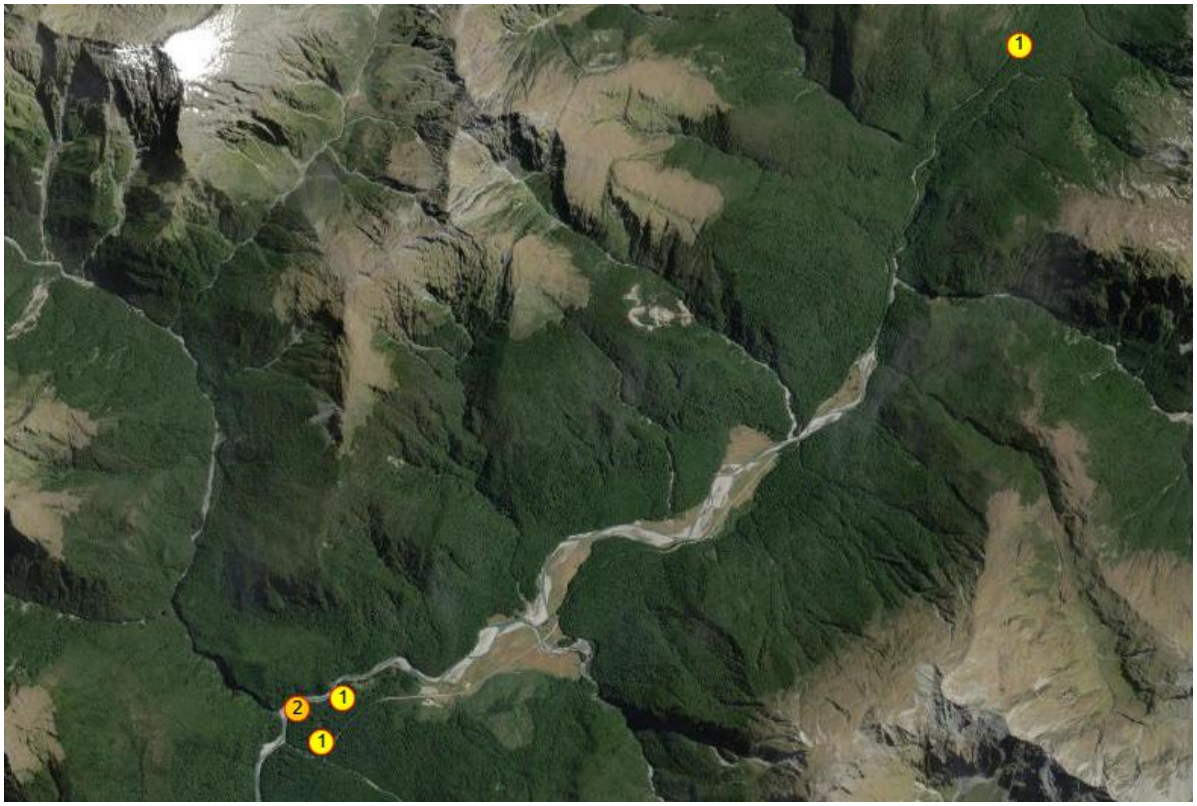


6. A24 Catch Numbers During Trial - Haast Pass.



7. A24 Catch Numbers During Trial - Muddy Creek.

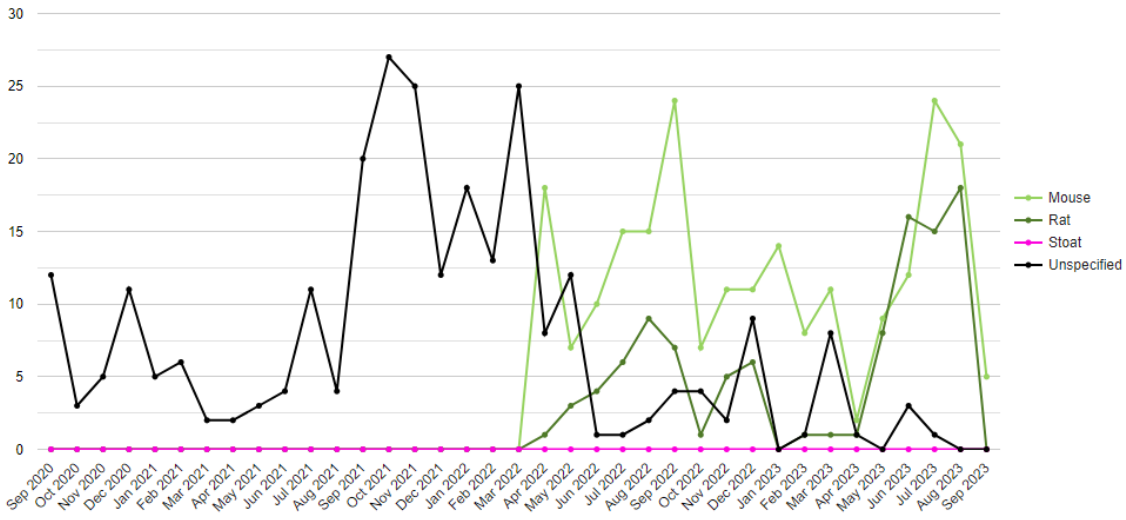
8. A24 Rat Catch Numbers During Trial.



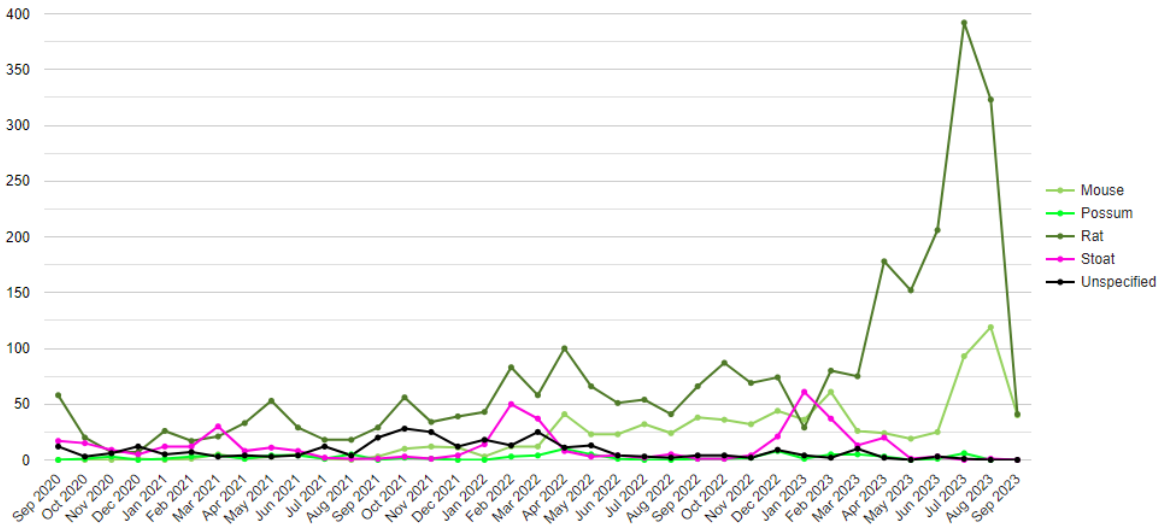
9. A24 Rat Catch Numbers During Trial, Haast Pass and Muddy Creek.

Only 5 rats were recorded as caught by A24s outside the Pipson Grid/Wonderland areas.

A24 Catch rates last 3 years



Catch rates last 3 years all traps



TrapNZ catch rate data analysis

To get an understanding of catches per trap across our project area during this study and the last 3 years, we have divided TrapNZ catch rates by number of traps. This will not be entirely accurate as trap numbers have not been consistent across this time, especially over the 3-year period. The 37.5% scavenge rate on A24 catches by cats (from this study) has also been applied. This scavenge rate is however from a small sample and may not reflect reality.

Catch Rate Per Trap			
	A24s	**A24s with cat scavenge rate of 37.5%**	**Other traps**
All Species during trial	0.835	1.148	0.962
All species during trial except mice*	0.335	0.461	0.849
All Species last 3 years	3.958	5.443	2.416
All species last 3 years except mice*	1.164	1.601	2.08

*Mouse numbers estimates for unspecified catches based on non-unspecified records.

Taking scavenging by cats into account, it seems that the A24 network has a higher overall catch rate than other trap types, across all species. However, a large proportion of A24 catches are mice, which are not a priority target species and are considered to be by-catch. Excluding mouse catches results in catch rate per trap for A24s dropping significantly, suggesting that other types of traps are more effective for catching target species such as rats and stoats.

Conclusions

From the above information, the following conclusions are drawn:

- Cameras recorded high trap interaction rates from several species across the area. Most common interactions were from mice, rats, and possums. Many cameras were visited almost every day, and many had multiple visits a day.
- The majority of interactions and kills from A24s are mice.
- Possums visited regularly but A24s are not suitable for catching them.

- Feral cats were recorded at all locations, and in many instances scavenged on A24 catches (37.5% of catches recorded). Cats seem to be habituated to checking under traps for catches. Cat scavenge rate on catches may significantly impact data recorded for A24s, making appropriate decision making difficult.
- Stoats were only recorded twice, and although stoats were at low densities across the region during the trial, it does not seem that A24s attract their interest in Makarora. A24s are unlikely to be an effective tool for controlling stoat numbers (subject to lure type) in Makarora.
- Only 1 hedgehog was spotted during the trial, although their numbers would be expected to be very low in the forested areas of the COLB trap network.
- The Chocolate and Meat Lovers lures were difficult to accurately compare in this trial, due to differences in sample, size, time, and trials being conducted back-to-back rather than simultaneously.
- Many A24 catches from the last years are from a small number of traps. These were largely on the Wonder Line, and to a lesser extent in Pipson Grid. However, habituated cats scavenging on catches could have a significant impact on recorded catch numbers here and elsewhere.
- Only 5 rats were caught on A24s outside of the Wonder Line - Pipson Grid area during the trial.
- When comparing overall catch rates per trap, A24s perform similarly or better to other trap types, especially if scavenging by cats is accounted for. However, most of these catches are mice, not a target species. Removing mice from catch rate per trap totals shows other traps have a higher catch rate than A24s.
- While mice are a pest species and it is useful to remove them from the area, the limited numbers being caught are not likely to have a significant impact on the population.
- A24s have a high maintenance cost for limited predator suppression, suggesting that how they are being used is not *good value for money*.
- The “Bisset Cages” may act a limiting factor for catches (at least of stoats) for the A24s, but this is hard to ascertain, and they are needed to remove the chance of non-target species being caught.

Recommendations

Based on the observations, statistical data from Trap NZ and the conclusions above, the following recommendations are made for better utilisation of the COLB A24 traps at Makarora:

- Only activate the majority of the A24 network at times of increased rodent numbers (taken from tracking tunnel data or catch rates from TrapNZ).
- Keep the Wonder Line A24s active as that line has the highest catch rate and the only line with a significant record of rat catches.
- Consider the implications and effort required to remove or replace the majority of the A24 network.
- Make a how-to guide for volunteers, giving more information on A24s and how best to service them and make them more appealing for predators.
- Do not use A24s to target stoats as they do not appear to interact with the traps (although camera monitoring at a time of increased stoat numbers may alter this)
- Given that a significant number of catches from A24s will be scavenged by cats, the impact of A24s is difficult to determine.

- Increase efforts to catch feral cats, as they are present across the trap network and will have a significant impact on biodiversity and data recording.
- Increase efforts to catch possums, as they are widespread, present in high numbers and neither A24s nor DOC200 traps are suitable for controlling their numbers (bearing in mind potential kea interference).
- Consider moving A24's that have had 0 catches since installation (23 have had 0 recorded catches in the last 3 years) to areas that have more rodent density based on TrapNZ catch data.
- Consider options for capitalising on high interaction rates by adding adjacent traps. A24s could be used as an additional lure for live-capture cage trapping.
- Continue using Goodnature® Chocolate lures for A24s as the Meat Lovers lure does not seem to give any benefit.

Acknowledgements

Thank you to Pete Lynds and Mo Turnbull for assisting with the installation of cameras and selection of locations. Thanks to Adie Lawrence for her massive effort scrolling through 1000s of photos when reviewing the data, and for removing the equipment at the end of the trial. A huge thank you to Mo Turnbull for an in-depth and professional editing process and for being an endless source of information, enthusiasm, and encouragement. And thank you to all the F&B COLB volunteers, committee members and SLS staff that make the trapping programme at Makarora not only possible, but also a huge success and a pleasure to be involved with.

References

Gillies C, Douglas-Withers K, Ward-Allen K, September 2021. Testing the effectiveness of native non-target mitigation measures for Goodnature® A24 self-resetting traps for rats & stoats.

Gallery

10. Rat.

11. Cat eating a rat (behind cage)

12. Cat scavenging on a caught mouse.

13. Mouse inspecting ping-pong ball in trap behind A24.

14. A rabbit spotted!!!

15. Rat on top of a cage.

16. Mouse on top of a cage.

17. Mouse during the day.

18. Mouse stretching towards the lure.

19. Deceased Mouse.

20. Cat arriving to scavenge on mouse catch.

21. Possum inspecting a gas cannister.

22. Possum piggy-backing.

23. Interested Possums.

24. Possum unscrewing gas cannister.

25. Dinner for three.

26. Mesmerised by that gas cannister.

27. A Cat checking for any catch.

28. Hedgehog strolling along.

29. Looking but not getting killed.

30. Reaching a long way in.

31. Still there!

32. Rifleman checking out the A24.

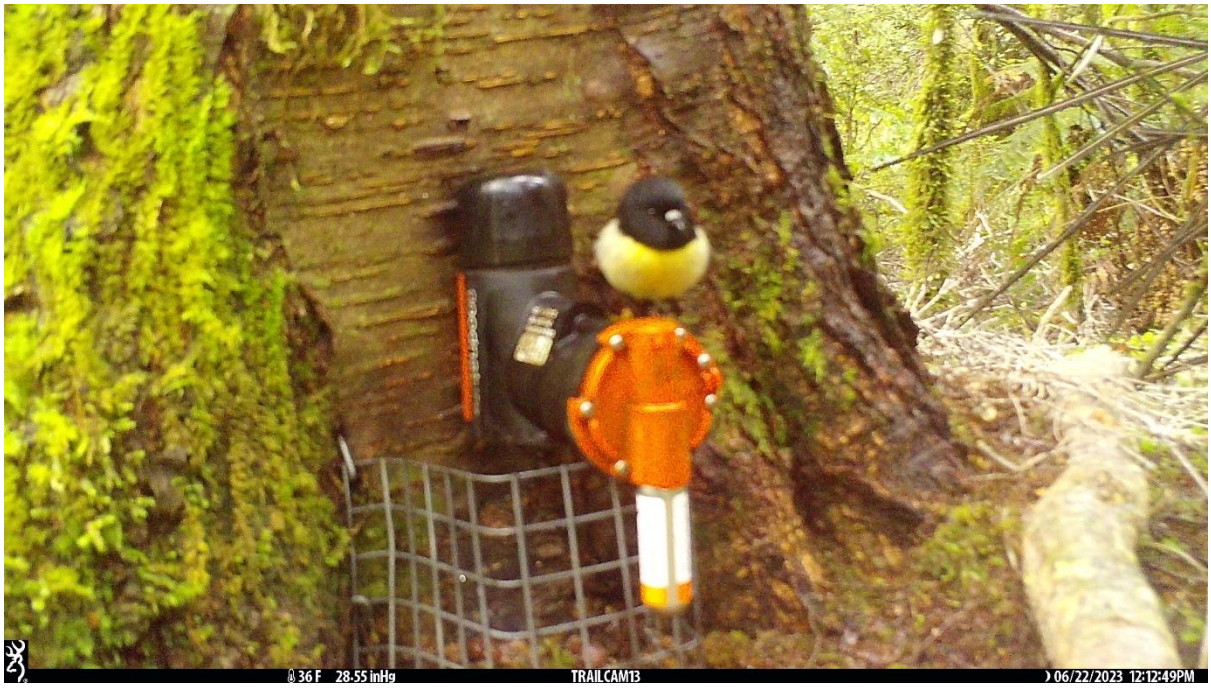
33. A feral cat doing its rounds.

34. Also curious about the camera. This looks like a different individual.

35. Cat reaching in for a meal.

36. A rat squeezing into the cage.

37. A rat checking out the lure.



38. A Tomtit enjoying a stable perch.

39. Rat!

40. Balancing Act

41. Possum unscrewing a gas cannister.

42. A stoat pauses briefly to consider an A24 before quickly moving on, in broad daylight.

43. Cat with mouse in mouth.