

AT220 Field Trial

A Review of the NZ Autotraps AT220 for Controlling Rats and Possums in Areas Over 250 Hectares

Bay Bush Action - Opuia State Forest - Bay of Islands

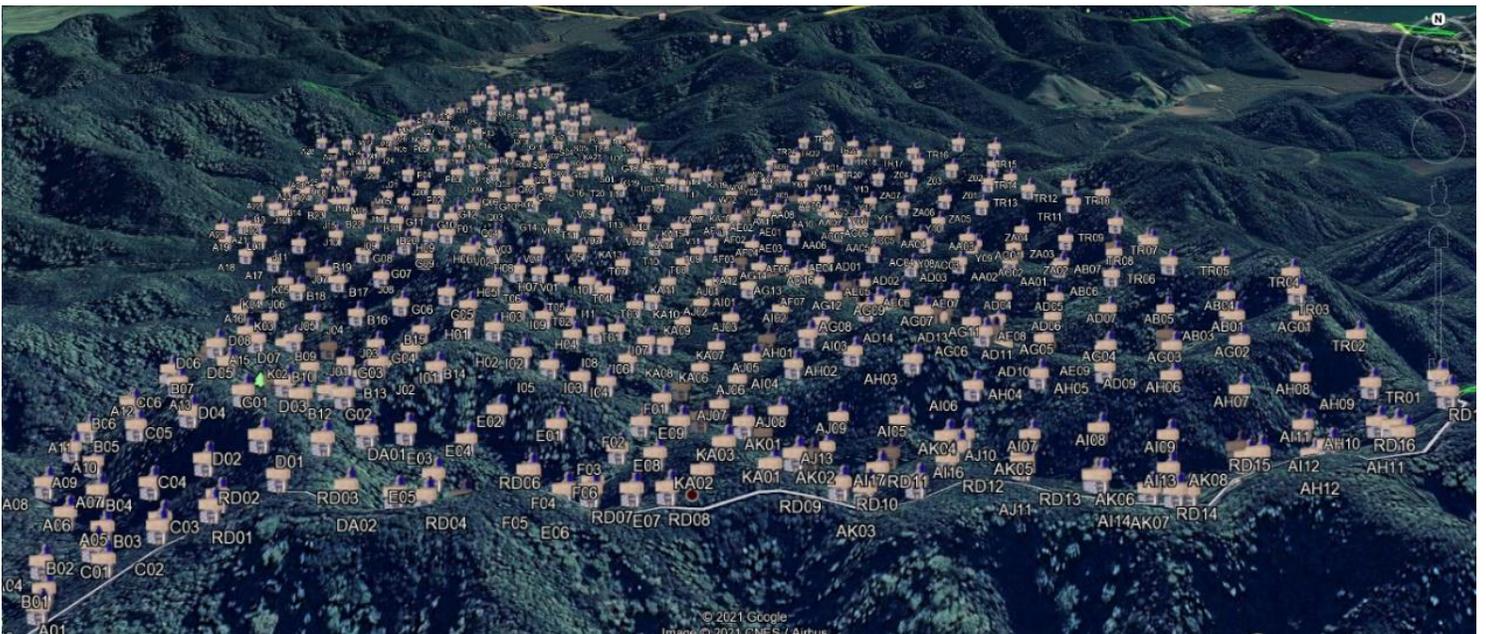
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Kia ora Koutou...

For years, while setting manual traps, we dreamed of a trap that re-baited itself. That's why when we heard about the AT220 we were so excited.

It was even better than we hoped. Not only did the trap keep re-baiting itself, and resetting itself, it also dealt to both possums and rats! It gets even better. Target animals didn't even have to bite down and pull on something - the trigger is an eye beam. Even a shy animal, just going in for a sniff breaks the beam and BANG, it gets hit. On top of this these traps turn off during the day, lessening the chance of by-kill. Because the traps are battery run and have a brain there are potentially lots of options which become available, and our hope is they will keep getting better into the future.

We knew they worked amazingly well on possums. One of the first AT220s we put up got 17 possums and 1 rat in just 7 nights. But the question was how did they go for rats? The key was to get a trap in every rat's territory. That meant a grid network of traps and after professional advice we settled on a 75x75m grid across 263h.

These traps were fairly new to the market. We received the first of version 2 of the traps. We expected there would be a few teething problems, and there were, but the result still blew us away! In just 3 months monitoring showed rats had gone from 46.6% to 3.3%, and, 6 months on, 0%. One year on, they were still 0%

In the control area, with no pest control for over 25 years, possum BMI numbers sat at an average of 93.3% over the span of the trial, however, in the AT220 area they dropped rapidly. After 1.5 months of the traps being active in the field the numbers dropped to 14.2% and reached 5.7% by the end of the trial. Although we did have a number of problems with the traps, many of these issues have been resolved and the new generation of version 2 is much improved on the earlier versions.

The team at NZ AutoTrap have been great to work with and to all the people who helped throughout the project, thank you. A special thanks to Hayden and Katie and Paul and Leslie, for allowing us on and access across their land. Also, a massive thanks to Craig Salmon for the use of his data collection, and work management system Job Complete and the App to go with it. And a special thanks to te hapū o Ngāti Kawa Ngāti Rahiri mō te tautoko. The forest is already showing signs of a comeback.

Ngahere Ora!
Brad Windust – Trustee, Bay Bush Action

Introduction...

Opuia Forest is a 2,000 hectare lowland coastal forest located behind Waitangi, Paihia and Opuia, in the Bay of Islands. It is public conservation land and home to at-risk species such as matuku, mokomoko, kakariki, pekapeka, ancient puriri, mātai, kauri, rimu and important wetlands. Since 2011, Bay Bush Action and volunteers have trapped around 250ha of the forest for rats, possums, cats and stoats.



To reach BBA's goal of 1,000 hectares of protection, it was clear we needed to embark on growing the managed area.

The NZ Autotraps AT220 Possum and Rat Trap is a self-resetting, self-re-baiting spring trap, which, once triggered, is reset automatically by a gear drive mechanism using a small electric motor. The motor is powered by a rechargeable battery pack.

Estimates on the NZ Autotraps website suggested the trap can last for up to 100 cycles and 12 months before needing a lure refill and battery change. Data is logged and can be accessed by computer or mobile phone. The features and

benefits of the trap offered solutions to several challenges presented by trapping pests over medium sized areas.

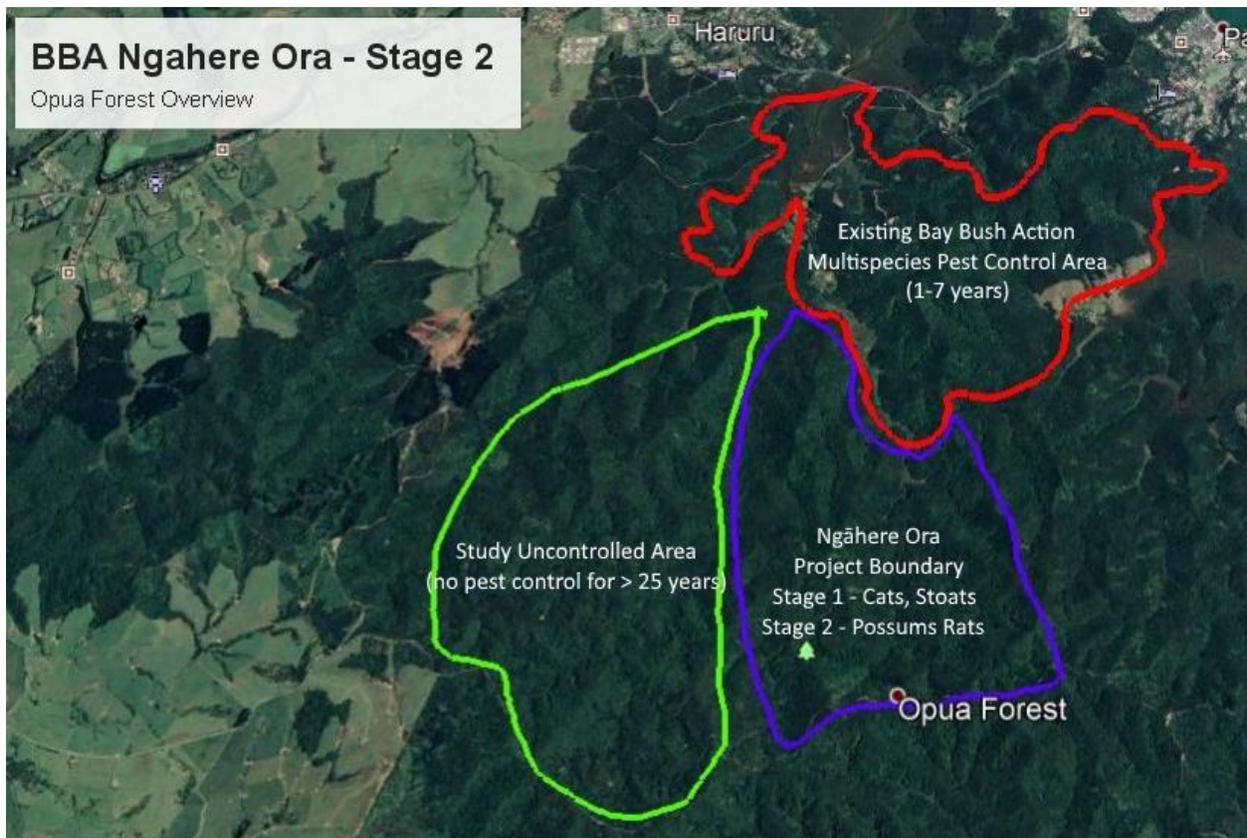
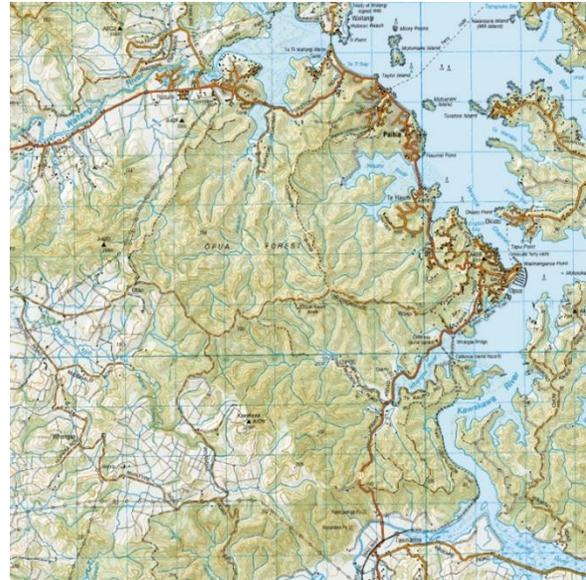
Following promising initial assessment, we designed the Ngahere Ora project - a one year field trial - to review the AT220 and its suitability as a multispecies trap for an area of 250 hectares. We sought to determine: 1) if the trap could achieve possum control to below 5% RTC or the equivalent 20% Bite Mark Index (BMI). 2) Below 5% tracking tunnel results for rats within 12 months of being installed; 3) the impact on the forest as a result of the project, and 4) the cost of set up and ongoing servicing and maintenance.



What We Did...

Field Trial Area

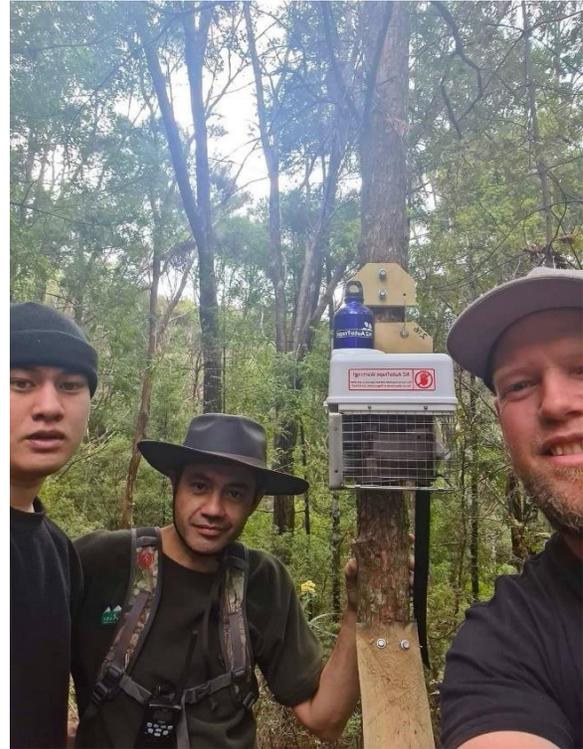
The field trial took place within the 263-hectare area marked by the purple Ngāhere Ora Project Boundary in the center of Opua Forest. On the northern boundary, was the existing Bay Bush Action manual trapping programme (active for 1-7 years). We set up a scientific “control area” to the west. Both the “control” area and the field trial area had been without pest control for more than 25 years placing it at “peak-possum”.



Installation

Traps were installed at a height of $>1.2\text{m}$, with ramps at a $>45^\circ$ angle. Each site was identified with a blue tag, marked with the site number. The traps were activated with factory settings.

For traps closer to public areas, security modifications were added.



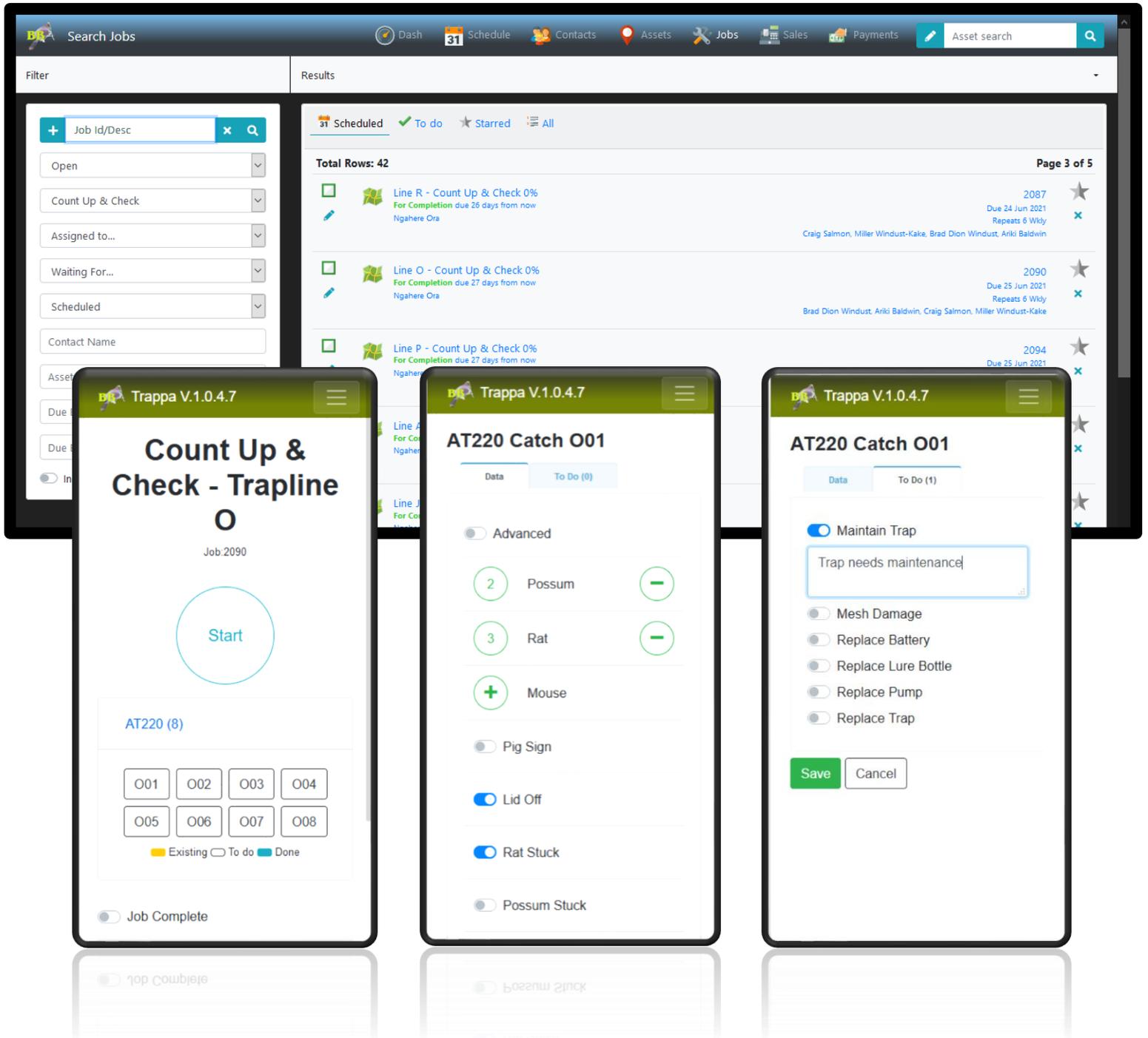
Servicing Interval

Throughout the course of the field trial the AT220 units were serviced 5 times. The lure and batteries were replaced as required, animals underneath the units recorded, any repairs that were possible in the field were undertaken and any additional maintenance noted, or, if trap replacement was required. The servicing and maintenance were scheduled and managed using the Bay Bush Action Trappa App which was developed inhouse by volunteers.

The project was originally planned to service the traps on a 6-week rotation. With the roll out of upgrades and COVID related delays, a 12-week service rotation was achieved.

Data Collection and Managing Maintenance

An existing cloud-based system called Job Complete, developed by associates of Bay Bush Action was provided for free as the back-end for the Bay Bush Action Trappa App. Using the App, workers, offline deep in the forest, could record their time and collect the data required for the field trial. The App collected catch information, triggers, problems with traps and recorded jobs for any repairs and maintenance, along with tracking Firmware and trap upgrades to the 533 traps. This data was synced to the cloud at the end of each work session along with time spent by each worker on each line.



Batteries

A battery recharge station was set up to charge batteries replaced during the servicing rounds. The field trial utilised 50 spare batteries (10%), with each one being replaced when flat or if the voltage dropped below 10V.



Monitoring

Count Up and Check

At each service of the AT220, trappers recorded the number of animal carcasses on the forest floor underneath the trap. These were marked with spray paint to avoid double counting and the numbers and species recorded in the Trappa app.



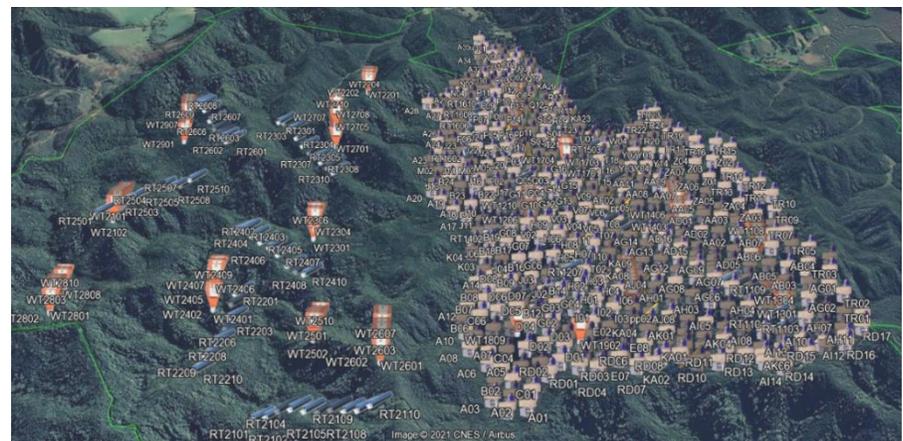
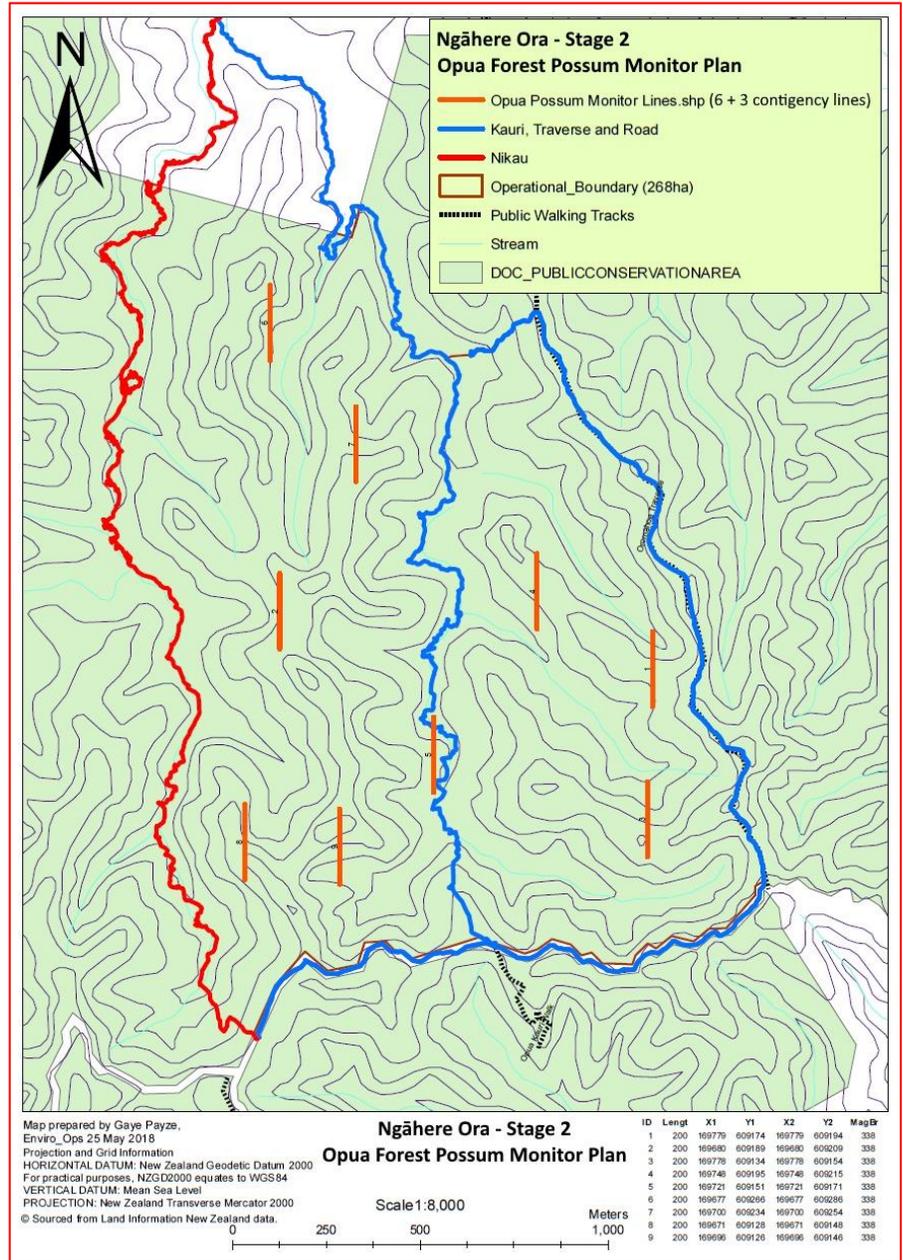


Photo Courtesy of Nga Manu Images

Possums

Wax tag Bite Mark Index (BMI) was used to measure the density of possums.

After initial pre-installation monitoring in November 2020, the monitoring was completed quarterly by Predator Patrol, over 7 lines with 10 wax tags per line in the AT220 area, and the same in an adjacent no-control area.



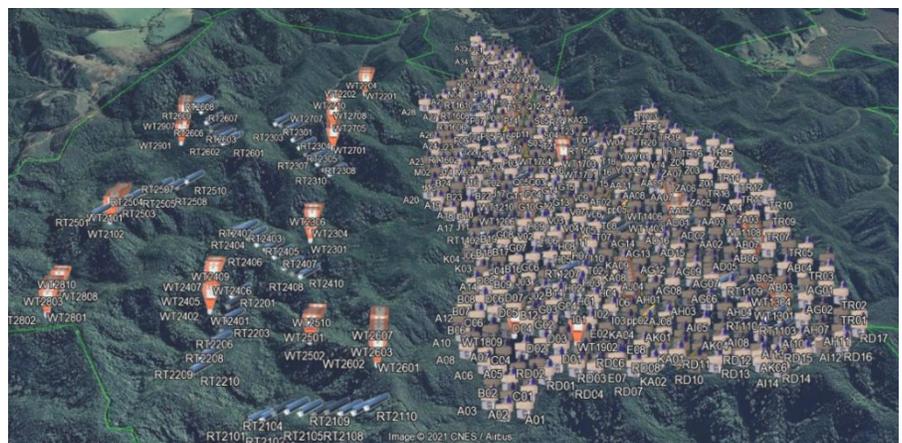
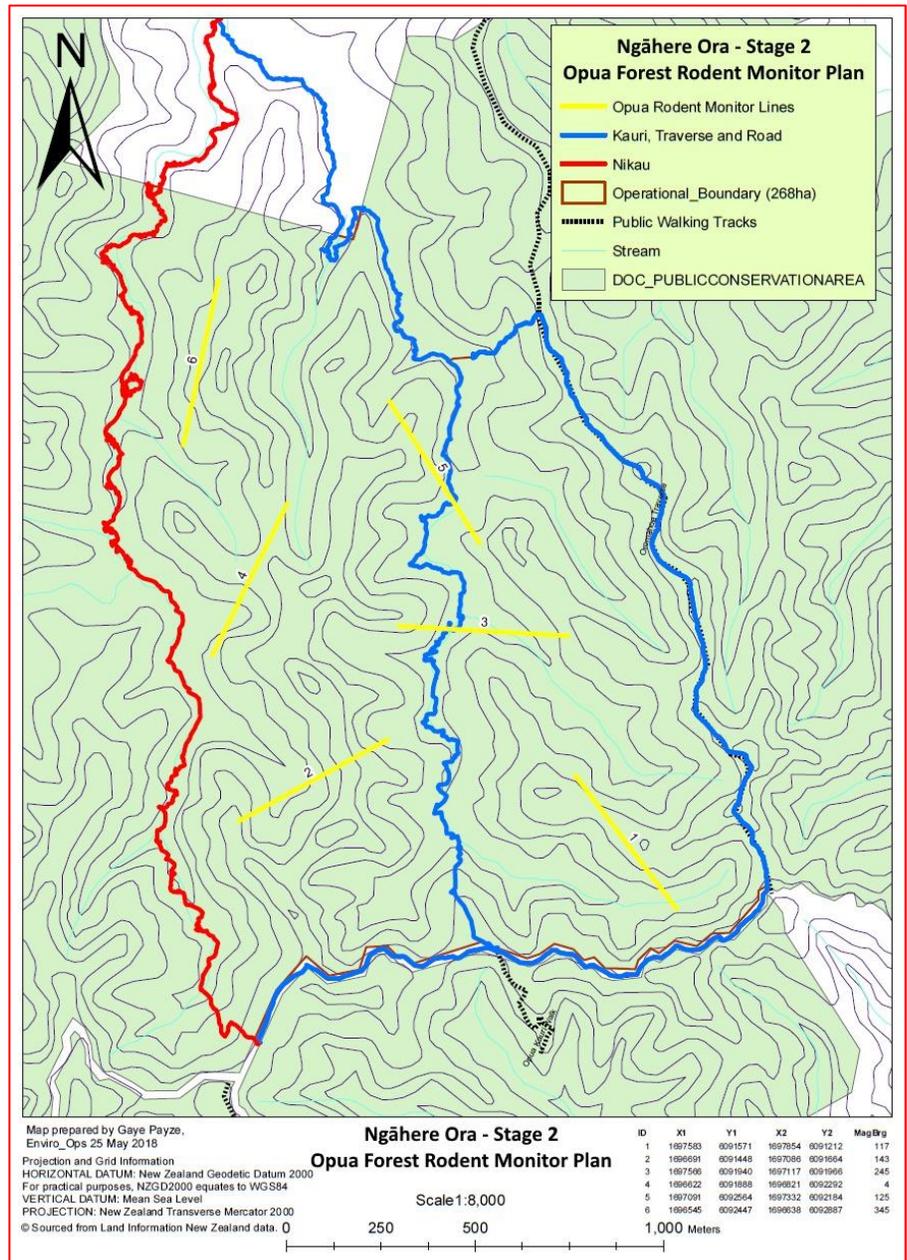


Rats

Tracking tunnels and cards were used to measure the density of rats before, during and after the trial.

After initial monitoring in November 2020, monitoring was completed at quarterly intervals by Predator Patrol.

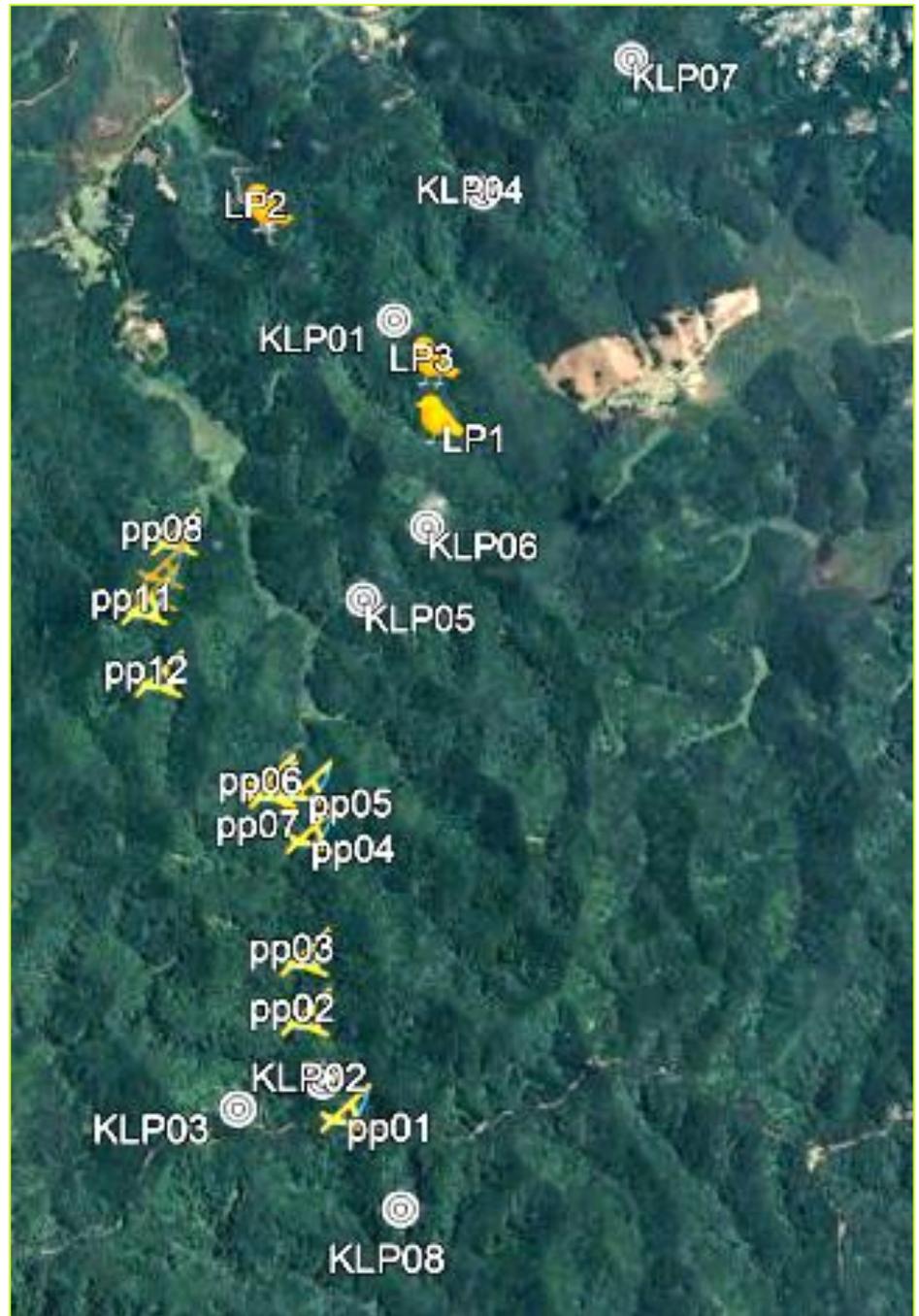
The percentage of monitoring cards with rat sign was recorded over 6 lines with 10 tracking tunnels per line in the Ngāhere Ora AT220 trial area, and the same in an adjacent area with no pest control.





Forest Measurements

Five Minute Bird Count Listening Points (LP), Annual Kiwi Listening Points (KLP) and Annual Time Lapse Photo Points (pp) were also set up and data recorded for the measurement of long-term impact.

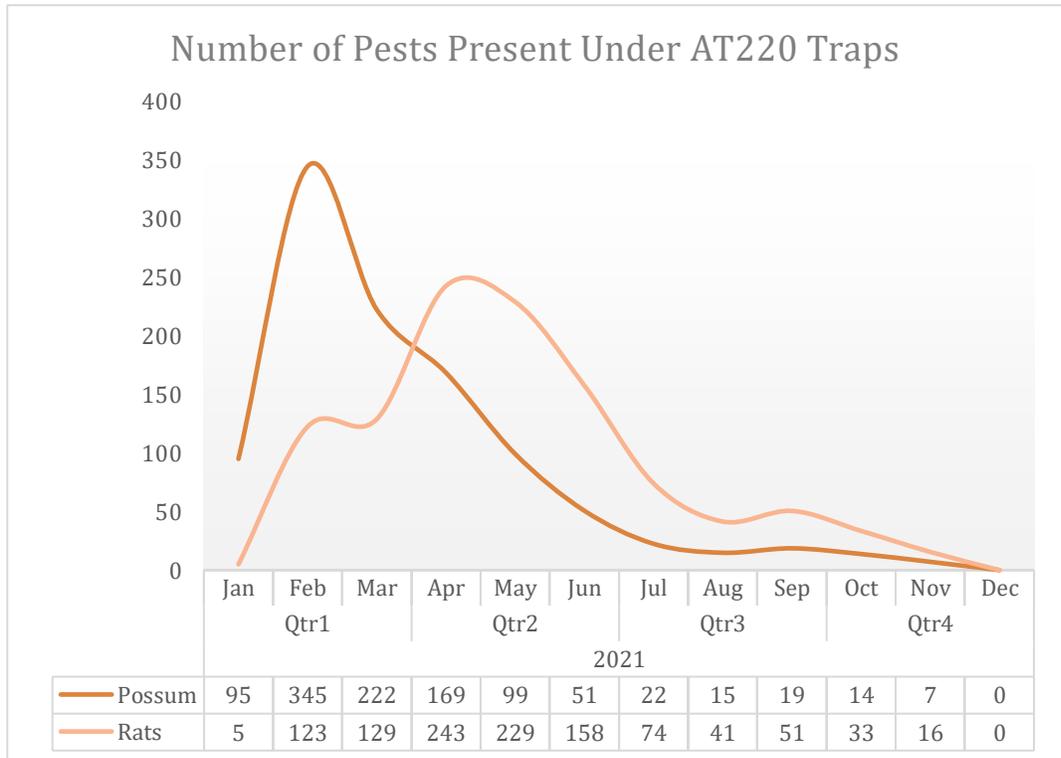




Results...

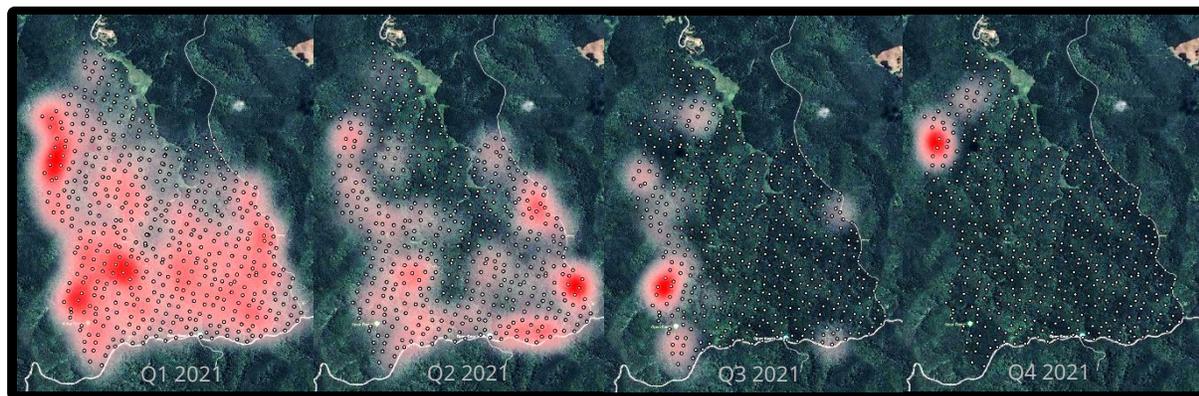
Count and Check

The number of possum and rat carcasses present under AT220 traps, counted, and recorded during servicing, decreased over the year, reaching zero in December 2021. A total of 1,102 rat and 1,058 possum carcasses were counted.

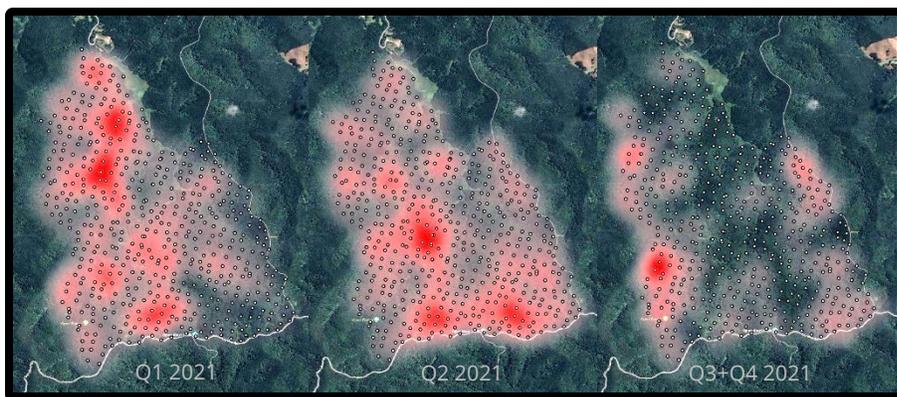


Distribution of Pests Present Under AT220 Traps

Possums



Rats



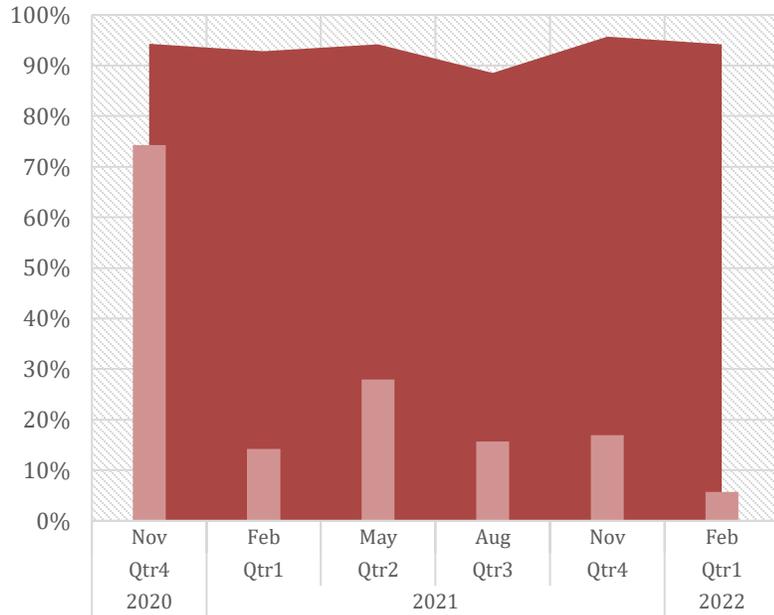
Initially, possum catches were distributed evenly across the AT220 trial area, apart from an approx. 300m strip in the northeast section of the area where lower catch rates were recorded. The lower density in the northeast is attributed to active pest management by Bay Bush Action volunteers in the adjacent area over the last 8 years.

As the trial progressed, higher densities of carcasses were recorded around the perimeter of the trial area. Traps located around the perimeter had higher servicing needs (batteries and lure) than traps towards the center of the trial area due to incursion activity.

ATs, due to their own data gathering, could also potentially be used as de facto monitoring tools.

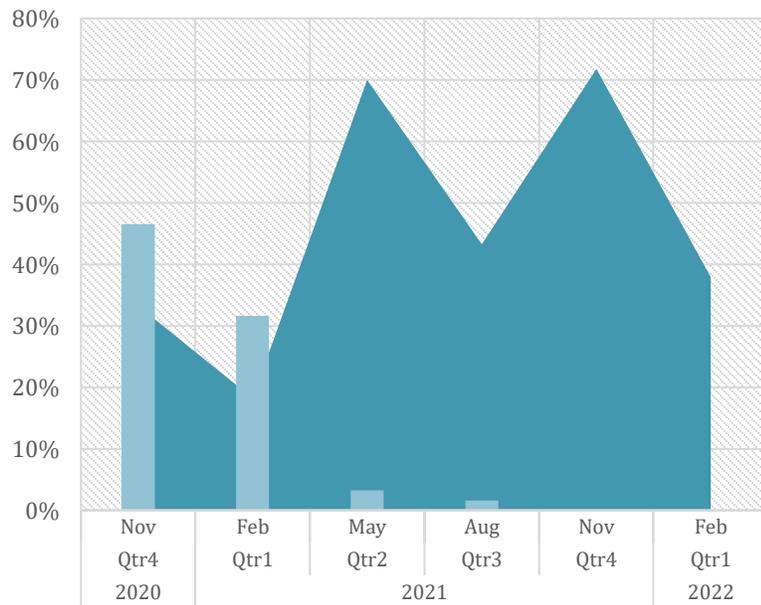


Possum Bite Mark Index (BMI)



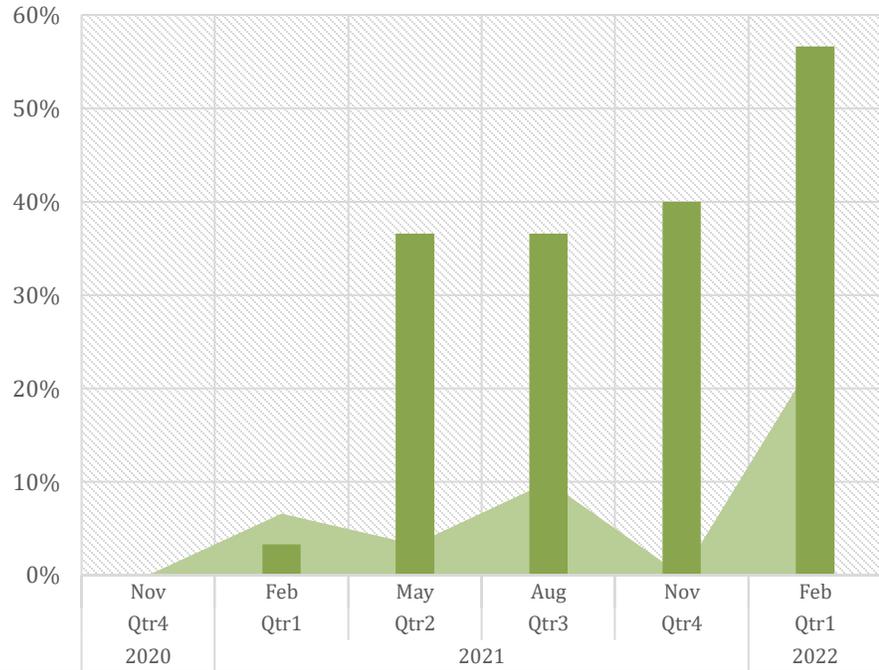
■ No Control - Bite Mark Index - Possum	94.30%	92.80%	94.20%	88.50%	95.70%	94.20%
■ AT220 - Bite Mark Index - Possum	74.30%	14.20%	28.00%	15.70%	17.00%	5.70%

Rat Tracking Tunnels



■ No Control - Tracking Tunnels - Rats	33.30%	18.30%	70.00%	43.30%	71.80%	37.90%
■ AT220 - Tracking Tunnels - Rats	46.60%	31.60%	3.30%	1.60%	0.00%	0.00%

Weta in Tracking Tunnels



No Control - Tracking Tunnels - Weta	0.00%	6.60%	3.30%	10.00%	0.00%	23.30%
AT220 - Tracking Tunnels - Weta	0.00%	3.30%	36.60%	36.60%	40.00%	56.60%

5MBC, Annual Kiwi Listening and Photo Points

There were no notable results observed 12 months post trap activation. These measurements will continue to be taken annually to monitor the long term impact on the ngahere.



What We Saw

There was a visible improvement in forest health with several indicator species making a comeback.



What It Cost...

Bay Bush Action Ngahere Ora Project Costs '000s

Cost	Project Spend	Volunteered / Donated	Total
Set Up	280.6	15.0	295.6
Track Cutting Labour	58.3		58.3
Equipment (Traps, Ramps, Tags, Sundry)	183.8	0.5	184.3
Installation Labour	38.6		38.6
Project Management	0.0	6.5	6.5
Asset/Job Management Software - Set Up	0.0	8.0	8.0
Project Servicing and Administration	33.9	1.1	35.0
Servicing	24.8		24.8
Consumables	5.5		5.5
Administration	3.6		3.6
Asset/Job Management Software - Annually	0.0	1.1	1.1
Independent Monitoring	51.7		51.7
Repairs and Upgrades	33.1	6.5	39.6
Grand Total	399.3	22.6	421.9

Set Up Summary

Project Area	268 hectares
Protected by	553 x AT220 Traps (533 x in field + 20 x spare traps in rotation)
Serviced with	58 kilometers of tracks
Set Up Total Cost	\$1,103 per hectare
Track Cutting Cost	\$1,005 per kilometer
Equipment	\$333 per trap (traps, batteries, ramps, tags, sundry)
Installation Labour	\$72 per installation
Project Management	130 hours
Software Set Up	\$8,000 per project

Ongoing Servicing Costs

The initial costs of servicing and administration are not reflective of what they will be ongoing. Upgrades to rectify issues with the original trap specifications and COVID related delays meant that the traps were not able to be serviced on a 6 weekly rotation as planned.

We estimate the ongoing costs to be \$6,200 per service round, or roughly \$11.63 per trap, per round including lure, labour, administration, software costs and some basic in field repairs.

A replacement program will need to be put in place for when traps reach the end of their serviceable lifespan. This will be driven by the failure rate data we capture via Job Complete and the Trappa App.

AT220 Reliability...

AT220 Challenges and Improvements

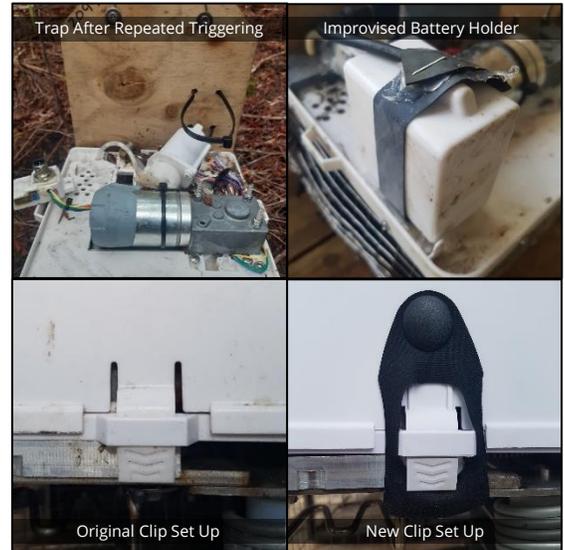
Lids Coming Off

Problem: The catches were not sufficient to secure the lid to the baseplate, allowing the lid to pop off when the trap was triggered.

With no lid, the battery would fall off and hang from its cable unsupported, pulling the microcontroller away from baseplate. The microcontroller eyes could then not see each other, and the trap triggered repeatedly, effectively destroying itself. Also, with no lid, mice and rats had access and gnawed on rubber lure lines.

BBA Remedial Work: To prevent the lids coming off, we used weed-mat staples to keep the lid on. Battery holders were improvised to prevent the battery from hanging if lid came off.

AutoTraps Fix: New improved lids with more secure fastenings were supplied by AutoTraps to resolve the issue.

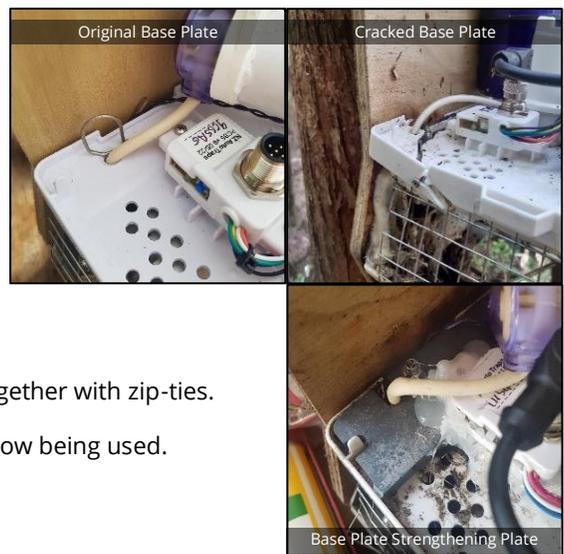


Base Plate Strength

Problem: The plastic used for the base plate did not stand up to the forces from the triggering of the trap. The fixing slots for the microcontroller were weak, allowing the microcontroller to break free of the baseplate. Area around the microcontroller and back of the trap prone to breaking. Area around the microswitches and gearings breaking.

BBA Remedial Work: We used silicone to embed the microcontroller screws; added a strengthening plate supplied by AutoTraps to the rear of the unit. We knitted other breakages together with zip-ties.

AutoTraps Fix: An alternative, much stronger plastic composite is now being used.



Rats Stuck

Problem: On occasions, dead rats were entering a rigor mortis state prior to the trap resetting and getting stuck in the trap frame after a kill. Sometimes this would interfere with the eye sensors.

BBA Remedial Work: Using sticks, we would spend some time trying to remove the rats.

AutoTraps Fix: A firmware change checked if the catch was small, resetting the trap within minutes of a kill.

Pumps Not Working

Problem: After 6-12 weeks, many pumps started to fail and could not be cleaned or restarted. It appears the lure would congeal and cause the pumps to become clogged and no longer start.

BBA Remedial Work: With a firm jiggling, the pumps would often free up the lure and the pumps would start working again. Within 6 months, the problem was on a scale large enough that AutoTraps supplied new replacement lure bottles and pumps for all 533 traps.

AutoTraps Fix: New type of pump and bottle set up to allow servicing/replacement.



Possum Damaging the Microswitch Trigger

Problem: On occasions, the claws of the possum would catch the microswitches, affecting the trap's ability to set and reset after a kill.

BBA Remedial Work: Installed possum guards progressively on traps during the trap-upgrade work.

AutoTraps Fix: Stainless steel possum guards retrospectively fitted.



Structural Strength of the Lure Bottle

Problem: On occasions, the aluminum lure bottles would get holes in them, this would lead to lure leaking out.

BBA Remedial Work: When required, used duct tape to fix holes in bottles. We were supplied with new bottles as part of the upgrade; however, issues were still occurring.

AutoTraps Fix: Move to stainless steel bottles.

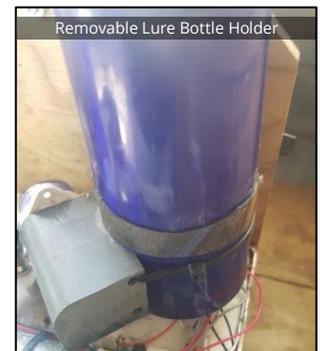


Lure Congealing

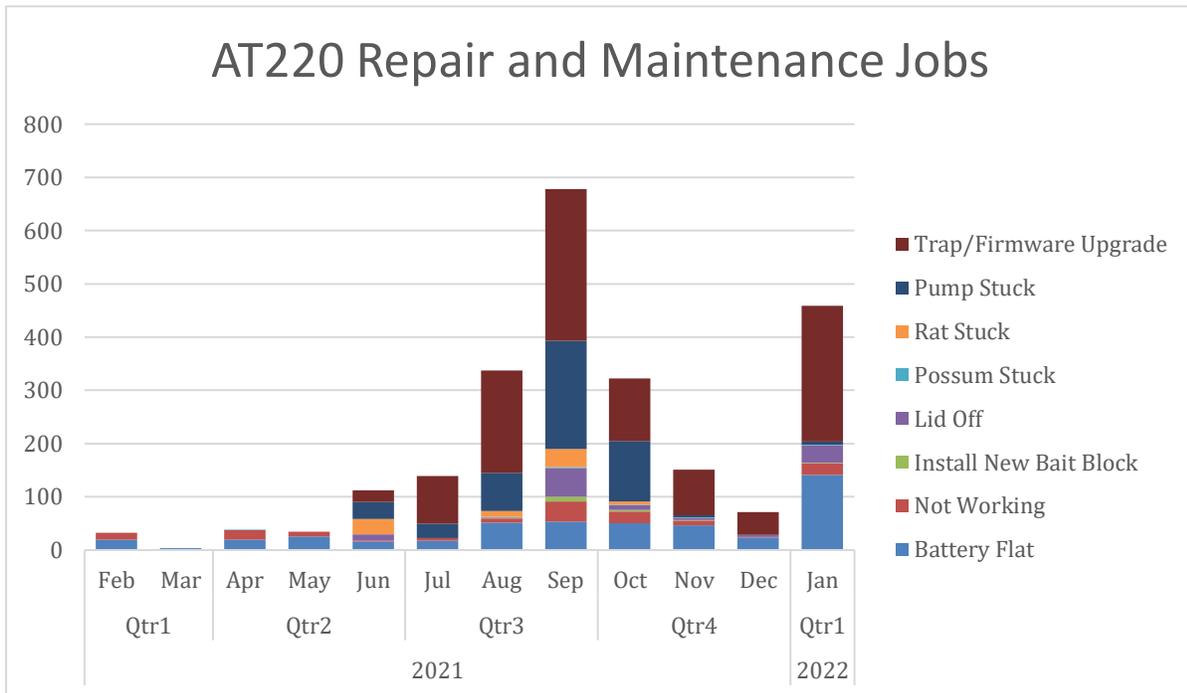
Problem: After 6-12 weeks, lure would sometimes coagulate and congeal, leading to blockages of the pump and lure lines.

BBA Remedial Work: The issue was extremely challenging on scale. The fix required the lure bottle to be removed from the pump and the unit, and a great deal of time taken to clean the old, congealed lure out. We are currently in the process of again swapping out the lure bottles and pumps on all of the traps as the time taken to clean lure bottles is excessive and not justified over installing a new one.

AutoTraps Fix: Oil additive. Investigation and trialing different lure recipes.



Repairs and Upgrades...



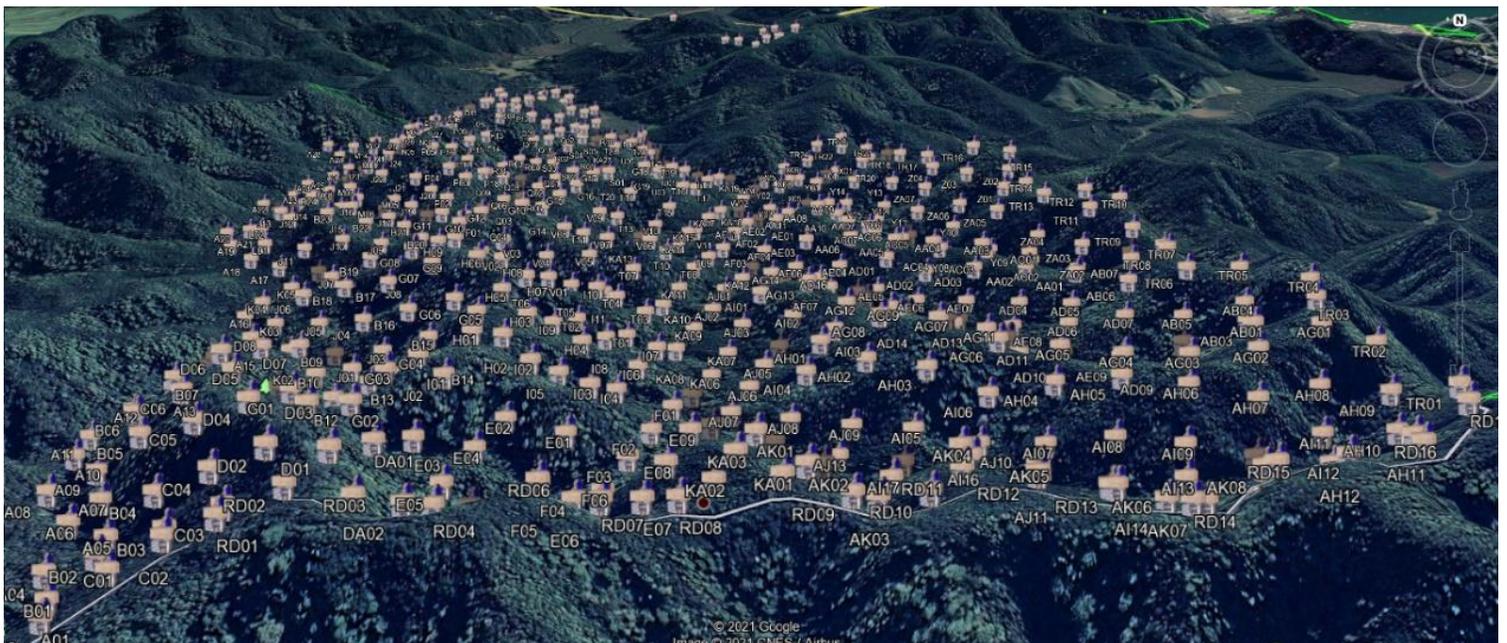
The first major challenges started arising with the traps around 3 months after they were activated in the field. Following a project wide firmware upgrade and repairs, the issues we have experienced to date have largely been resolved satisfactorily. We continue to work with NZ AutoTraps on the pump/lure issue and resolving other issues as they arise.



Recommendations...

Owners:

- 1) We recommend checking your AT220s every 2-3 months depending on pest density and how hard they are working. That's around 60 - 90 nights the traps are set with fresh bait ready for a pest. In comparison, our manually set possum traps are set with fresh bait for around 7 nights per month, and that's if they don't catch something.
- 2) We recommend that, because the current AT220 lure can become congealed, the bait bottle is only half filled, and a good amount of peanut oil is put in on top. Preferably the trap should be nearly out of lure by the time of the next check. The oil at the end seems to help clean the trap out ready for the next top-up. This is, at least until the bait recipe is improved, which is currently being worked on by NZ AutoTraps.
- 3) We highly recommend you use 2 x AT220's per hectare to control both possums and rats.





A Final Word...

The whole planet is currently running a marathon. It's a marathon to overcome the twin challenges of climate change and biodiversity loss. Both are now intimately intertwined, but, at the same time, they are different in their causes and their solutions. Frustratingly, as a nation we still seem to prioritise roundabouts over ruru, motorways over miromiro. This. Must. Change.

The solutions to these twin challenges will take all the ingenuity and tools in the kete. The field trial was about embracing and testing that ingenuity to see if the AT220 belongs *in* that kete.

The results of the trial have been beyond what we had hoped, but the challenges in scaling up the use of this trap were more than we had counted on. The project needed solutions to be devised, software to be developed and, as our ngahere toa can attest, it still required sweat to be shed. Though, rising to that challenge and overcoming many of the difficulties to achieve such spectacular results made it all worthwhile.

Huge ups to the team at NZ AutoTraps along with donors, volunteers and workers for helping be a part of the solution. And special thanks to Peggy Burbank for navigating the dreaded funding applications for us. I believe the AT220, with continual improvements, has a great future and has earned its place in the kete.

In 2050 I'll be 77. We'll know then whether all that ingenuity, time, volunteer hours, donations and funding won the marathons started 35 years earlier. After this past 2 and a half years, I still have hope it will.

Kia ora!
 Craig Salmon
 Chair, Bay Bush Action Trust

Contributors to Ngahere Ora

Together with donations from the public, the following organisations made a significant contribution and without all our supporters the project would not have been possible:



Department of Conservation
Te Papa Atawhai



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Tāmaki ō Tai Tokerau*



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