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Operational Report for Norway rat, Possum, Ship rat Control in the Wet Jacket Peninsulas

20 Jun 2020 - 27 Jun 2020

9(2)(a), 9(2)(g)(ii)
23/11/2020
Department of Conservation
Te Anau

Contents

1. Operation Summary

Operation Name Norway rat, Possum, Ship rat Control in Wet Jacket Peninsulas
Operation Date 20 Jun 2020 - 27 Jun 2020
District Te Anau **Region:** Southern South Island
Pestlink Reference 2021TEA01
Field Trial -
Treatment Area Wet Jacket Peninsulas **Size (ha)** 37283.00

Conservation Unit Name(s)	GA Id(s)
Fiordland National Park	2801633

Treatment Block Details

Treatment Blocks	Size (ha)	Grid Ref	GIS Ref
Wet Jacket Peninsulas	37283.00	CE05 23300 32593	

Contact Name 9(2)(a), 9(2)(g)(ii)
Contractor Name CWAC
Contractor Phone Number 0276598220
Performance Based ? -

Treatment Dates	Start	Completion
Wet Jacket Peninsulas	20 Jun 2020	27 Jun 2020

Target Pest Details

Treatment Blocks	Target Pests	Control Method	Name
Wet Jacket Peninsulas	Norway rat, Possum, Ship rat	Pesticide Aerial	Pesticide - Aerial in Wet Jacket Peninsulas-(2)

Conservation Outcome(s)

The main objective of this operation is to provide learnings for an adaptive management program of Southern Fiordland tokoeka (SFT). Matching kiwi outcomes to results from an

aerial 1080 operation will inform what is required for a successful management regime that may then be applied at other sites, allowing the sustainable conservation of the species throughout its range. There are three main outcomes for the 2020 Wet Jacket Peninsulas operation: 1. Increased chick recruitment of Southern Fiordland tokoeka (SFT) (Apteryx australis australis) enables the SFT population in the operational area to increase in the 2020/21 season. 2. The efficacy of 1080 to protect SFT on large Fiordland peninsulas is tested, including quantifying net population growth expected in the treatment year (T) and the following two seasons (T+1, T+2). 3. Ecosystems are protected and restored against the pressures of rats, stoats, and possums.

Result Target(s)	Treatment Area/Block	What we got
• 1. One-month post-operation, stoat tracking is 0% on the 21-day stoat survey run on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn.	Wet Jacket Peninsulas	0%
• 2.	Wet Jacket Peninsulas	n/a
• 3. In years T+1 and T+2 an index of stoat abundance is gained from 21-day stoat survey runs on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn	Wet Jacket Peninsulas	n/a

Outcome Targets	What we got
• The Shy Lake Southern Fiordland chick recruitment study will be the outcome monitoring used for this operation. Details and reports of the Shy Lake study can be found on the SOIK Fiordland homepage (DOC-5491418). 1. In the 2020/21 breeding season, 40% of SFT kiwi chicks monitored at the Shy Lake study site reach safe weight.	Unknown at the time of writing
• 2. In the two breeding seasons after a 1080 operation (T+1, T+2) it is learned what proportion of SFT chicks monitored at the Shy Lake study site reach safe weight.	
• 3. Recruitment and survival of kiwi chicks in the treatment year and two years following (T, T+1, T+2) is greater than estimated yearly adult and	

subadult mortality (combined) indicating population growth. Annual mortality measured in transmitter years through the Skyranger system.

2. Introduction

2.1 TREATMENT AREA

Animal pest species

Common Name	Scientific Name
Mouse	Mus musculus
Norway rat	Rattus norvegicus
Ship rat	Rattus rattus
Stoat	Mustela erminea
Possum	Trichosurus vulpecula

Non-target species

Common Name	Scientific Name
Red deer	Cervus elaphus scoticus
Moose	Alces alces andersoni

Target benefit species

Common Name	Scientific Name
southern Fiordland tokoeka	Apteryx australis "Southern Fiordland"
kea	Nestor notabilis
South Island kākā	Nestor meridionalis meridionalis
southern Fiordland tokoeka	Apteryx australis "Southern Fiordland"
bellbird	Anthornis melanura
rock wren	Xenicus gilviventris
southern falcon	Falco novaeseelandiae "southern"
South Island robin	Petroica australis australis
South Island fantail	Rhipidura fuliginosa fuliginosa
New Zealand pigeon	Hemiphaga novaeseelandiae
morepork	Ninox novaeseelandiae novaeseelandiae
tomtit	Petroica macrocephala
grey warbler	Gerygone igata
brown creeper	Mohoua novaeseelandiae
weka	Gallirallus sp.
-	Acanthisitta chloris

Threatened species

Common Name	Scientific Name

southern Fiordland tokoeka	Apteryx australis australis
rock wren	Xenicus gilviventris
kea	Nestor notabilis
South Island kākā	Nestor meridionalis meridionalis

Concurrent pest operation details

Concurrent pest operations	Contact Name	VPN	Contact Office

Geographical location

The Wet Jacket Peninsulas is situated 45 km East of Manapouri.

TREATMENT BLOCK DETAILS:

Treatment block	Wet Jacket Peninsulas
Vegetation type	The area contains a diversity of vegetation typical of central Fiordland and the Doubtful Ecological District. The area extends from the coast up to mountain tops. The most extensive vegetation is silver beech forest; however, this varies with altitude, slope, drainage and soils. Coastal silver beech forest has some rimu, miro, Halls totara and southern rata present in the canopy or emergent above. This forest tends to be rich in associated species. At moderate altitude silver beech is generally dominant but may contain some kamahi, rata and Hall's totara. With increasing altitude, the silver beech forest becomes stunted and locally grades into mountain beech. Also present at higher altitude and where the soils are thin and/or heavily leached pink pine becomes common generally with mountain beech and generally with some manuka, southern rata and sometimes with Halls totara, kamahi, celery pine and leatherwood. Within the forest there are areas of valley floor Carex wetlands wetland suc
Bioclimatic zone	alpine semi-coastal montane lowland sub-alpine sub-montane
Climate characteristics:	
Rainfall	3000 mm
Temperature:	**Average Summer** 12.0
	Average Winter 8.0
Snow level	1300 m
Altitude	0-1370 m
Community and Iwi interests	The immediate coastal vicinity surrounding the operational area is used by commercial and recreational fishers, by charter boat operators and recreational hunters. The public hut at Supper Cove is part of the Dusky Track.
Historic sites	Wet Jacket Arm was visited and named by members of Captain Cook's expedition on their 1773 exploration of the area.

2.2 MANAGEMENT HISTORY

Management history was not chosen to be shown in this operational report. This history is, however, available via Pestlink

3 Outcomes and Targets

3.1 CONSERVATION OUTCOMES

The main objective of this operation is to provide learnings for an adaptive management program of Southern Fiordland tokoeka (SFT). Matching kiwi outcomes to results from an aerial 1080 operation will inform what is required for a successful management regime that may then be applied at other sites, allowing the sustainable conservation of the species throughout its range. There are three main outcomes for the 2020 Wet Jacket Peninsulas operation: 1. Increased chick recruitment of Southern Fiordland tokoeka (SFT) (Apteryx australis australis) enables the SFT population in the operational area to increase in the 2020/21 season. 2. The efficacy of 1080 to protect SFT on large Fiordland peninsulas is tested, including quantifying net population growth expected in the treatment year (T) and the following two seasons (T+1, T+2). 3. Ecosystems are protected and restored against the pressures of rats, stoats, and possums.

3.2 TARGETS

3.2.1 Result Targets

The result targets for the treatment area were:

- 1. One-month post-operation, stoat tracking is 0% on the 21-day stoat survey run on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn.
- 2.
- 3. In years T+1 and T+2 an index of stoat abundance is gained from 21-day stoat survey runs on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn

3.2.2 Outcome Targets

The outcome targets for the treatment area were:

- The Shy Lake Southern Fiordland chick recruitment study will be the outcome monitoring used for this operation. Details and reports of the Shy Lake study can be found on the SOIK Fiordland homepage (DOC-5491418). 1. In the 2020/21 breeding season, 40% of SFT kiwi chicks monitored at the Shy Lake study site reach safe weight.
- 2. In the two breeding seasons after a 1080 operation (T+1, T+2) it is learned what proportion of SFT chicks monitored at the Shy Lake study site reach safe weight.
- 3. Recruitment and survival of kiwi chicks in the treatment year and two years following (T, T+1, T+2) is greater than estimated yearly adult and subadult mortality (combined) indicating population growth. Annual mortality measured in transmitter years through the Skyranger system.

4 Consultation, Consents & Notifications

4.1 CONSULTATION

Consultation on effects was initially undertaken by DOC with our Treaty partners, major stakeholders, and concessionaires with further consultation being undertaken by the contractor. Notification was undertaken by the contractor to a wider audience of users of the area. Due to the operation being delayed twice, once in 2019 and again due to Covid-19 in 2020 consultation and communication was a little stuttered. This was overcome in the lead up to the operation in June 2020. Concessionaire lists were updated also, to capture nay new concessionaires.

Consultation outcomes

Iwi were supportive with no concerns or issues raised. Other stakeholders were generally supportive. After consultation with commercial cray fishermen a setback around areas where they coffed their pots was put in place to alleviate any perceived concerns for foreign markets of 1080 entering the food chain via the water.

Lessons learned

Undertake consultation as early as practicable. Keep Treaty partners and major stakeholders engaged and updated throughout the process, especially where the operation is complicated and may be delayed.

4.2 CONSENTS

Consent	Consent date	File Reference	Permission ID
Public Health South	22/04/2020	DOC-6289929	20/04/SAM/DUNPH
DOC	03/06/2020	DOC-6158130	6158130

Lessons learned

Always allow more time than you think you will need!

4.3 NOTIFICATION

Notification before and after the operation was undertaken be the contractor including phone calls and discussions, emails and text messaging plus public newspaper advertisements

Lessons learned

At the notification stage prior to prefeed one concessionaire did know the operation taking place and was close to the operational area during the drop. This was through no fault of our systems. They received the notification but it was not passed onto the skipper who was in the Wet Jacket area by their shore staff. For future operations we will consider different methods from email and phone that may enable us to get the message to remote stakeholders e.g. using marine radio channels to communicate to all vessels/people in the vicinity. For future operations we will consider better processes for confirming notifications are received.

5 Methods

5.1 TARGET SPECIES

Treatment Block Wet Jacket Peninsulas

Control method	Name	Target pest species
Pesticide - Aerial	Pesticide - Aerial in Wet Jacket Peninsulas-(2)	Possum Norway rat Ship rat

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Treatment Block	Control Method	Name	Target Pest Species
Wet Jacket Peninsulas	Pesticide - Aerial	Pesticide - Aerial in Wet Jacket Peninsulas-(2)	Possum Norway rat Ship rat

Trade name of pesticide 0.15% 1080 Pellets RS5 Orillion
Name of pesticide Sodium fluoroacetate
Type of bait Cereal pellet
Toxic loading 1.5 g/kg
Bait quality sampling Not Conducted

Bait Details

	Pre-feed	Toxic
Bait type	Cereal pellet	Cereal pellet
Lure/ mask/ deterrent	Cinnamon	Cinnamon
Lure/ mask/ deterrent	0.15%	0.30%
Dye	None	Green
Individual Bait Weight	6.0g	6.0g

Sowing Rate Details

Pre-feed				Toxic			
Date	**Rate(kg/ha)**	**Wind Speed**	**Direction**	**Date**	**Rate(kg/ha)**	**Wind Speed**	**Direction**
20/06/2020	1.50	Calm	East	26/06/2020	1.50	Calm	East
21/06/2020	1.50	Calm	East	27/06/2020	1.50	Calm	East
22/06/2020	1.50	Calm	East				

Time between pre-feed and toxic 4
End of Caution Period Date -
Aircraft type Jet Ranger
LongRanger
Squirrel AS 350
Other
Number of Aircraft 7
Sowing gear details

Description	Capacity
-	0 kg

Type of navigational guidance system used TracMap
Loading Method -

Complaints and Incidents

No complaints or incidents to report

Other Details about this method

-

Deviations from planned operation

-

Lessons Learned

-

5.2 ENVIRONMENTAL EFFECTS

5.2.1 Effects on Non-Target Species

Kea were radio-tagged in the lead up to this operation. A total of 21 had been radio tagged in the 18 months leading up to the operation but only 6 were able to be successfully tracked through the operation. The others radio transmitters were in mortality mode BEFORE the toxic operation took place. It is thought they were either killed by predators, or their transmitters fell off or failed.

Performance standard(s)	Followed ?	Monitored ?
Kea COP	Yes	Yes

Effectiveness of performance standards

The Kea COP was followed.

Bykill of non-target species

3 of 6 radio tagged kea monitored in the operational area were found to have died from 1080 poisoning. This information was entered into the Vertebrate Pesticides Residue Database

5.2.2 Effects on Soil and Water Quality

Perception of 1080 entering marine environment and affecting commercial crayfish market

Performance standard(s)	Followed ?	Monitored ?
DOC initiated setbacks from coast	Yes	Yes

Effectiveness of performance standards

No bait was allowed to enter the marine environment

5.2.3 Effects on Ecosystems

The ecosystem is expected to benefit by the reduced numbers of possums, rats and stoats.

Performance standard(s)	Followed ?	Monitored ?
Consents	Yes	Yes

Effectiveness of performance standards

A successful operation was carried out and the performance standards met.

5.2.4 Effects on Human Health

Those working on the operation may be exposed to the toxin, especially from dust whilst loading the hoppers. This risk was managed by the contractors CWAC under their H&S plan.

Performance standard(s)	Followed ?	Monitored ?
Consent conditions	Yes	Yes

Effectiveness of performance standards
Managed by contractors

6 Monitoring Results and Outcomes

6.1 RESULT MONITORING - TARGET SPECIES

Result target(s)

1. One-month post-operation, stoat tracking is 0% on the 21-day stoat survey run on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn.
2.
3. In years T+1 and T+2 an index of stoat abundance is gained from 21-day stoat survey runs on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn

6.1.1 Target Species Monitoring Method: **Tracking tunnels**
Species monitored Stoat - Mustela erminea in Wet Jacket Peninsulas
Monitor method details
21 night tracking tunnel survey
Deviations
n/a
Target pest result details

	Pre	During/Post
Monitoring dates	05/05/20	04/08/20
Results	22%	0%

Result target met? Yes
Lessons Learned
Stoat numbers can be reduced through secondary poisoning when rodent numbers are tracking low. In the preceding 18 months rat numbers never tracked above 5% for this operation

6.1.2 Target Species Monitoring Method: **Other**
Species monitored Stoat - Mustela erminea in Wet Jacket Peninsulas
Monitor method details
Trail cameras on monitored kiwi nests to record stoat presence/absence
Deviations
n/a
Target pest result details

	Pre	During/Post
Monitoring dates	2017-2019	2020-2021
Results	90%	n/a

Result target met? Monitoring incomplet
Lessons Learned
n/a

6.1.3 Target Species Monitoring Method: **Tracking tunnels**
Species monitored Stoat - Mustela erminea in Wet Jacket Peninsulas
Monitor method details
21 night tracking tunnel surveys
Deviations

n/a

Target pest result details

	Pre	During/Post
Monitoring dates	n/a	n/a
Results	n/a	n/a

Result target met? Monitoring incomplet

Lessons Learned

n/a

6.2 RESULT MONITORING - ENVIRONMENTAL EFFECTS

6.2.1 Non Target Species

Monitoring of: **Kea**

Monitor Method details

Followed Kea COP for aerial 1080 operations

Deviations

NA

Monitoring dates Post op

Results 3 of 6 radio-tagged kea were found to have died from 1080 poisoning

Lessons Learned

Operations at remote, first time treated sites do not necessarily result in good results for kea as previously thought. More active research into the kea issue is required

6.2.2 Soil and Water Quality

Monitoring of:

Monitor Method details

No monitoring of soil and water quality took place

Deviations

NA

Monitoring dates NA

Results NA

Lessons Learned

NA

6.2.3 Ecosystems

Monitoring of: **Compliance with TNM Best Practice**

Monitor Method details

TNM Best Practice

Deviations

None

Monitoring dates 26-27/06/2020

Results NA

Lessons Learned

NA

6.2.4 Human Health

Monitoring of:	**PPE use**

Monitor Method details

Observance of operation throughout the day(s)

Deviations

NA

Monitoring dates	26-27/06/2020
Results	Operation completed within the best practice

Lessons Learned

NA

6.3 OUTCOME MONITORING

Outcome targets

The Shy Lake Southern Fiordland chick recruitment study will be the outcome monitoring used for this operation. Details and reports of the Shy Lake study can be found on the SOIK Fiordland homepage (DOC-5491418). 1. In the 2020/21 breeding season, 40% of SFT kiwi chicks monitored at the Shy Lake study site reach safe weight.

2. In the two breeding seasons after a 1080 operation (T+1, T+2) it is learned what proportion of SFT chicks monitored at the Shy Lake study site reach safe weight.

3. Recruitment and survival of kiwi chicks in the treatment year and two years following (T, T+1, T+2) is greater than estimated yearly adult and subadult mortality (combined) indicating population growth. Annual mortality measured in transmitter years through the Skyranger system.

No monitoring of outcomes was undertaken

7 Costs

GL Account	Description	Actual Costs	Notes
62372	Full cost	$1,735,588.37	
		$0.00	
Total		$1,735,588.37	

8 Recommendations

8.1 FUTURE MANAGEMENT AT THIS TREATMENT AREA

Future management at this site will be guided by the outcome monitoring of kiwi survivorship. The results from this operation will provide information to assist in guiding future management in the western Fiordland area

8.2 GENERAL RECOMMENDATIONS

Careful consideration should be given to aerial predator control in non-mast years.

9 Acknowledgements

Thank you to the people below who have contributed to the operation or have supplied information for the writing of this report. Thanks to Contract Wild Animal Control Ltd staff for assisting with planning and delivering the operation

The following DOC staff were involved

Name	Position	Office
[redacted]	Operations Lead Predator Control	Te Anau
	Regional Lead Battle for our Birds	Invercargill
	Logistics Lead Tiakina Nga Manu	Hokitika
	Senior Ranger/Supervisor Biodiversity	Te Anau
	Ranger	Te Anau
	Permissions Advisor	Dunedin
	Operations Planner Kiwi	Nelson
	Operations Lead Tiakina Nga Manu	Invercargill
	Tiakina Nga Manu Officer	Christchurch
	Geospatial Information Analyst	Christchurch
	Tiakina Nga Manu Administrator	Hokitika
	Logistics Support Officer Tiakina Nga Manu	Hokitika
	Ranger Biodiversity	Te Anau
	Principal Ranger Biodiversity	Te Anau
	Operations Manager	Te Anau

10 Approval

This operational report was approved by [redacted], Operations Manager, on 23 Nov 2020

11 References

Work Plan

Operational Plan -- DOCCM 6278538

AEE

Part of DOC application

Application for DOC consent to use pesticide

DOCCM - 6158336

Communication record

DOCCM - 5610688

Result monitoring details

See DOC Monitoring database for post op monitoring

Bait and carcass monitoring report

TBA

Outcome monitoring report

TBA

Other references

Operation homepage DOCCM - 5609808

Save Our Iconic Kiwi – Fiordland
2020-21 Annual Report

Written July 2021 by 9(2)(a), 9(2)(g)(ii)

Contents

Context

A sample population of southern Fiordland tokoeka is being monitored at Shy Lake, between Wet Jacket Arm and Breaksea Sound in western Fiordland. The goal is to determine if aerial 1080 alone can control stoats to a level where tokoeka populations can average a significant population growth over the control cycle period; and what the timing of that period should be. This will then be used to inform expanded pest control to increase Fiordland tokoeka populations in other areas. Basic behavioural and biological information is also being collected for the first time for the southern Fiordland tokoeka taxon. This report focuses on the work at Shy Lake and gives a brief outline of other SOIK work in Fiordland in the 2020-21 financial year. For more context on Save Our Iconic Kiwi and the rationale for the work in Fiordland, see the SOIK Implementation Plan 2018-2022 (DOC-5538590). For the previous report on the first two seasons at Shy Lake, see DOC-3227231 and DOC-6028979. For further information on anything in this report, contact 9(2)(a), 9(2)(g)(ii) at the DOC Te Anau office.

This was the fourth season of recruitment monitoring at Shy Lake, but the first after the 1080 operation that took place in June 2020. This year saw the first chicks of the project to survive to the 6-month / 1 kg thresholds usually used to determine safety from stoat predation.

Nesting 2020-21 season

Adult males were fitted with transmitters carrying Wildtech Ltd's Chick Timer Haast v4.4 software. Females carried Wildtech's GSK Diagnostic v2.0 software. The Chick Timer appeared successful in almost all cases at determining the onset of incubation. One or two males have variable activity patterns and the software doesn't pick up on their incubation; in these cases it's also difficult to choose a reliable date from manual collection of the raw data. Overall the software does an excellent job and we now rely on it for all but the known difficult males.

See Appendix 1 for a map of the study area and this season's nests.

First clutch eggs were laid between approx. 8 July and 1 September. Second clutch eggs were laid between 29 October and 17 December. 75 days was used as the estimated incubation period, with predicted first emergence of the chick from the nest a further 5 days later. Without having cameras in the nest, we don't know exactly how accurate our hatch date estimates are; however the 80 days from onset of incubation to first emergence seems to be a pretty good estimate.

All nests were monitored with trail cameras, starting ~2.5-8 weeks from lay date and continuing until the nest was resolved. Cameras were checked approximately fortnightly. 8 lithium AA batteries would usually provide a month of footage, though there were quite a few camera failures and battery failures. A 32 GB SD card was used to reliably have space for everything, although in most cases an 8 GB card would suffice. Footage taken was a 20 s video, taken repeatedly if the passive infra-red sensor camera continued to be triggered. The rest time between videos was 3-4 s and it is likely that some comings and goings of chicks and maybe predators were missed by the camera. It is a recognised issue that all passive infrared cameras will miss some things. The cameras are all the same brand (Exodus Lift and Lift II) to try to ensure consistency.

Reflective tape on the adult kiwi's tx, combined with the size of the bird and bill, usually made it easy to tell which kiwi of the pair was seen on camera. There was no evidence of a third bird helping at any of the nests, although in some cases it was not possible to be certain, as four of the nesters (3 males and a female) had un-transmittered mates. More than 2 adults were never observed on camera at once. Daytime incubation was done by the male, though sometimes the female would share the burrow during the day and shared daytime incubation in these instances can't be ruled out. The female would usually relieve the male from incubation for one or more spells during the night.

Table 1 summarises nests, chicks and trailcam footage of predators. A dramatic difference is the reduction in stoat detections at the nests. Only one visit was detected at one nest, on the night that the chick disappeared and likely related to that predation. In previous years, 67 – 89 % of nests had stoat visits detected, and most of these nests had many visits. Possum visits were reduced to zero, and weka visits also reduced markedly. The reduced disturbance may have contributed to a higher hatching success rate of around 86 %, compared to 45 – 67 % in previous seasons.

The lack of stoat detection was cause for early optimism, but sadly late October through to December saw five chicks killed by stoats. Two first clutch chicks did survive however, and are still looking good at the time of writing. Three chicks died of other causes, an increase on previous years. One was taken by a kea from a very shallow nest in the base of a tree, captured on camera. It's possible the

trailcam may have attracted the kea to the vicinity the nest, but we'll never know for sure. It was easy to see the nest bowl from the right angle and the kea may have found the nest independently of the trailcam's presence. Due to this uncertainty, this nest has not been excluded.

One chick died of an acute infection in its hock which caused severe swelling. It was seen on camera that it was very painful to walk, and sadly the chick ended up starving.

Both of these unusual deaths occurred in the same basin as one of the surviving chicks. It's reasonable to suggest that in another year without these stochastic events, survival may have been somewhat higher.

Table 1: Summary of 2020/21 southern Fiordland tokoeka breeding season at Shy Lake

Category	Number	Comments
Males with tx	17	
Females with tx	9	A number of females dropped their transmitters in summer of 2019/20 and recapture was not attempted due to Covid-19 lockdown.
Pairs monitored	16	One male nested according the transmitter, but the nest was not found due to dangerous terrain. In autumn the decision was taken to no longer monitor this pair.
1st clutch nests inferred from tx activity / found	13 / 12	One nest was abandoned the night after we found it; this nest is therefore excluded from the totals below due to human interference.
2nd clutch nests inferred from tx activity / found	5 / 4	Only birds whose nest failed or chick died before late October re-nest. Not all birds failing this early re-nest. One nest was abandoned when we found it; this was unexpected considering we were ~2 m from the nest bowl and the bird had been monitored without incident several times previously. This nest is therefore excluded from the totals below due to human interference.
Nests (with more than 1 week's trailcam footage) visited by stoats	1/14	The proportion of nests (7 %) with stoat visits detected this year fell dramatically from the pre-1080 seasons (67 – 89 %).
Nests visited by possums	0/14	
Nests visited by kea	2/14	The proportion of nests visited by kea fell to 14 % from 39 % in 19/20; however many of the visits 19/20 were from a single, highly motivated banded individual that was not present at the site in 20/21. The 14 % 20/21 figure is not too different from the 10 % 18/19 figure.
Nests visited by weka	3/14	
Nest abandoned, probably due to human disturbance	2/16	Excluded from totals below.
Nest failed: kea removed egg	1/14	Can't determine whether kea was first attracted by presence of trailcam, but it's possible. This nest was at low altitude (~240 m) in tall forest.
Egg hatched	12/14	Higher hatch rate than previous years; may reflect greatly reduced disturbance by stoats, possums and weka.
Chick disappeared, fate unknown	1/12	Arrived a little later than predicted, and disappeared early before we could fit a tx.
Chick dead, stoat predation confirmed	6/12	Confirmed by field sign e.g. stoat scat, den, puncture wounds, stash site etc.
Chick dead, kea predation	1/12	Kea seen on trailcam entering nest and removing chick.
Chick dead, injury/infection	1/12	Acute infection in hock joint prevented walking and led to starvation.
Chick dead, cause unknown	1/12	Carcass decomposed when recovered; necropsy suggested possible exposure but cause for this unknown.

Chicks surviving	2/12	Both from first clutch and have attained "stoat-safe" age/size.

Comparing Fiordland tokoeka taxa

The breeding biology of southern Fiordland tokoeka remained unknown prior to this study.

There was no evidence of family groups or more than 2 adults at nests, as is seen on Rakiura; but this may well be an artefact of poor recruitment rather than innate biology.

Table 3 compares breeding statistics between southern and northern Fiordland tokoeka. Several years of data are summarised from the Clinton and Murchison Mountains studies, while Shy Lake is in its infancy, and so comparisons should be drawn with caution. Early indications are that the southern Fiordland tokoeka at Shy Lake nest more often and produce more eggs than their northern counterparts in the Murchison Mountains and Clinton, but chick survival is lower.

Table 2: Breeding statistics of Fiordland tokoeka taxa

	Shy Lake southern FT 2020/21 season	**Shy Lake** southern FT 2019/20 season	**Shy Lake** southern FT 2018/19 season	**Shy Lake** southern FT 2017/18 season	**Murchison Mntns** northern FT 2003-2009 seasons	**Clinton Valley** northern FT 2001-2005
Males monitored	16 males (excludes one nest deliberately not found)	17 males	16 males	13 males	45 different males	21 different males
Nests monitored	14: 11 first clutch, 3 second clutch	22: 15 first clutch, 7 second clutch	21: 15 first clutch, 6 second clutch	16: 13 first clutch, 3 second clutch	105	41: 30 first clutch, 11 second clutch
Proportion of males recorded nesting (not all NFT males were monitored every season of the projects)	13/17 = 76 %	14/17 = 82 %	14 or 15/16 = 88 or 94 %	13/13 = 100 %	34/45 = 76 % nested at some point during project	14/21 = 67 % nested at some point during project, but some only monitored for one season. 47-78 % depending on season.
Eggs per male per year	0.94	1.29	1.38	1.3	0.82	0.79
Infertile or very early embryo death	Unknown	Unknown	1/14 known = 7 %	1/13 known = 8 %	16 %	22 %
Hatching success	12/14 = 86 %	10/22 = 45 %	14/22 = 64 %	10/15 = 67 %	47 %	78 %
Chicks survival (first 183 days)	2	0	0	0	37 % in trapped area 17 % in untrapped area	16 %
Chicks predated by stoats (known and suspected)	58 %	80 %	86 %	100 %	78 %	69 %

NB. Two nests in 2017-18, 1 in 2018-19 and 2 in 2020-21 have been excluded from some of the percentage calculations, where there's reason to believe that human disturbance or influence may have adversely affected the outcome.

Pest & phenology monitoring

Three sets of 5 lines of tracking tunnels were run at Shy Lake. Together with a set at Mt Forster and a set at Henry Burn, both between Wet Jacket Arm and Dusky Sound, these were considered representative of the Wet Jacket Peninsulas pest control block. All lines were run overnight for rodents, and 21 nights for mustelids and rodents, in August, November, February and May.

Tunnel tracking rates for mustelids and rodents were reduced to zero after the June 2020 1080 operation (Appendix 2). The climb in mustelid tracking from November 2020 onwards is from the Henry Burn, on the eastern edge of the block, where reinvasion might be expected to be detected first. Tracking at Shy Lake remains at zero at the time of writing.

The trailcam network in collaboration with Manaaki Whenua Landcare Research continued throughout the year, with surveys run according to DOC-5990928 in conjunction with the tracking tunnel surveys. See Appendix 3 for a map of the camera network. The trailcam system appears to have fulfilled its promise to be a more sensitive tool than tracking tunnels in detecting stoats at low numbers. Full data is being written up in a paper by [redacted] of Manaaki Whenua. A few key stats:

- The pre-1080 check had 162 stoat detections, while the post-1080 check had 5, which were identified as all being the same stoat.
- The November check detected zero stoats.
- The February check had small numbers of detections on lines 4, 14 and 15. 14 and 15 are close to several chicks that were predated.
- The May check detected stoats at one camera on each of lines 3, 4, 11, 13 and 15.

14 seedfall funnels were run in the Shy Lake area for monitoring mountain and silver beech seed. The seed is due to be collected in August.

Pest control

The "Wet Jacket Peninsulas" SOIK aerial 1080 operation took place over 40 000 ha in late June 2020. The operation took place on much lower rodent levels than most operations targeting rodents/mustelids, and was deferred for this reason from winter 2019. As rodent numbers remained low, the recommendation from the technical advisory group was that a good stoat knock-down was still likely. For further detail on the operation, see the Wet Jacket 1080 Operation Homepage DOC-5609808 and the Wet Jacket Operational Plan DOC 5592692.

Acoustic monitoring

A SOIK Fiordland tokoeka monitoring plan DOC-3156071 was drawn up Olive Gansell in spring 2017. Autumn 2021 represented the third season of acoustic recorder deployment under this plan. The fieldwork was implemented by Morgan Maclean and Megan Bogisch's Biodiversity Monitoring Team based out of Invercargill, between May and June 2020. Data will be analysed by James Mortimer's team in the PMR unit.

Territory mapping

The SOIK Fiordland tokoeka monitoring plan DOC-3156071 calls for territory mapping at six sites throughout Fiordland over the course of five years, on an

ongoing basis. Trips follow the protocol DOC-5597576. The third of these trips was in the Murchison Mountains. The original plan had been to survey the Mystery Burn, but after concerns were raised about the number of catchable birds, the neighbouring Point Burn was included too. The trip took place from February 3-17, 2021. based at the Mystery Burn and Point Burn bivvies. The trip report will be written by Hugh Robertson.

Finance

The budget for the Shy Lake study for 2020/21 financial year was $194,554 including salaries and wages, in WBS D400719002. We finished the year $22,552 underspent excluding salaries ($24,183 including). The main reasons for the underspend were:

- lower kiwi chick survival than budget allowed for, meaning less monitoring required and no new transmitters to buy;
- delayed recruitment of B-band role in spring;
- project manager reduction to 0.9 FTE half way through year
- a contractor pulling out of some work in April.

Staffing

9(2)(a), 9(2)(g)(ii) continued to run the Shy Lake project. Monty Williams joined the team on a temporary contract from November 2020 to end-March 2021 and ably contributed to the Shy Lake project.

9(2)(a), 9(2)(g)(ii) and 9(2)(a), 9(2)(g)(ii) continued in their respective roles of combined predator control lead and SOIK operations planner. In November 2020 Troy Watson started a one-year contract as supervisor for 9(2)(a), 9(2 and Monty (among others), which had previously been filled by Jamie McAulay. Jamie continued as senior ranger.

Engagement & advocacy

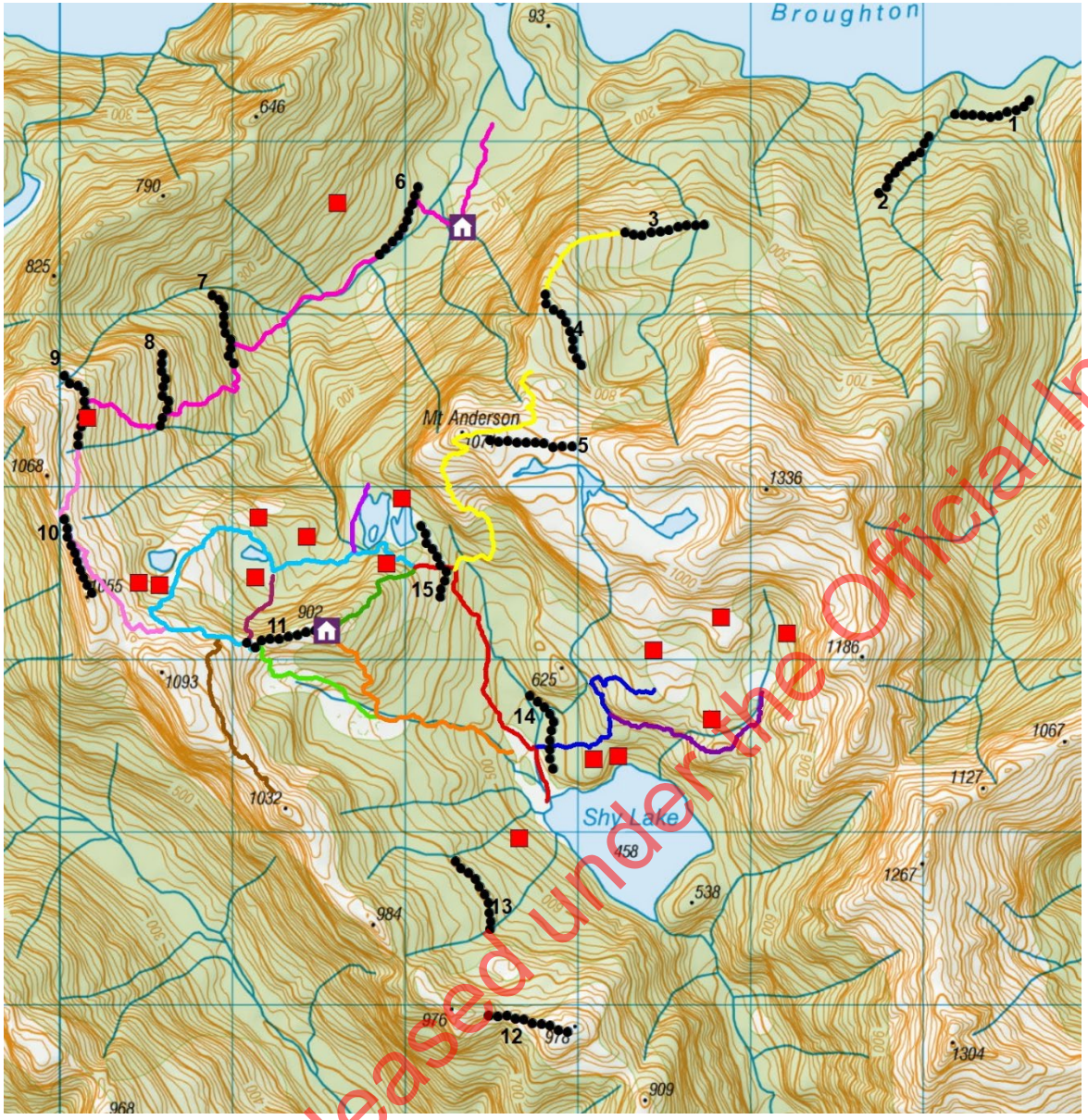
The film documentary "Fight for the Wild" was released in May 2021 on the RNZ website and aired on Saturday nights on TVNZ. It was well received. Shy Lake featured in the first episode and briefly in the final episode.

Belle Gwilliam from the DOC media team visited Shy Lake in October 2020 and May 2021 to film for an internally-produced film on the project, as part of a wider media strategy to gain social licence for aerial 1080 use. Belle is planning to use the footage for both a short Tiakina Nga Manu film and a longer (~20-minute) documentary.

9(2)(a), 9(2 continued to produce an ongoing series on the DOC blog forum, "The Fiordland Kiwi Diaries", charting the work and progress at Shy Lake.

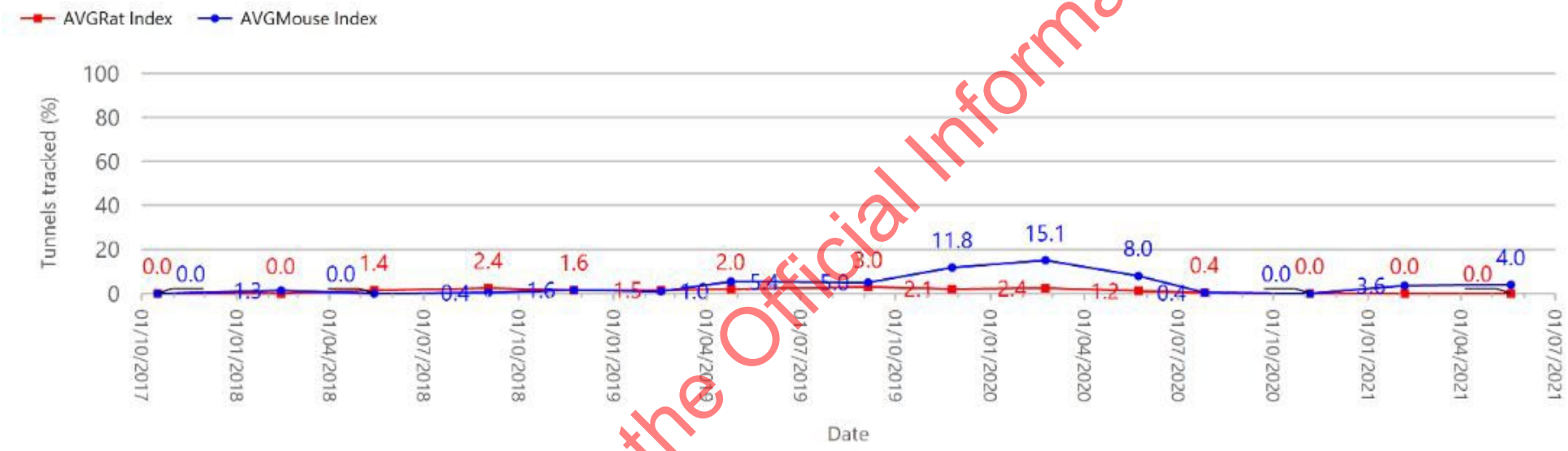
Several media articles featured the project, including an occasional series in the Otago Daily Times by journalist Kerrie Waterworth.

Appendix 1: Map of Shy Lake study site with 2020 season kiwi nests

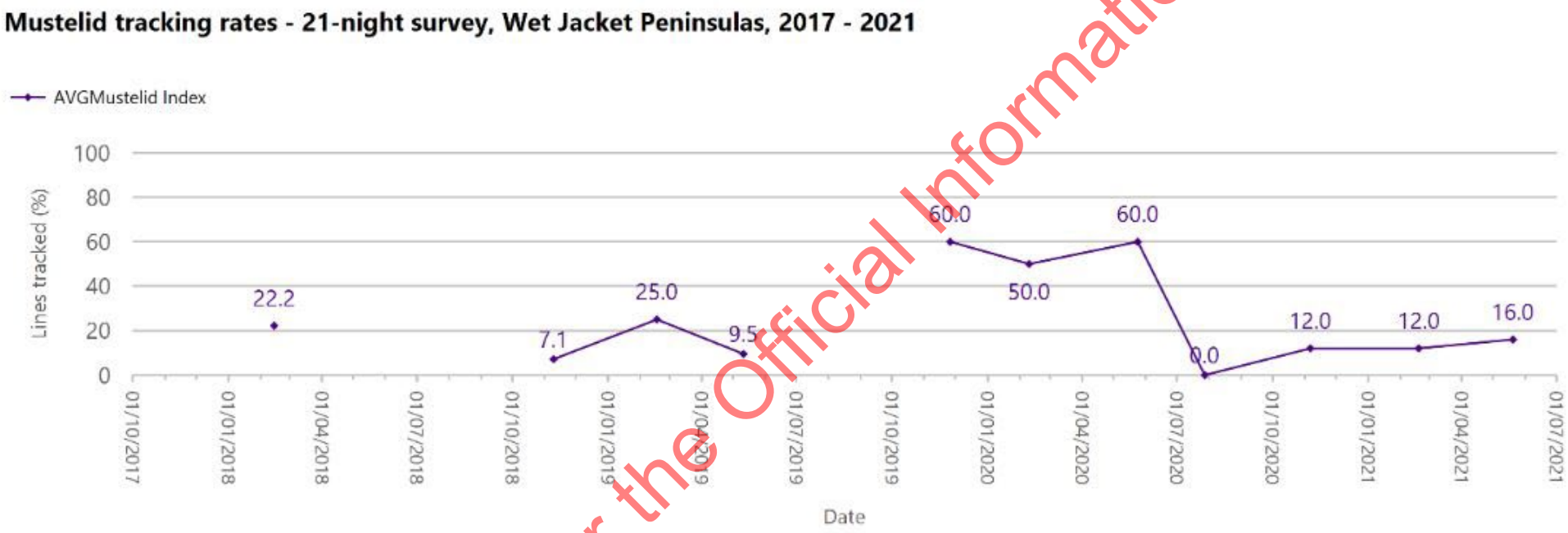


Red blocks = nests
Black dots = tracking tunnels
Coloured lines = tracks

Appendix 2a: Wet Jacket Peninsulas rodent tracking, 2017-21

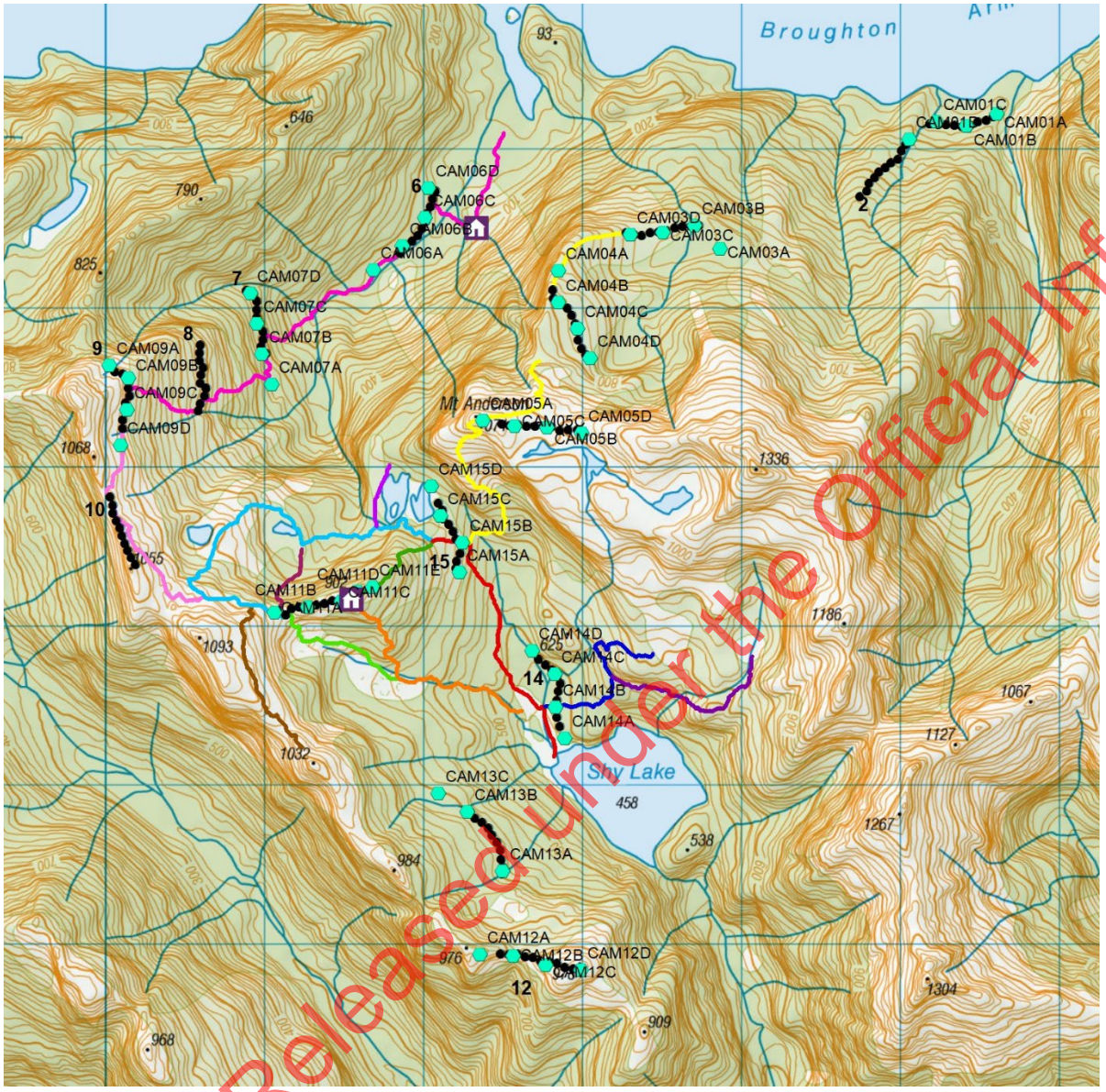


Appendix 2b: Wet Jacket Peninsulas mustelid tracking, 2017-21



Tunnel tracking rates for mustelids were reduced to zero after the 1080 operation. The climb in rates from November 2020 onwards is from the Henry Burn, on the eastern edge of the block, where reinvasion might be expected to be detected first. Tracking at Shy Lake remains at zero at the time of writing. However, the trailcam network showed an increase in stoat detections at Shy Lake by February and May 2021.

Appendix 3: Map of mustelid trailcam monitoring network



Black dots = tracking tunnels
Turquoise hexagons = mustelid cameras
Coloured lines = tracks

Save Our Iconic Kiwi – Fiordland
2021-22 Annual Report

Written June 2022 by Monty Williams & 9(2)(a), 9(2)(g)(ii)

Contents

Context

A sample population of southern Fiordland tokoeka is being monitored at Shy Lake, between Wet Jacket Arm and Breaksea Sound in western Fiordland. The goal is to determine if aerial 1080 alone can control stoats to a level where tokoeka populations can average a significant population growth over the control cycle period; and what the timing of that period should be. This will then be used to inform expanded pest control to increase Fiordland tokoeka populations in other areas. Basic behavioural and biological information is also being collected for the

first time for the southern Fiordland tokoeka taxon. This report focuses on the work at Shy Lake and gives a brief outline of other SOIK work in Fiordland in the 2020-21 financial year. For more context on Save Our Iconic Kiwi and the rationale for the work in Fiordland, see the SOIK Implementation Plan 2018-2022 (DOC-5538590). For reports on previous seasons at Shy Lake, please see DOC-3227231 , DOC-6028979 and DOC-6735995. For further information on anything in this report, contact Monty Williams at the DOC Te Anau office.

This was the fifth season of recruitment monitoring at Shy Lake, but the second after the 1080 operation that took place in June 2020. This year saw 3x (25%) chicks of the project to survive to the 6-month / 1 kg thresholds usually used to determine safety from stoat predation.

Nesting 2021-22 season

Adult males were fitted with transmitters carrying Wildtech Ltd's Chick Timer Haast v4.4 software. Females carried Wildtech's GSK Diagnostic v2.0 software. The Chick Timer appeared successful in almost all cases at determining the onset of incubation. One or two males have variable activity patterns and the software doesn't pick up on their incubation; in these cases it's also difficult to choose a reliable date from manual collection of the raw data. Overall the software does an excellent job and we now rely on it for all but the known difficult males.

First clutch eggs were laid between approx. 8th July and 28th September. Second clutch eggs were laid between 10th November and 17th December. 75 days was used as the estimated incubation period, with predicted first emergence of the chick from the nest a further 5 days later. Without having cameras in the nest, we don't know exactly how accurate our hatch date estimates are; however the 80 days from onset of incubation to first emergence seems to be a pretty good estimate.

All nests were monitored with trail cameras, starting ~2.5-8 weeks from lay date and continuing until the nest was resolved. Cameras were checked approximately fortnightly. 8 lithium AA batteries would usually provide a month of footage, though there were quite a few camera failures and battery failures. A 32 GB SD card was used to reliably have space for everything, although in most cases an 8 GB card would suffice. Footage taken was a 20 s video, taken repeatedly if the passive infra-red sensor camera continued to be triggered. The rest time between videos was 3-4 s and it is likely that some comings and goings of chicks and maybe predators were missed by the camera. It is a recognised issue that all passive infrared cameras will miss some things. The cameras are all the same brand (Exodus Lift and Lift II) to try to ensure consistency.

Table 1 summarises nests, chicks and trailcam footage of predators. A dramatic difference is the reduction in stoat detections at the nests. At the time of writing not all footage had been viewed.

Table 1: Summary of 2021/22 southern Fiordland tokoeka breeding season at Shy Lake

Category	Number	Comments
Males with tx	16	Hook & Flame re-caught. Buckles dropped.
Females with tx	3	Swash dropped.
Pairs monitored	13	
1st clutch nests inferred from tx activity / found	11 / 10	One nest was inferred from tx activity (Swash & Buckles) but no evidence could be found of any nest after lockdown in September 2021.
2nd clutch nests inferred from tx activity / found	5 / 5	4 hatched. Pegleg abandoned.
Nests (with more than 1 week's trailcam footage) visited by stoats	1/15	
Nests visited by possums	1/15	1 possum visted Commandos nest during second clutch.
Nests visited by kea	1/15	1 kea visit was seen at LGS's nest – chick was probable predation soon after.

Nests visited by weka	3/15	Filibusters 2nd clutch egg was predated by a weka. A few others were sporadically seen at other nests throughout season.
Nest abandoned, probably due to human disturbance	1/15	Excluded from totals below. Pegleg abandoned first clutch
Nest failed: kea removed egg	0/15	
Egg hatched	12/15	
Chick disappeared, fate unknown	1/12	JS 2nd clutch
Chick dead, stoat predation confirmed	7/12	Cake chick 1, Cake chick 2, JS chicks 1 & 2, LJS chick 2, Filibuster chick 1, Sinbad Colby chick 2
Chick dead, kea predation	-	Potential kea predation of LGS 21-1 chick – see below "Chick dead, cause unknow"
Chick dead, injury/infection	0/12	N/A
Chick dead, cause unknown	1/12	Carcass decomposed when recovered; self necropsy suggested possible kea predation but overall unconclusive.
Chicks surviving	3/12	All from first clutch and have attained "stoat-safe" age/size. 25% survival rate

Table 2: Breeding statistics of Fiordland tokoeka taxa

	Shy Lake southern FT 2021/22 season	**Shy Lake** southern FT 2020/21 season	**Shy Lake** southern FT 2019/20 season	**Shy Lake** southern FT 2018/19 season	**Shy Lake** southern FT 2017/18 season	**Murchison Mntns** northern FT 2003-2009 seasons	**Clinton Valley** northern FT 2001-2005
Males monitored	16 males	16 males (excludes one nest deliberately not found)	17 males	16 males	13 males	45 different males	21 different males
Nests monitored	15: 10 first clutch, 5 second clutch	14: 11 first clutch, 3 second clutch	22: 15 first clutch, 7 second clutch	21: 15 first clutch, 6 second clutch	16: 13 first clutch, 3 second clutch	105	41: 30 first clutch, 11 second clutch
Proportion of males recorded nesting (not all NFT males were monitored every season of the projects)	10/15 = 66.7%	13/17 = 76 %	14/17 = 82 %	14 or 15/16 = 88 or 94 %	13/13 = 100 %	34/45 = 76 % nested at some point during project	14/21 = 67 % nested a some point during project, but some only monitored for one season. 47-78 % depending on season.
Eggs per male per year		0.94	1.29	1.38	1.3	0.82	0.79
Infertile or very early embryo death	2/15 = 13.33%	Unknown	Unknown	1/14 known = 7 %	1/13 known = 8 %	16 %	22 %
Hatching success	12/15 = 80%	12/14 = 86 %	10/22 = 45 %	14/22 = 64 %	10/15 = 67 %	47 %	78 %
Chicks survival (first 183 days)	3	2	0	0	0	37 % in trapped area 17 % in untrapped area	16 %
Chicks predated by stoats (known and suspected)	58.3%	58 %	80 %	86 %	100 %	78 %	69 %

NB. Two nests in 2017-18, 1 in 2018-19 and 2 in 2020-21 have been excluded from some of the percentage calculations, where there's reason to believe that human disturbance or influence may have adversely affected the outcome.

Pest & phenology monitoring

Three sets of 5 lines of tracking tunnels were run at Shy Lake. Together with a set at Mt Forster and a set at Henry Burn, both between Wet Jacket Arm and Dusky Sound, these were considered representative of the Wet Jacket Peninsulas pest control block. All lines were run overnight for rodents, and 21 nights for mustelids and rodents, in August, November, February and May.

Mainly Fauna took over the contract for delivery of tracking tunnels and trail camera trips from MCU in the spring of 21.

Overall rodent and stoat tracking tunnel numbers remained low over the summer and autumn period.

The trailcam network in collaboration with Manaaki Whenua Landcare Research continued throughout the year, with surveys run according to DOC-5990928 in conjunction with the tracking tunnel surveys. The trailcam system appears to have fulfilled its promise to be a more sensitive tool than tracking tunnels in detecting stoats at low numbers.

14 seedfall funnels were run in the Shy Lake area for monitoring mountain and silver beech seed. The seed is due to be collected in August. It should be noted that no beech mast occurred in the Shy Lake area over the 21/22 summer.

Pest control

The "Wet Jacket Peninsulas" SOIK aerial 1080 operation took place over 40 000 ha in late June 2020. The operation took place on much lower rodent levels than most operations targeting rodents/mustelids, and was deferred for this reason from winter 2019. As rodent numbers remained low, the recommendation from the technical advisory group was that a good stoat knock-down was still likely. For further detail on the operation, see the Wet Jacket 1080 Operation Homepage DOC-5609808 and the Wet Jacket Operational Plan DOC 5592692.

Acoustic monitoring

A SOIK Fiordland tokoeka monitoring plan DOC-3156071 was drawn up Olive Gansell in spring 2017. Autumn 2022 represented the forth season of acoustic recorder deployment under this plan. The fieldwork was implemented by Megan Bogisch's Biodiversity Monitoring Team based out of Invercargill, between May and June 2022. Data will be analysed by James Mortimer's team in the PMR unit.

AR's were also deployed in January 2022 in the Princess Mountains near Lake Haruoko – to see if tokoeka were present in the area. No Tokoeka were heard from any of the recorders brought in – which goes in line with current population maps which show the northern end of the Princess mountains as the southern extent of Southern Fiordland Tokoeka distribution in the area.

Territory mapping

The SOIK Fiordland tokoeka monitoring plan DOC-3156071 calls for territory mapping at six sites throughout Fiordland over the course of five years, on an ongoing basis. Trips follow the protocol DOC-5597576. A trip was originally planned for the Lake Beattie area; however after consultation with Hugh Robertson (study lead) it was decided to do another year of monitoring at the Mystery/Point Burn valleys in the Murchison Mountains.

Finance

The budget for the Shy Lake study for 2021/22 financial year (as of June 14th) was $161,882 including salaries and wages, in WBS D400719002. We finished the year $9,502 underspent excluding salaries ($8,478 including). The main reasons for the underspend were:

- No recruitment of B-band role in spring;
- project manager reduction to 0.9 FTE half way through year.

Staffing

Monty Williams took over running the program from 9(2)(a), 9(2)(g)(ii) in September 2021. Monty had joined the team on a temporary contract from November 2020 to end-August 2021. No B-band role, to replace Monty over the summer was filled.

9(2)(a), 9(2)(g)(ii) and 9(2)(a), 9(2)(g)(ii) continued in their respective roles of combined predator control lead and SOIK operations planner. 9(2)(a), 9(2)(g)(ii) left the Department in January 2022 and was replaced by 9(2)(a), 9(2)(g)(ii). Troy Watson continued as supervisor for 9(2)(a), 9(2) and Monty (among others), which had previously been filled by Jamie McAulay. Jamie continued as senior ranger.

Engagement & advocacy

Monty continued to produce an ongoing series on the DOC blog forum, "The Fiordland Kiwi Diaries", charting the work and progress at Shy Lake.

Monty & Crystal Brindle also presented a speech to Verdon College students about the use of 1080 as a tool for kiwi conservation – in respect to the SOIK Shy Lake project.

9(2)(a), 9(2)(g)(ii)

From: 9(2)(a), 9(2)(g)(ii)
Sent: Wednesday, 12 April 2023 1:44 pm
To: 9(2)(a), 9(2)(g)(ii)
Cc: 9(2)(a), 9(2)(g)(ii)
Subject: RE: Request for NPCP TAG advice for Wet Jacket operation

Follow Up Flag: Follow up
Flag Status: Flagged

Hi 9(2)(a), 9(2)(g)

Here is the response from TAG to the WJ operation questions.

What is your confidence level that the operation with be successful given the number of vectors?
Does TAG support the operation proceeding given the levels of vectors?

- We think the operation will achieve a very high secondary kill of stoats. Though the 1-night tracking rates are low, rodents appear widely distributed, the non-mast conditions favour high rodent kill rates and it is therefore likely that all stoats will encounter poisoned animals.
- It is important that the 'one-hit' of stoat control from 1080 secondary poisoning is timed to protect kiwi chicks before significant stoat reinvasion occurs. We think the timing in early winter should achieve this because the main period of stoat dispersal will have concluded. We don't expect significant stoat reinvasion to occur over the winter months. While the ideal knockdown time for stoats could be late winter/early spring closer to the hatch time of kiwi, the typical weather patterns mean that this timing risks delaying the operation well into spring when kiwi chicks are hatching.
- We advise both above points assuming that robust monitoring will be undertaken to determine if stoat result and kiwi outcome targets are met with these rodent levels and operational timing.

Cheers

9(2)(a), 9(2)(g)(ii)
Technical Advisor - Animal Threats
Biodiversity Group—*Kāhui Kaitiaki Koiora*
Department of Conservation - *Te Papa Atawhai*
9(2)(a), 9(2)(g)(ii)

From: 9(2)(a), 9(2)(g)(ii)
Sent: Thursday, April 6, 2023 9:27 AM
To: 9(2)(a), 9(2)(g)(ii)
Cc: 9(2)(a), 9(2)(g)(ii)
Subject: RE: Request for NPCP TAG advice for Wet Jacket operation

Hi 9(2)(a), 9(2)(

Yeah good questions. I have modified the document to add that info in. The majority of the non-targets on the wax-tag lines where actually kea, not rodents, but it does show rodents spread across the lines.

Thanks.

9(2)(a), 9(2)(g)(ii)
Senior Ranger/District Lead Fiordland, National Predator Control Team | Kaitiaki, Kanorau Koiora
Department of Conservation | Te Papa Atawhai
M: 9(2)(a), 9(2)(g)(ii)

Kia piki te oranga o te ao tūroa, i roto i te ngātahitanga, ki Aotearoa.
To work with others to increase the value of conservation for New Zealanders.

www.doc.govt.nz

From: 9(2)(a), 9(2)(g)(ii)
Sent: Wednesday, April 5, 2023 4:20 PM
To: 9(2)(a), 9(2)(g)(ii)
Cc: 9(2)(a), 9(2)(g)(ii)
Subject: RE: Request for NPCP TAG advice for Wet Jacket operation

Hi 9(2)(a), 9(2)(g)

I'm anticipating that TAG members may be interested in how many of the tracking lines have tracked rats and mice in the most recent session. Can you present this?

The waxtag line data just last month, plenty of the lines having non target bites, I assume the majority are rodents. Is this a good indication, maybe even better than TT presence/absence, that rodents are widespread? What is the deployment interval of the waxtag lines?

Cheers
9(2)(a), 9(2

From: 9(2)(a), 9(2)(g)(ii)
Sent: Wednesday, April 5, 2023 3:33 PM
To: 9(2)(a), 9(2)(g)(ii)
Cc: 9(2)(a), 9(2)(g)(ii)
Subject: Request for NPCP TAG advice for Wet Jacket operation

Hi 9(2)(a), 9(2)(

Please find attached a TAG question template re vector levels for the Wet Jacket op which is scheduled to start pre-feed late April/early May.

If I can get further info from our trail camera analysis to add to the picture I will forward this on. If you need any more info please let me know.

Thanks,

9(2)(a), 9(2)(g)(

9(2)(a), 9(2)(g)(ii)
Senior Ranger/District Lead Fiordland, National Predator Control Team | Kaitiaki, Kanorau Koiora
Department of Conservation | Te Papa Atawhai
M: 9(2)(a), 9(2)(g)(ii)

Kia piki te oranga o te ao tūroa, i roto i te ngātahitanga, ki Aotearoa.
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DOC-6112549

Question template for TAG

Site	Wet Jacket Peninsulas, Fiordland
From	9(2)(a), 9(2)(g)(ii) (please cc 9(2)(a), 9(2)(g)(ii) and 9(2)(a), 9(2)(g)(ii) as I will be on leave from late April)
Date sent	5/4/23
Date to be answered by	ASAP/before end of April. Operation due to begin late April/early May
Question	• What is your confidence level that the operation with be successful given the number of vectors? • Does TAG support the operation proceeding given the levels of vectors?
Key species to be protected	Southern Fiordland Tokoeka (SFT)
Context	• SOIK site including Shy Lake kiwi survival study site • Result target is stoat reduction to undetectable levels in order to allow kiwi chicks to survive to 'safe weight', preferably for 1-3 breeding seasons • Overall project outcome target is to increase SFT population growth by 2% or more. From kiwi monitoring to date an outcome of 20-40% chick survivorship to safe weight may be realistic in the 1-2 yrs post-op • First operation undertaken in June 2020 with low rodent vector (1.2% rats) but reasonable possum vector (42% WTI) as possums had not received any control at this site beforehand • Moving into the second operation we have a similarly low rodent vector (4.1% rats) but seemingly a much lower possum vector (10% WTI) – the possum WTI undertaken in March '23 is almost the same as it was post-op in 2020.
Planned operation	• May/June 2023 • No 2023 mast forecast, DeltaT value of -0.05 (see details below for DeltaT forecasts over past few years) • Pre-feed sowing rate - 1.5kg/ha • Toxic sowing rate – 1.5kg/ha • Cinnamon loading - Single • 1080 loading – 0.15% • Bait size & type – 6g cereal • Pest abundance measures as of Feb 2023 Tracking tunnels: Rats 4.1%, mice 3.8%, stoats 31% (see graphs below), 10% possum WTI – this is skewed heavily by 2x coastal lines where WTI was 45% (see below).
Last operation	• Pest abundance pre-treatment:

	Tracking tunnels: Rats 1.2%, mice 8%, stoats 60%. Possum WTI 42%. • Post-op results: Tracking tunnels: Rats 0%, mice 4.7%, stoats 0%. Possum WTI 9%. • Date – Prefeed 20th-22nd/6/2020. Toxic 26 & 27th/6/2020 • Mast status – Strong mega mast of beech, podocarp and tussock occurred in 2019. No mast in 2020. • Useable swath width & overlap - Unsure • Pre-feed sowing rate – 1.5kg/ha • Toxic sowing rate – 1.5kg/ha • Cinnamon loading – 0.3% • 1080 loading – 0.15% • Bait size & type – 6g, RS5 Orillion • Number of fine nights post pre-feed drop - Unsure • Number of fine nights post toxic drop - Unsure • Duration between prefeed and toxic drops – 5-7nights
Additional information	Wax tags deployed for 11 nights (intention was 7 but the weather did not play ball!). Wax tags deployed at 20m intervals along monitoring lines. Lines at least 200m apart. The vast majority of the non-target bite-marks are actually kea, not rodents. Rats were detected on 13 of the 22 possum monitoring lines in mid-March, so 68% of lines. Compared to rats detected on 24% of tracking tunnel lines in Feb.

DeltaT

Forecast year	Wet J
2014	1.4
2015	-1.5
2016	1.1
2017	0.1
2018	-2.9
2019	2.3
2020	-0.6
2021	-1.1
2022	1.2
2023	-0.05
2024	1.19

Stratum	Location	Line	Wastags with possum bite	Wastag with non target bite	Wastags lost or damaged	Wastags without bite marks	VTI
Sub-aplin	Shy Lake	4	1	4	2	1	10%
Sub-aplin	Shy Lake	9	0	9	0	1	0%
Sub-aplin	Shy Lake	11	0	5	3	2	0%
Sub-aplin	Shy Lake	15	0	7	0	3	0%
Sub-aplin	Mt Forst	17	0	1	1	8	0%
						VTI	2%
						SE	2%

Stratum	Location	Line	Wastags with possum bite	Wastag with non target bite	Wastags lost or damaged	Wastags without bite marks	VTI
>400m	Shy Lake	3	0	3	0	7	0%
>400m	Shy Lake	8	0	4	0	6	0%
>400m	Mt Forst	18	0	2	1	8	0%
>400m	Mt Forst	19	0	2	0	8	0%
>400m	Henry Bu	21	0	0	0	0	0%
						VTI	0%
						SE	0%

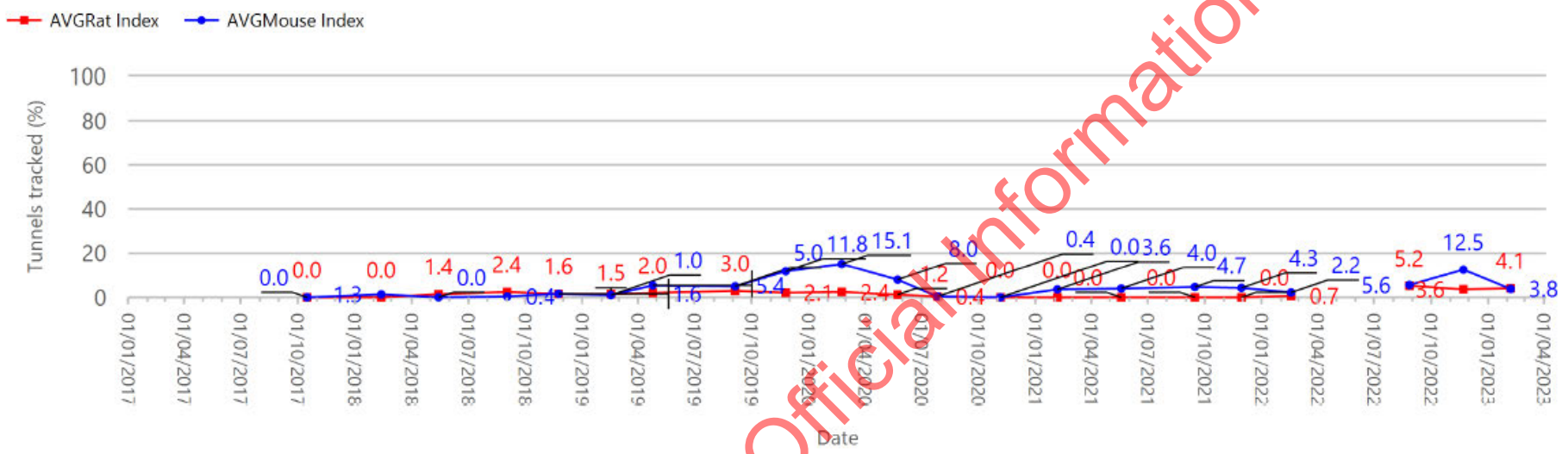
Stratum	Location	Line	Wastags with possum bite	Wastag with non target bite	Wastags lost or damaged	Wastags without bite marks	VTI
<400m	Shy Lake	2	3	4	0	3	30%
<400m	Shy Lake	6	0	9	1	0	0%
<400m	Shy Lake	7	3	4	0	3	30%
<400m	Henry Bu	22	0	1	0	9	10%
<400m	Henry Bu	23	0	2	0	8	0
<400m	Henry Bu	24	1	0	0	9	10%
						VTI	13%
						SE	6%

Stratum	Location	Line	Wastags with possum bite	Wastag with non target bite	Wastags lost or damaged	Wastags without bite marks	VTI
Coast	Shy Lake	1	3	4	0	3	30%
Coast	Mt Forst	20	6	0	0	4	60%
						VTI	45%
						SE	15%

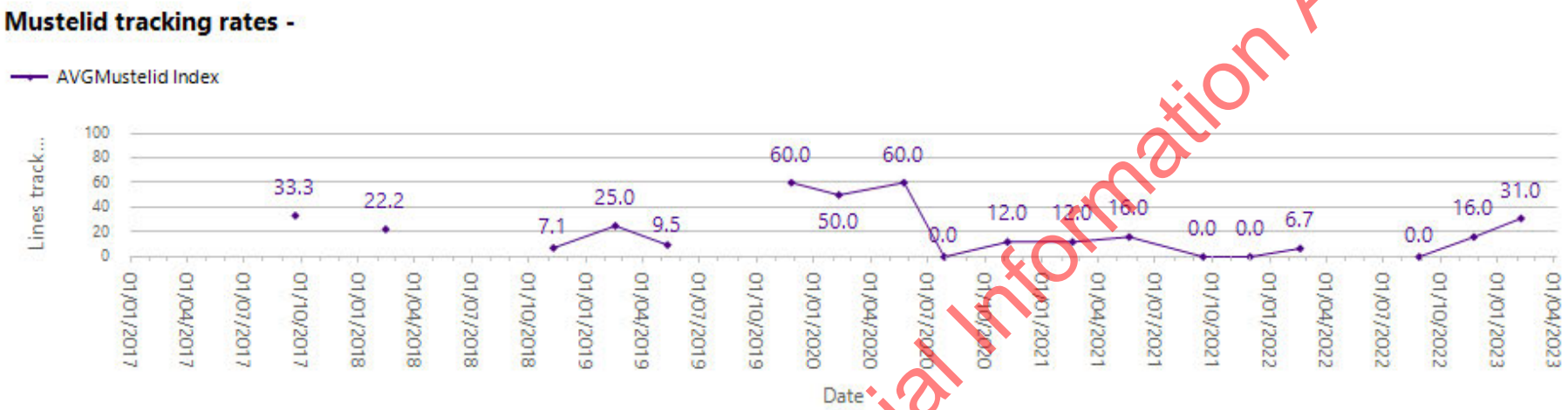
Combined Resul	
VTI	10%
SE	4%

DOC-6112549

Rodent tracking rates - R



DOC-6112549



Feb 2023		% of tunnels on each line which tracked		
Line ID	**Altitude ~**	**Tracked rats**	**Tracked mice**	**Tracked stoats**
HB 21	700	0	0	0
HB 22	350	0	10	0
HB23	200	0	0	0
HB 24	100	0	0	0
HB 25	20	0	10	32
MF 16	900	0	20	0
MF 17	800	0	20	0
MF 18	400	10	0	0
MF 19	350	0	30	11
MF 20	20	30	0	22
SL 1	50	10	0	10
SL 2	200	20	0	0
SL 3	550	0	0	0

SL 4	800	0	0	11
SL 5	1000	0	0	0
SL 6	50	0	0	30
SL 7	300	0	0	0
SL 8	600	0	0	0
SL 9	900	0	0	0
SL 10	1000	0	0	0
SL 11	900	0	0	15
SL 12	900	0	0	0
SL 13	700	0	0	0
SL 14	500	0	20	0
SL 15	650	0	0	0
BH SE	100	30	0	0
BH SF	200	10	0	12
BH SG	50	0	0	0
BH SH	50	10	0	11
29 lines	**% of lines tracked:**	**24%**	**21%**	**31%**

Department of Conservation
Te Papa Atawhai

Aerial 1080 Operational Plan
Wet Jacket - May 2023

Please Note: This document contains sensitive information specific to delivery of the Wet Jacket Aerial Operation. If this document is to be forwarded to any external party, please redact any and all information that may present a security risk to personnel involved in the operation.

Version History

Version	Reason for change	Date
1.0	First draft	Nov 2022
2.0	Incorporated peer review comments	Feb 2023
2.1	Final edits and checks – [redacted]	May 2023

Contents

Section A Project management

1. Project scope

The Wet Jacket Peninsulas aerial 1080 operation is part of an adaptive management trial to develop tools with which to reverse the decline of the Southern Fiordland tokoeka species of kiwi (SFT). This operational plan describes the planning approach for the second anticipated aerial 1080 operation specifically for the benefit of Fiordland tokoeka.

The predominant agent of decline for Fiordland tokoeka is stoat predation on younger birds less than 1200g in weight (approximately less than a year). In the absence of stoat control, wild populations of Fiordland Tokoeka are estimated to be declining by 2% p.a., with studies from Shy Lake, the Murchison Mountains and the Clinton Valley reporting kiwi chick survival being <17% and as low as 0% each year (Internal Shy Lake reports). The secondary cause of chick loss is misadventure.

To achieve enough chick recruitment to allow populations of SFT to increase, stoats must be controlled to low levels over multiple SFT breeding cycles/years. To achieve this on a large enough scale to protect the species, it is anticipated large tracts of Fiordland will have to undergo stoat control on a cyclic period. At present aerial 1080 is considered the best tool to control stoats to low levels over large tracts of land cost effectively, provided a suitable vector is available to provide secondary poisoning to resident stoats. Aerial 1080 also has the benefit of controlling rats and possums to very low levels at the same time; possum and rat numbers will be measured before and after the 1080 drop as part of the scope of operation.

The 2023 Wet Jacket Peninsulas operation aims to further test whether treatment of Fiordland peninsulas with aerial 1080 can reduce stoat predation (through secondary poisoning of stoats via rodents and possums) sufficiently for kiwi recruitment over multiple seasons. It also provides an opportunity to further test the use of trail cameras for monitoring stoat numbers at low densities, to assess whether they are sensitive enough to provide an indices at which it can be assumed that SFT recruitment will be sufficient to prevent localised extinction. Quantification of kiwi chick survival in the treatment year (T) and 2 years following (T+1, T+2) will inform parameters for a population model that will determine the ideal treatment 'return time' or desired management regime. The overall project will be deemed complete once T+2 chick survival is known, in May 2025. The 1080 operation will be deemed complete when the Pestlink report has been finalised.

The first aerial 1080 operation in this trial was undertaken in June 2020 and achieved a significant reduction in stoat numbers as detected by tracking tunnels and trail cameras set up along tracking tunnel monitoring lines, and at kiwi nests. However, despite low stoat detections both on predator monitoring devices and at kiwi nests, in the treatment year (T) 54.5% (6/11) of chicks of known fate were still predated by stoats, increasing to 63.6% (7/11) in T+1. In the year T 18% (2/11), and in T+1 27% (3/11), of monitored kiwi chicks of known fate survived past the 1kg/6mth threshold presumed as safe from stoat predation. Monitoring suggests that c.20% of sampled chicks may suffer 'other' non-stoat predation deaths each year (eg. natural causes, misadventure). Therefore, it may be assumed that in the years T and T+1, with low 'other' deaths, chick survivorship has the potential to reach c.45%.

2. Summary table of key documents

Table 1 lists the key project documents being developed for this project. A more comprehensive list is available in the project 'Home page' DOC-7028991.

Document	Reference	Purpose
Project home page	7028991	A quick reference collation of documents created for or relevant to this project
Operational plan	This document	A plan to guide the planning and implementation of the project.
Communication plan	DOC-7204952	Plan covering the consultation and notification of stakeholders and visitors about the operation which also serves as a record of those consulted and/or notified.
Work Allocation	7110715	Detailed list of tasks allocated to either the contractor or DOC staff.
Compliance register	7294661	Register of conditions and performance standards to be met by the project;
Action Plan bait application		A collation of planning needed on bait application days

3. Objectives and targets

The main objective of this operation is to provide learnings for an adaptive management program of Southern Fiordland tokoeka (SFT). Matching kiwi outcomes to results from an aerial 1080 operation will inform what is required for a successful management regime that may then be applied at other sites, allowing the sustainable conservation of the species throughout its range. There are four main outcomes for the 2023 Wet Jacket Peninsulas operation:

1. Increased chick recruitment of Southern Fiordland tokoeka (SFT) (Apteryx australis australis) enables the SFT population in the operational area to increase in the 2023/24 season (T).
2. The efficacy of 1080 to protect SFT on large Fiordland peninsulas is tested, including quantifying net population growth expected in the treatment year (T, 2023/24) and the following season (T+1 2024/25).
3. The efficacy of using trail cameras to monitor stoat abundance at low levels is tested, including quantifying an indices at which net population growth of SFT can be expected in a treatment year (T), and the following season (T+1).
4. Ecosystems are protected and restored against the pressures of rats, stoats, and possums.

Outcome target

The Shy Lake Southern Fiordland chick recruitment study will be the outcome monitoring used for this operation. Details and reports of the Shy Lake study can be found on the SOIK Fiordland homepage (DOC-5491418).

1. In the 2023/24 breeding season, 40% of SFT kiwi chicks monitored at the Shy Lake study site reach safe weight.
2. In the two breeding seasons after a 1080 operation (T and T+1) it is learned what proportion of SFT chicks monitored at the Shy Lake study site reach safe weight.
3. Recruitment and survival of kiwi chicks in the treatment year and year following (T, T+1) is greater than estimated yearly adult and subadult mortality (combined) indicating population growth. Annual mortality measured in transmitter years through the Skyranger system.

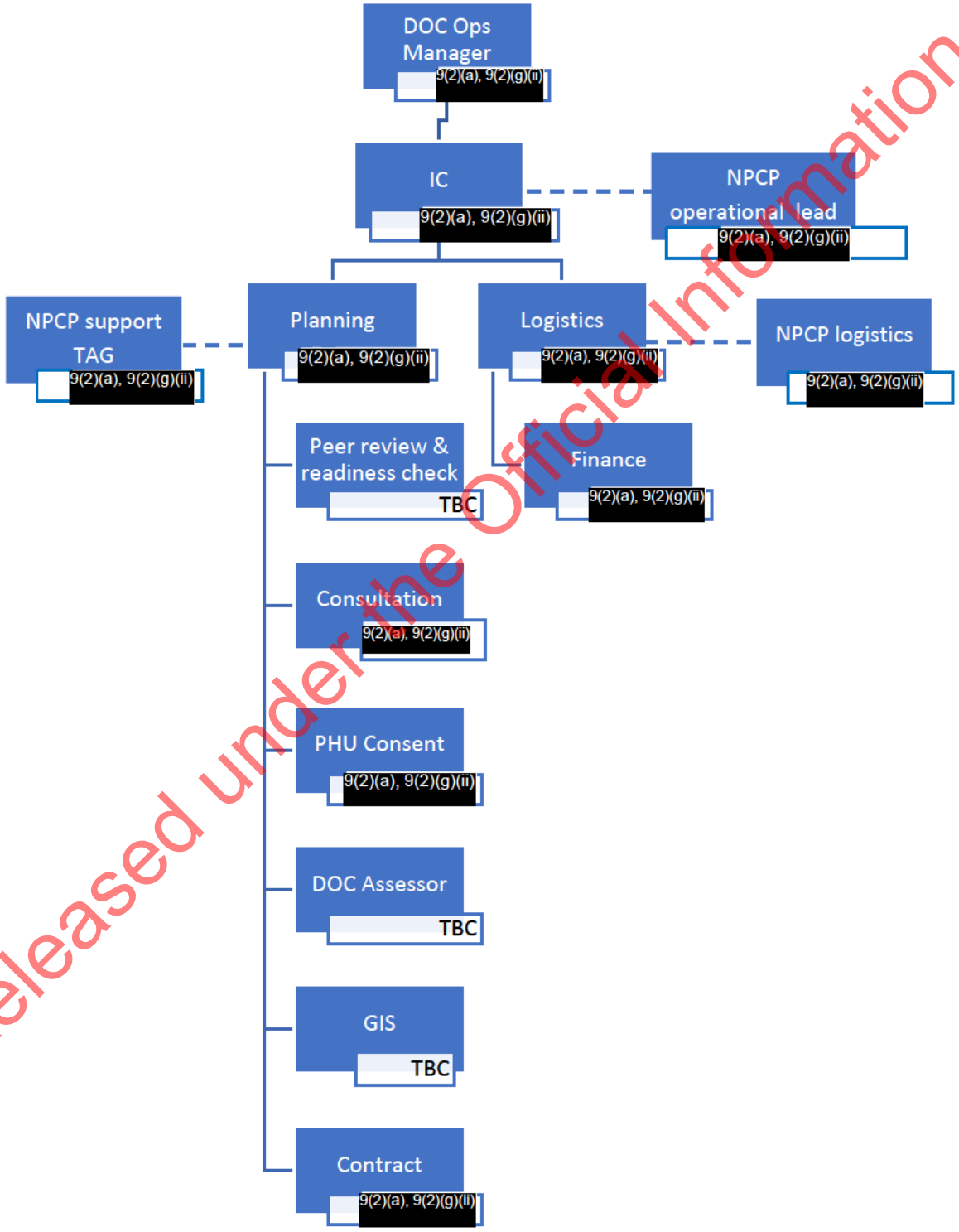
Result target

1. One-month post-operation, stoat tracking is 0% on the 21-day stoat survey run on the tracking tunnel network at Shy Lake, Mt Forster and Henry Burn.
2. In the one year post operation, stoat indices on predator trail camera network result is xx per 2000 camera hrs
3. <10% of monitored SFT nests show stoat visitation on trail cameras during the incubation and post-hatch period, indicating a reduction in stoat/kiwi encounters.

4. Project team

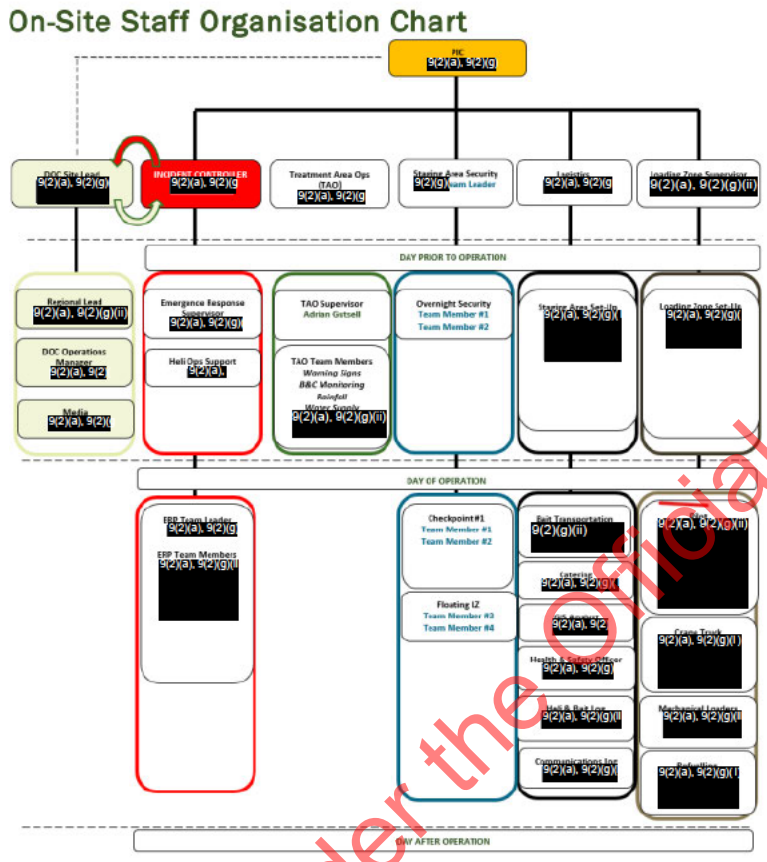
Planning/Pre-Operational phases

This planning team will be in place for all the Planning phase and through to the end of the Pre-operational phase of the animal pest framework.



Pre-operational/ Operational phase

This team will form during the Pre-operational phase of the Animal Pest Framework (after consents have been obtained) to allow the roles identified here to contribute to the planning of tasks and take responsibility for their implementation during the Operational phase.



Key Roles and Responsibilities

Title	Role	Responsibilities
Incident Controller	This is a DOC only role (generally filled by the DOC Site Lead). The IC oversees the operation and makes decisions on behalf of the Department, when required.	Ensure Work Allocation & SOW is fulfilled as agreed and to the standards required. The IC is the Departments representative on-site and must be part of any Incident Response decisions.
Project Manager (Contractor) Lead	Take charge and deliver the project. This is a single focus role i.e. the person should not have any additional roles within the structure on operational days.	Deliver all phases of the operation detailed in the SOW and Work Allocation to the standards required. Provide regular Situation Reports to the IC and include IC in any critical decision making.
Safety Officer	Oversee safe working environment and practices. This is a single focus role.	Support, mentor and audit the delivery of safety in the workplace.
Liaison (DOC Ops Manager)	Liaison between the IC on site and the DOC Director or other agencies, including media if required.	Co-ordinate any office-based response required from DOC in the event of an incident. Provide up-dates to the Director.
Contractor Base	Office support	Be available to organise addition resources for the operation if required.
Notifications	Communicate the 24-hour notice	Notify key stake holders identified in the Comms plan that the operation is going ahead.
Air Operations Manager	Supervises aerial baiting delivery.	Manage aircraft loading, bait, and sowing information to ensure aerial baiting is safely completed to standard.
Heli ground crew lead.	Leads the bait loading and refuelling team.	Liaison between pilots and Air Ops Manager. Leads bait loading team, bait loading and adherence to PPE and safety requirements within team.
GIS Technician & back-up person. As this is a specialist role there must be a fully GIS	Provide mapping services to support the planning and delivery of the project. This is a single focus role.	GIS mapping required during planning and implementation. Creates finalised shapefiles for heli operators. Captures data coming from helicopters on application days. Monitoring, recording, reporting and presentation of bait spread data.

competent back-up identified within the team.		
Bait log & aircraft tracking. Include back-up person	Capture critical data required to monitor operational delivery. This is a single focus role.	Accurately record each load the leaves the LZ, when and where it goes, what if anything is returned and the delivery method. Relay information to GIS.
Chief Pilot	Lead for Helicopter company	Make decisions on behalf of pilots and helicopter company. Liaise with Air Ops Manager.
Ancillary Flying	Staff transport.	Flying other than bait delivery. This may be carried out by a local company other than the helicopter company carrying out bait delivery.
Ground Operations Manager	Supervise implementation not covered by air operations	Manage ground-based tasks identified, specified and delegated in Work Allocation e.g. track clearing, security, bait transport, signs, emergency response etc.
Security Company Lead & number of staff	Provide on-site security for operational phase	Advise, plan, and deliver security to prevent or limit disruption of operation and risks to staff safety.
Bait Transport & number of drivers	Deliver bait from storage facility to loading zone.	Load and transport bait to LZ meeting all legal requirements and delivering bait in good condition.
Tracks Clearing and Sign installation lead & number in team	Lead field teams and liaise with Ground Ops Manager.	Install warning signs and clear tracks as per permission conditions
Emergency Response Lead & number in team	Lead emergency response team. Note this person cannot be filling another critical role on the day.	Be prepared to lead a team to respond to a range of incidents that may occur and follow the steps outlined in the Emergency Response Plan.
Water Tanker	Driver / operator	Drive and operate the water tanker/water supply at the site for dust control and washdown.
Logistics Manager	Provide logistical supplies required.	Manage logistical tasks required in the lead up to and on bait delivery days.
Facilities	Establish equipment and maintain supply	Maintaining generators, toilets, shelters, lights, heating etc.

Comms and Operational Log	On-site record keeping	Keep an accurate record of communication, decisions, movements, developments, and progress throughout application day/s
Catering	Provide food and drink for team on-site.	Ensure staff and sub-contractors are feed.
Weather watch	Provide latest weather forecasts on application days.	Provide latest forecasts to help inform management decisions on application days.

5. Contracts

Project management will be undertaken by Contract Wild Animal Control New Zealand Limited (CWAC NZL) under NPCP contract and as described in Statement of Work 7223165 and Work Allocation: 7110715

DOC will supply bait to the agreed storage facility in 9(2)(d), 9(2)(g)(ii). All storage and bait quality monitoring functions while the bait is in transit and in storage will be undertaken by the Department of Conservation.

Management of bait transportation from the storage facility to the Loading Zone (LZ) is the responsibility of the contractor. Bait will be transported by 9(2)(g)(ii) under a carrier contract between CWAC NZL and 9(2). CWAC NZL will be responsible for all bait quality monitoring and Hazardous Goods tracking once bait has left the store, to the point where all unused bait and bags are returned to the store. After this, DOC will again resume responsibility.

CWAC NZL will load the bait onto the designated truck(s) at the 9(2)(d), 9(2)(g)(ii) storage facility with support from the 9(2) forklift operator, under supervision and to the satisfaction of the 9(2) truck driver. Unloading of the truck will be done on-site, within the Loading Zone perimeter, by 9(2)(g)(ii) using a 9(2) trailer-mounted hi-ab and loader(s). These works will be supervised by an experienced 9(2) LZ supervisor.

Management of bait application is the responsibility of CWAC NZL. Bait application will be undertaken by 9(2)(g)(ii) under contract to CWAC NZL. All bait application requirements are described in:

- DOC / CWAC NZL Statement of Work 7223165

- CWAC NZL / 9(2)(g)(ii) Contract for Service
- DOC Standard Operating Procedures
- CWAC NZL Standard Operating Procedures

Management of staging area security is the responsibility of CWAC NZL. CWAC NZL will sub-contract an approved security company (approved by DOC as a member of the NPCP Security Panel) to undertake all security related tasks on-site. Security assessment is currently low-risk.

All other on-site project requirements including, but not limited to, GIS mapping support, aircraft and bait logs, track clearing etc. will be managed by CWAC NZL. For a full list of these management tasks please see the work allocation 7110715

6. Consents required

RMA	Not required. Notification will follow RMA requirements.
PHU Toxin Use Permission	Required from Public Health South.
DOC Toxin Use Permission	Required
Land Occupier Toxin Use Permission	None required. Land tenure is public conservation land in its entirety.
Loading Zone Permission	Located on public conservation land, permission via DOC permission. Transpower maintain the road, consultation re access to be undertaken.
Loading Zone Closure & Trespass Authority	9(2)(d), 9(2)(g)(ii) [redacted]. Trespass authorities will be provided to the security team.
Public Road Closure	9(2)(d), 9(2)(g)(ii) [redacted]

Conditions of the above listed consents and permissions are included in the Compliance Register for this operation 7294661

All communications relating to the above listed consents and permissions are recorded in the Communications Plan and Log for this operation DOC-7204952

7. Consultation

All pre-operational communications relating to this operation will be recorded in the Communications Plan DOC-7204952

Iwi consultation will be undertaken via the Kaitiaki Roopu Murihiku group. Consultation will be initiated via email with the key partners and stakeholders listed in the Communications Plan, providing context, a factsheet and map of the operational area, and an invitation to engage in person in consultation, discussion or provision of feedback.

In 2020 consultation revealed concerns regarding the perception of aerial toxin use on the overseas crayfish market. Buffers were put in place around the entire block to alleviate this concern. Fishing is not undertaken in the Fiords themselves, they crays are just held temporarily in holding pots off Sunday and Saturday Coves. In 2023 we will aim to avoid the placement of such buffers or reduce them to just around the two coves as buffers leave gaps which may compromise the success of the operation. A buffer around the entire block leaves an approx. 420ha 'gap' and is no longer deemed acceptable for managing a perception which is not founded by current scientific research.

A buffer will remain around the Wet Jacket Arm marine reserve to ensure baits do not enter the marine reserve, as required by the Marine Reserves Act (advice received from 9(2)(a), 9(2)(g)(ii)).

These changes to buffers will be communicated in consultation with iwi and other affected parties.

8. Monitoring

Stoats – trail camera monitoring and kiwi nest visitation rate

The number of kiwi nests in which stoats are recorded visiting on trail cameras will be used as an indication of stoat abundance at the site. In the three years pre predator control, an average of 78% of kiwi nests were visited by stoats. In the two years post-control nest visitation by stoats was reduced to 7% and 15% respectively. This operation aims to reduce the stoat visitation rate to <10%.

Stoat visitation at nests will also be used in conjunction with trail cameras on monitoring lines to investigate which metric provides the most sensitive measure of stoat abundance: comparison of detection days (yes or no, daily) or stoat detections per 2000 camera hours**.** This

will help to further investigate the use of tracking tunnels versus trail cameras as tools for detecting stoats at lower densities and calibrate them against the desired outcomes for SFT.

Tracking tunnels

The two standard relative index methods for result monitoring will also be used:

1) One-night rodent tracking tunnel monitoring rounds are run each quarter (February, May, August, November), with extra monitoring rounds being done immediately prior to toxin application, and one to two weeks post toxic application.

2) Twenty-one night stoat monitoring rounds are run each quarter (February, May, August, November), with extra monitoring rounds being done immediately prior to toxin application, and one to two weeks post toxic application.

Possum monitoring

Possums are believed to have arrived at the study site within the last 15 years and until 2020 have never been controlled at this site on a large scale. Some small scale possum fur recovery occurs on occasion. It is expected that possum abundance will be heavily reduced within the study area as an additional benefit of the 1080 operation. Pre-op chew wax-tag monitoring will be undertaken pre and post operation using 20 lines of possum chew wax-tags, as per the NPCA A1 National Possum Monitoring guidelines DOC 5651521. Along with indicating vector levels, this data will be compared to trail camera indices to investigate if trail cameras can be confidently used as a more sensitive and reliable detection method than chew wax-tags.

9. Timeline and Milestones

1. Milestone 1: Completion of the work set out under the Preparation Phase of the Task Allocation List (Consent Process, Operational Planning, Other Planning Documents, Bait, Logistics) by 30th April 2023
2. Milestone 2: Completion of the work set out under the Delivery Phase (Prefeed Pre-Operational Tasks, Operational Tasks, Post-Operational Tasks) by 30th May 2023
3. Milestone 3: Completion of the work set out under the Delivery Phase (Toxic Pre-Operational Tasks, Operational Tasks, Post-Operational Tasks) by 30th June 2023
4. Milestone 4: Other post-operational work as agreed in the Statement of Works and associated Task Allocation List Toxic baiting complete by 30th Sept 2023

10. Project risks and mitigation

Risk	Consequence	Likelihood	Mitigation
Opposition to Programme	- Coordinated public campaign against the programme - Potential disruption to planned operation	Low	- Develop comprehensive communications plan and log - Identify all landowners and occupiers - Undertake early and regular communication - Escalate potential issues and concerns early
Poor Bait Quality	- Reduced effectiveness of bait - Excessive dust - Higher potential for death of non-target species	Low	- Provision of suitable storage and transportation - Follow DOC Bait Handling Best Practice - Audit compliance against best practice
Unauthorised Access to LZ	- Delay or cancellation of operation - Injury to member of public - Injury to staff and contractors	Low	- Position LZ away from public view and access where possible - Provide adequate, trained and experienced security - Secure all access points and erect warning signage - Inform police of operation in-case back-up is required
Low Cloud / Fog	- Closing aircraft bait-transit routes to operational area	Moderate	- Undertake long range weather forecasting well in advance - Obtain information on weather from several reputable sources - Include learning about weather patterns from regular users of the area (e.g. helicopter operators, concessionaries) - Plan for potential delays due to morning fog or cloud

Mechanical Failure	- Delay or cancellation of operation - Injury to staff and contractors	Low	- All machinery to be maintained to manufacturers standards - Ensure spare machinery and parts are available on the day of operations and that there is a mechanic on-site - Test equipment prior to use
Boundary Over-sow to Land	- Legal non-compliance - Landowner complaint - Reputation damage	Low	- Contract competent and experienced helicopter operators - Undertake pre-operational boundary flights
Boundary Over-sow to Marine Area	- Legal non-compliance - Landowner complaint - Reputation damage	Low	- Contract competent and experienced helicopter operators - Use accurate and tested GPS in aircraft - Undertake pre-operational boundary flights - Place buffers as required - Low sowing rates will further minimise the chance of baits entering water bodies
Bait Spill (dropped bucket or spill at LZ)	- Delay or cancellation of operation - Injury to staff and contractors - Legal non-compliance - Landowner complaint - Reputation damage	Low	- Ensure all equipment is well maintained and tested prior to use - Ensure all hooks and attachment points are structurally sound and working prior to operation commencement - Only identified staff working under supervision of the LZ Operations Manager are to attach loads under an aircraft

			- Attach loads away from areas where there are ground crew operating, as much as possible
Water Supply Contamination	- Public Fatality or Ill Health - Adverse Media Interest - Reputational Loss	Low	- Identify drinking water sources through consultation - Record all water supply sources and identify on operational maps - Apply exclusion zones and voids around water sources as per consent conditions - Ensure aircraft do not fly over water sources with loaded or unloaded hoppers - Disconnect water supplies where possible - Provide alternative supply of water where practicable - Undertake water monitoring where required

11. Project debrief and reporting

At the conclusion of the toxic operations CWAC NZL will undertake all post-operational notifications as per the Communications Plan. At this point CWAC NZL will provide to DOC a reconciled Communications Log for the entire operation.

A post-operational debrief will be undertaken between DOC, CWAC NZL, 9(2)(g)(ii) and the Contract Manager directly after the pre feed, and within four weeks of the toxic operation. This will provide lessons into this and future operations.

Post-operational notification by CWAC NZL to Environment Southland to meet the requirements of Schedule 2 of the Resource Management (Exemption) Regulations 2017 will occur no later than 20 working days after operation completion. Notification will include a) a

map showing the completed aerial application boundary and b) the exact dates of both the prefeed and the toxic operations.

The contractor will install Bait and Carcass monitoring (preferably within the Shy Lake kiwi monitoring area for ease of monitoring). Monitoring and removal will be completed by DOC. A post-operational Bait & Carcass Monitoring Report will be completed by the DOC Site Lead when baits and carcasses have degraded to a point where the caution period may be lifted. Once approval to lift the caution period is received, all bait and carcass monitoring cages will be removed from the site.

Once the caution period has been lifted, warning signage will be removed from the operational area by DOC staff.

Once all the above information has been received by the DOC Site Lead, they are then responsible for all updates to the DOC Pesticide Application for this operation.

Within 6 months of operation completion DOC will be responsible for writing the Pestlink Report for this operation and supplying the required reporting to the EPA.

12. Project Compliance register

DOC - 7294661

Section B Operational

13. Site description

The area contains a diversity of vegetation typical of central Fiordland and the Doubtful Ecological District. The area extends from the coast up to mountain tops. The most extensive vegetation is silver beech forest; however, this varies with altitude, slope, drainage and soils. Coastal silver beech forest has some rimu, miro, Halls totara and southern rata present in the canopy or emergent above. This forest tends to be rich in associated species. At moderate altitude silver beech is generally dominant but may contain some kamahi, rata and Hall's totara. With increasing altitude, the silver beech forest becomes stunted and locally grades into mountain beech. Also present at higher altitude and where the soils are thin and/or heavily leached pink pine becomes common generally with mountain beech and generally with some manuka, southern rata and sometimes with Halls totara, kamahi, celery pine and leatherwood. Within the forest there are areas of valley floor Carex wetlands wetland such as adjacent to the inlet of Shy Lake.

The alpine zone is dominated by Chionochloa acicularis and/or C. crassiuscula tussockland with areas of cushionbog. Fellfields are restricted to higher ridges and other localised highly exposed areas. Sub-alpine shrublands are generally associated with rocky areas or disturbed areas at or below treeline. The sub-alpine shrublands is generally dominated by a mixture of pink pine, silver beech, mountain beech and manuka with some inaka, Dracophyllum rosmarinifolium, pineapple shrub, Hebe mooreae, Coprosma psuedocuneata and leatherwood. In some area's leatherwood is dominant and locally (particularly on boulderfields) is a tree daisy shrubland composed of a mixture of leatherwood, mountain holly and Olearia crosby-smithii.

The diversity of forest and other habitats contributes to the rich flora recorded from the area.

Conservation Values

Although the primary focus of the operation is for the benefit of southern Fiordland tokoeka, several other threatened species are known to exist at the site based on work in a sub-sample of the area (the Shy Lake chick recruitment site). Although the wider treatment area is likely to contain a more diverse and numerous range of species, based on the Shy Lake recruitment site, at a minimum there are populations of:

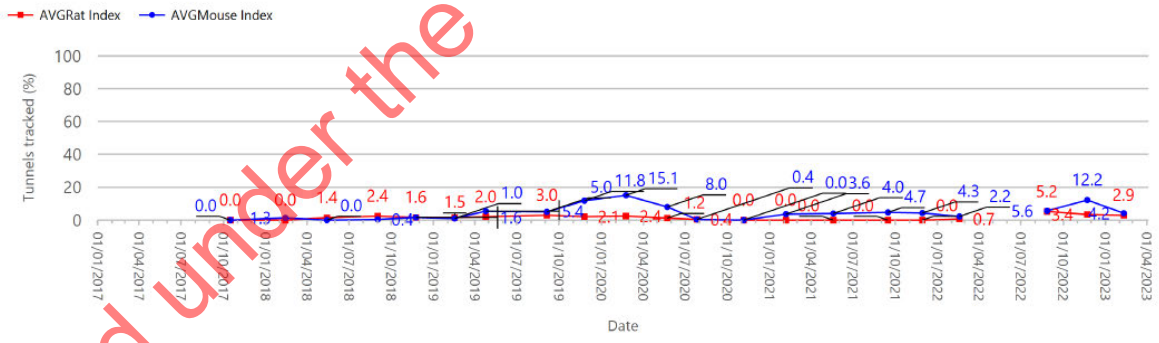
kea (nationally endangered), kaka (nationally vulnerable), rock wren (nationally critical), Scaup, paradise duck, falcon, ruru, tomtit, robin, kereru, fantail, brown creeper, grey warbler, rifleman,

silvereye, weka, long-tailed cuckoo, giant earthworms (Octochaetus spp.), kokopu, long-finned eel.

Threats

Stoats are the primary agent of decline in SFT kiwi. Monitoring of juvenile kiwi at the study site showed no monitored kiwi chicks survived in the three seasons prior to predator control (2017-mid 2020). Kea have been recorded visiting kiwi nests at Shy Lake and have been confirmed to have predated 2x chicks and an egg, plus a third potential chick, across five seasons. Whether the kea were initially attracted to the nests by human presence or trail camera is unknown. Possums were recorded visiting nests and it is possible they would target kiwi chicks. Possums also present a general threat to ecosystem health. Stoats, rats, mice and possums are a listed threat for many of the forest species listed.

The Wet Jacket Peninsulas have a pattern of low rodent density, never tracking higher than 3% rats prior to the first 1080 operation, reaching a high of 5.2% in Aug '22 for the first time since monitoring began in Nov 2017. The June 2020 operation was completed with rats tracking pre-op at 1.2% and mice at 8%. Possum control had never been undertaken at this site prior to June 2020. Possum index pre-operation was 42% (April 2019), and post-op 9% (Sep 2020).

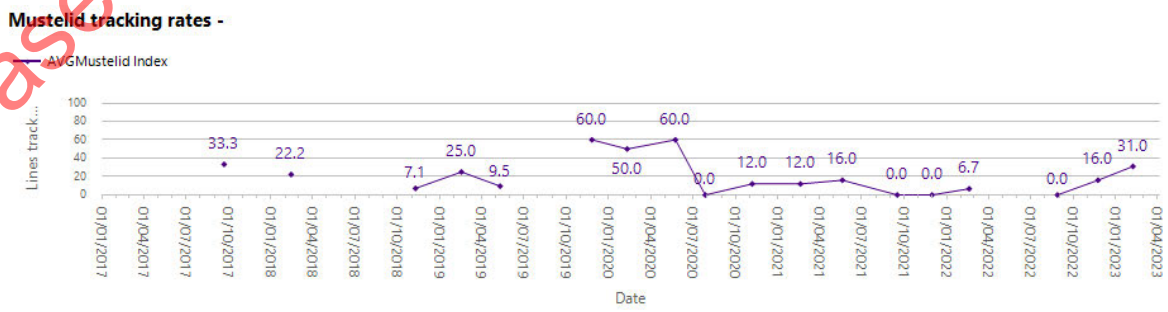


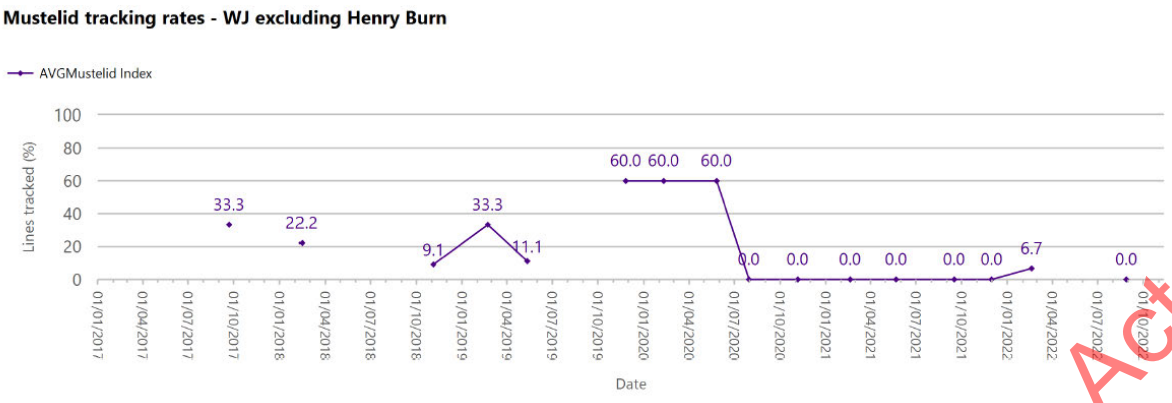
Results and outcomes from July 2020 1080 operation

The first aerial 1080 operation in this trial was undertaken in June 2020 and achieved a reduction in stoat numbers as detected by tracking tunnels from 60% pre-treatment (May 2020) to 0% post-treatment (Aug 2020). Zero stoats detected in tracking tunnels continued for all but the Henry Burn lines (which are right on the edge of the block and presumably subject to faster re-invasion) through to Feb 2022. However, trail camera monitoring at Shy Lake proved to be much more sensitive at detecting stoats. Pre-treatment there were 162 stoat detections (May 2020), this reduced to just 4 detections (believed to have been just one stoat) post-treatment in Aug 2020. In Nov

2020 cameras detected zero stoats. The trend of low stoats continued through to Nov ’21, then jumped significantly in Feb ’22.

Month	# of stoat detections on predator trail cameras
May 2020 (pre 1080)	162
Aug 2020	4
Nov 2020	0
Feb 2021	2
May 2021	7
Aug 2021	1
Nov 2021	1
Feb 2022	20
May 2022	No data
Aug 2022	1
Dec 2022	10
March 23	Data due end of March





Excluding Henry Burn lines

The proportion of SFT nests which were visited by stoats also decreased significantly, from 67-89% in the 3 years pre-treatment to 7.1% (1/14) in year T, and 6.7% (1/15) in the year T+1. However, despite low stoat detections both on predator monitoring devices and at kiwi nests, in the treatment year T 54.5% (6/11) of chicks of known fate were still predated by stoats, increasing to 63.6% (7/11) in T+1. In the year T 18% (2/11), and in T+1 27% (3/11), of monitored kiwi chicks of known fate survived past the 1kg/6mth threshold presumed as safe from stoat predation. These recruitment figures, although low, are enough to counteract the 2% estimated decline and thus allow for the population to sustain itself.

Issues

The treated area needs to be sufficiently large that increases in SFT chick production within the block within infrequent treatments (potentially limited to mast years) will lead to a net increase in total SFT population through the species' distribution.

Current best practice uses 1080 to target stoats via secondary poisoning, in years with high rodent numbers following beech and podocarp masting (mass seeding) events. The ideal timing for a 1080 operation to protect SFT is currently believed to be:

a. **Once abundance of vectors is believed enough to ensure by-kill of stoats:** the sufficient vector required to achieve good stoat knockdown is currently unknown, however a good stoat knockdown was chevied in 2020 with a starting point of 1.2% rat tracking, 8% mouse tracking and possum index of 32-54%. Rodent tracking is currently (Aug 2022) at 5%, however possum numbers are expected to still be quite low (monitoring results to come).
b. **Before stoat kits emerge from maternal dens**: from early November.

c. **Before SFT chicks emerge from burrows and become independent of the parent birds**: The Median emergence date for the first clutch of SFT over first 2 seasons at shy lake is October 21st. Based on these data, an operation before October 13 would precede >80 % of SFT chick emergence.

In order to meet the above criteria and avoid substantial snow-cover in the alpine areas it is proposed to undertake this operation in May-June 2023, with pre-feeding from mid April. Obtaining a suitable 2-3 day weather window is critical and complex. This operation is remote and challenging, requiring significant ferry times through several significant mountain ranges on both sides of the main divide.

Other management at the site

- Trapping on peninsula ends as buffer/incursion prevention for Resolution Island programme
- Site sits within/adjacent to a wider network of pest control operations in the dusky and doubtful sounds and it is hoped will reduce dispersal of rats and stoats to Resolution Island.
- Shy Lake tokoeka chick recruitment study
- Camera trapping study pre and post operation (Landcare & DOC)
- Tracking tunnel network
- Seed funnel network
- Helicopter phenology monitoring
- Future management of stoats via aerial 1080 is planned, dependent on the results of this operation

Past management:

- Wet Jacket Peninsulas aerial 1080 operation carried out June 2020, Pestlink Ref: 2021TEA01

14. Overview of method(s)

Target species	Rats, possums, stoats.
Control method	Aerial
Pesticide	Sodium fluoroacetate (1080) - Pesticide use # 1, #141

Trade name of bait	0.15% 1080 Pellets
Type of bait	Cereal pellet
Toxic loading	1.5g/kg
Bait size	6gram
Bait type	RS5
Lure	Cinnamon (in pre-feed and toxic)
Lure concentration	Single lure (0.15% w/w)
Dye	Green (toxic bait only)
Number of pre-feeds	1
Sowing rate of prefeed	1.5kg/ha
Sowing rate of toxic bait	1.5kg/ha
Aircraft type	Helicopter
Number of aircraft	7
Navigational guidance system	TracMap
Sowing gear	Under slung bucket with spinner
Loading method	Hi-ab to mechanical loader

Timing of operation

Ideal timing at present is 1st May – 30th June 2023, with pre-feeding from mid April.

Extending the period through to 30th October 2023 is potentially possible, however delaying post the end of June is risky due to expected snow levels in the alpine and the requirement to complete the toxin prior to mid October (after mid-Oct 80% of kiwi chicks are expected to have hatched and therefore be vulnerable to predation).

If snow falls in the alpine area after pre-feed has occurred, the toxic is not to be sown as it risks a poor stoat kill in the alpine. Delay operation as necessary, which may require a second pre-feed. A second pre-feed is preferable to a poor stoat kill seeing as we now know we need a very low stoat abundance for kiwi recruitment to be even marginally successful.

Obtaining a suitable 2-3 day weather window is critical and complex. This operation is remote and challenging, requiring significant ferry times through several significant mountain ranges on both sides of the main divide.

Baiting should occur as per the "Method Best practice for National Predator Control Programme Aerial 1080 baiting" (DOC-2749355). Particular note should be taken of the following points:

- **Toxic baiting** should occur no sooner than 5 days **after prefeeding** but as soon as possible after 5 days. This should allow enough time for prefeed to be fully consumed and/or cached so rodents encounter only toxic bait on the ground and not a mixture of prefeed and toxic which would allow them to compare baits and reject toxic.

- Operations should consider **forecast weather** and logistics of both prefeed and toxic operations at the time a decision is made to go with prefeeding. Prefeed will require reasonably good weather after it has been laid with a maximum of 20mm cumulative rainfall forecast at the site over the first two nights.

- **Toxic bait** should be available for at least 2 **fine nights** (defined as not more than 10mm cumulative rainfall over the nights) immediately following application. Application should only take place if the weather forecast indicates there is a very high probability of this. When toxic bait application will occur over more than 1 day the weather forecast will also need to indicate 2 fine nights beyond the last day of application. Analysis of operational results indicates that fine 2 nights is a sufficient interval for rats to find and consume the toxic bait while it remains in good condition (both toxicity and palatability).

- **Delays** in laying toxic bait **after prefeeding** can lead to rodents not being exposed to prefeed and therefore much less likely to accept toxic bait in lethal quantities. The longer the interval between prefeed and toxic (after the minimum of 5 days see point 9 above) the worse this situation may become. For example, environmental circumstances like mast seed fall where rodents are breeding prolifically (i.e., every female is having maximum litter size) and producing newly independent rats not conditioned to prefeeding.

  At some point there becomes an advantage (in kill results) of repeating the prefeed after delays in applying toxic. This point will vary for each site and requires expert advice. Anticipated delays beyond 1 month days would trigger such discussions. For operations subject to the Aerial 1080 in Kea Habitat Code of Practice (DOC-2612859), compliance with the compulsory performance standards will need to be checked and considered as part of a decision to repeat prefeeding.

- **Avoid** baiting in **gusty winds** where possible. Accurate bait application is achieved in average wind speeds up to 20 km/h (11 knots). Operating in higher winds may be necessary as trade-offs are made between present and forecast weather conditions and seasonal timing of the operation. In higher winds bucket swinging and bait drift can result in gaps in the coverage or risk bait being applied beyond treatment boundaries. Maintaining a steady ground speed (which affects sowing rate) can be more difficult with headwinds/tailwinds.

Kea Code of Practice:

This site has kea present and therefore must comply with the kea code of practice (DOC-6075660). The site is not classified as a scrounge site, and has had aerial 1080 sown in the past 5 years, therefore, the compulsory standards 1 (bait type), 2 & 3 (max sowing rates) apply. These standards will be met by the planned operation.

15. Block and treatment area boundaries

The proposed treatment area encompasses both significant mainland peninsulas in Dusky Sound (the Wet Jacket Peninsulas), several small islands, and a buffer zone to the east. The proposed bait application area encompasses all vegetation from valley floor, up to and including ridges – except major lakes and areas above the treeline that mostly comprise of rock and lack vegetation. Lakes will not be sown over but there will be no formal exclusions, pilots will instead button off as they pass over large waterbodies.

Wet Jacket Arm / Moana Uta is a marine reserve, and the Marine Reserves Act requires that we do not sow bait into this area. For this reason, a 50m set-back will be in place around the marine reserve and on Oke Island. This is a sensitive boundary.

Saturday and Sunday Coves, plus the Sunday Cove water supply intake are buffered by 50m to provide a set-back to reduce the chance of baits entering the marine ecosystem around these areas where cray-holding pots are positioned. This is a sensitive boundary.

A flight corridor will be in place to link the mainland to Oke Isl, other than this, flying over the marine reserve should be avoided where flying conditions allow. A formal fly-over exclusion will not be in place due to the complex nature of accessing the block, but it would be appreciated wherever possible to avoid flying over the marine reserve.

The bait application area is set-back 20m from the Dusky Track, and the track and Supper Cove hut are outside of the bait application area. A combination of topo map and Strava data has been used to identify the exact route of the Dusky Track, with a conservative approach to buffering being taken. It is expected that the Supper Cove Hut water supply will not need disconnecting and that the Dusky track will not need clearing (subject to PHP).

A boundary swath is required around the coastal edges of the block and along the edge adjacent to the Dusky Track, but not along the Eastern inland boundary. Trickle as required on small islands and any awkward areas identified during the boundary flight. Small adjacent islands to be included are: Harbour Islands, John Islands, un-named Isl in Muscle Cove and entrance to the Marine Reserve, Oke Island, Girlies Isl. The total bait application area is approximately 39,429 ha.

There are two water intakes within the block. One public at Sunday Cove servicing boats. This will be disconnected prior to the operation and excluded as per PHU requirements. The second is a roof water intake at 9(2)(g)(ii) , a private DOC bivy used by DOC staff and contractors. This will be disconnected prior to the operation (by DOC staff if possible during kiwi work).

There is a second private DOC staff/contractor bivy called Possum Inn, located near Broughton Arm. This has no water intake. Any staff and contractors using this bivy during the operation will be instructed to fly in their own water.

Due to the remote location and long ferry distance increasing the risk that weather interferes with operations, the block will be split into three prioritised blocks. The priority will be the northern peninsula including the Shy Lake study site, the second priority the southern peninsula, and the third priority will be the small islands. See map in Section E for more detail. Blocks are for practicality only, the whole area will remain as one 'treatment block' for the purposes of permitting and PestApp. In the event the entire block is not sown, further discussion will be required with NPCP, DOC Operations and the contractor. It is likely snow will make the block harder to sow from late July.

16. Loading sites & other set up

9(2)(d), 9(2)(g)(ii)

9(2)(d), 9(2)(g)(ii) [redacted]

Risk	Solution
Fog	Forecasting / contingency plan and days / cross fingers
Ice/snow on road	Have road crew on standby to grit/clear road. Transport plan required.
Other road blockage (eg slips)	Have road crew on standby to clear road. Transport plan to be provided by CWAC.
Communications	In 2020 CWAC used a UHF mini-repeater which worked well. Since this time a DOC repeater has been installed but is untested for its reliability/coverage. DOC & CWAC now have access to Starlink and this will be used at this site. 2x forms of communication should be available at all times.

17. Security

DOC will provide a fortnightly situation report to the national Police team which includes information on up-coming operations, perceived risk levels and recent incidents related to those operations. The DOC Security team will be monitoring social media sites and providing reports to the NPCP team. Relevant information will be sent on to NPCP contractors and local police.

This operation is currently classed as low-risk due to the remote location. 9(2)(d), 9(2)(g)(ii) [redacted]

18. Public safety

The Wet Jacket Communication Plan DOC-7204952 outlines the target audiences for consultation and notification about the operation. The record contained within that plan shows who was contacted when and by what means and all outcomes of consultation.

Public notices will be placed in local newspapers prior to the operation.

An Information Sign will be placed at the 9(2)(g)(ii) gate prior to the pre-feed operation occurring. Pre-feed application signs will be erected the day prior to the pre-feed occurring. Warning signs will be erected as per the sign register in the Pesticides Application at least the day before toxic bait is laid.

No public areas which will need to be closed during this operation, however the Borland Rd is likely to be closed from Easter as is normal for this time of year to manage winter road conditions.

The Loch Maree to Supper Cove tramping track is excluded from the treatment area, the track will not be checked, nor walked held back, during the operation. The Supper Cove hut will be excluded from the treatment area. Information and warning signs will be placed on the track and at the hut prior to bait application.

The Sunday Cove vessel water intake will be disconnected and excluded from the operation as per the PHU consent requirements. The Celmisia Lodge DOC bivy roof water intake will be disconnected by DOC staff prior to the operation (note this is not a public use bivy and is used only by DOC staff and contractors).

19. Bait, storage and transport

Bait Transport

9(2)(d), 9(2)(g)(ii)

Management of bait transportation from the storage facility to the Loading Zone (LZ) is the responsibility of CWAC NZL. Bait will be transported by 9(2)(g)(ii) under a carrier contract between CWAC NZL and 9(2)(g)(ii). CWAC NZL will be responsible for all bait quality monitoring and Hazardous Goods tracking once bait has left the store, to the point

where all unused bait and bags are returned to the store. After this, DOC will again resume responsibility.

CWAC NZL will load the bait onto the designated truck at 9(2)(d), 9(2)(g)(ii) storage facility with support from the 9(2)(g)(ii) forklift operator, under supervision and to the satisfaction of the 9(2)(g)(ii) truck driver. Unloading of the truck will be done on-site, within the Loading Zone perimeter, by 9(2)(g)(ii) using a 9(2)(g)(ii) trailer-mounted hi-ab and loader. These works will be supervised by an experienced 9(2)(g)(ii) LZ supervisor.

20. Incidents and emergencies

A Safety plan with associated hazard register will be provided by CWAC. The DOC risk manager safety plan #22462 also covers NPCP operations within the SSI district.

In instances where an incident triggers an emergency response procedure the DOC Incident Controller, CWAC NZL Person in Charge (PIC) and the 9(2)(g)(ii) PIC (all on-site) will come together to form an Incident Management Team. The DOC Operations Manager will be situated in the Te Anau Office, to support and lead in the event of a critical incident.

The Staging Area will have a signposted First Aid station and first aid supplies will be on-hand for the team, should they be required. The local Medical Centre will be notified of the operation, so that staff are aware of timing and have safety information available to them.

All Staging Area personnel will:

- Hold a First Aid Certificate
- Be included in the pre-operational briefing for this operation
- Be able to access a set of incident management and emergency response procedures
- Wear hi-viz for the duration of the operation
- Wear appropriate PPE as per their role

21. Decision making on the day of bait application

On the day of the operation, for all standard Staging Area systems, processes and procedures decisions within the scope of delegated tasks will fall to those people delegated the task. The contractors project manager/person in charge (PIC) will take charge and deliver the project. This is a single focus role (i.e. the person should not have any additional roles within the structure

on operational days). The role of of the project manager/PIC is to deliver all phases of the operation detailed in the SOW and Work Allocation to the standards required and to provide regular Situation Reports to the DOC IC and include IC in any critical decision making. The DOC incident controller (IC) will oversee the operation and makes decisions on behalf of the Department, when required. All personnel are encouraged and supported to identify any concerns, issues or hazards they may encounter throughout the day. Where there is an emergency response required the plan outlined in Section 20 of this document will apply.

22. Bait spreading

Prefeed Bait	
Sowing rate of prefeed	1.5kg/ha
Total Prefeed Required	65,000kg
Type of bait	Cereal pellet
Toxic loading	Non-toxic bait
Bait size	6gram
Bait type	RS5
Lure	Cinnamon
Lure concentration	Single (0.15% w/w)
Dye	None
Number of pre-feeds	1

Toxic Baiting

Toxic Bait	
Sowing rate of toxic bait	1.5kg/ha
Total Toxic Required	65,000kg
Trade name of bait	0.15% 1080 Pellets
Type of bait	Cereal pellet
Toxic loading	1.5g/kg
Bait size	6gram
Bait type	RS5
Lure	Cinnamon
Lure concentration	Single (0.15% w/w)
Dye	Green

Number of applications	1

Bait loading

Application Information	
Package Size	300kg bulk bags (2 x bags to a pallet)
Loading method	Hi-ab to mechanical loader
Aircraft type	Helicopter
Sowing gear	Under slung bucket with spinner
Number of aircraft	7
Navigational guidance system	TracMap
Number of days for application	2-3

Data capture

Helicopter GPS data will be downloaded from each machine immediately after the first load and thereafter at refuelling times (approximately hourly). Downloads will be processed by the CWAC NZL GIS Analyst. The CWAC NZL PIC, DOC Incident Controller and 9(2)(g)(ii) PIC will be reviewing downloads once they have been mapped.

A bait log will be kept for each load leaving the loading site. This data will be precisely timed so that it can be matched with GPS downloads. Additional record keeping will include:

- An operational log of personnel on site, weather reports and records, decisions taken by Incident Controller;
- Tracking of bulk bags from the 9(2)(d), 9(2)(g)(ii) Storage Facility to the Loading Zone and back again;
- An Emergency Response Log containing all relevant communications and actions undertaken during an emergency response procedure (should one occur).

23. Demobilisation

Clean up and disposal

- Empty bulk bags will be rolled and stowed into a primary bulk bag and loaded back onto the transportation vehicle/s for transportation back to the 9(2)(d), 9(2)(g)(ii) bait storage facility. Any unused bait in bulk bags will be loaded back onto the transportation vehicle/s for transportation back to the 9(2)(d), 9(2)(g)(ii) bait storage facility. This material will be unloaded at

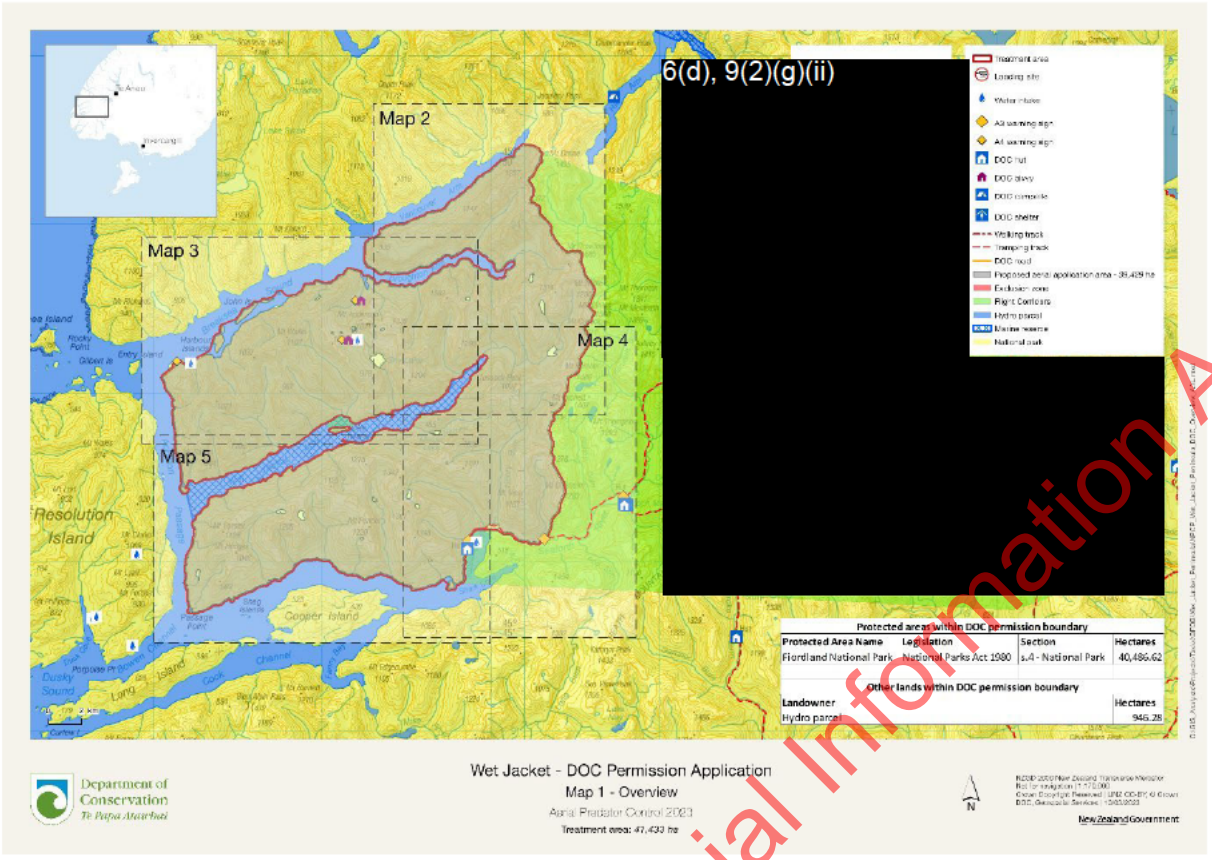
the store by a 9(2)(g)(ii) [redacted] forklift driver, under the supervision of a CWAC NZL team member. Disposal of this material is the responsibility of DOC, once it is back in storage.

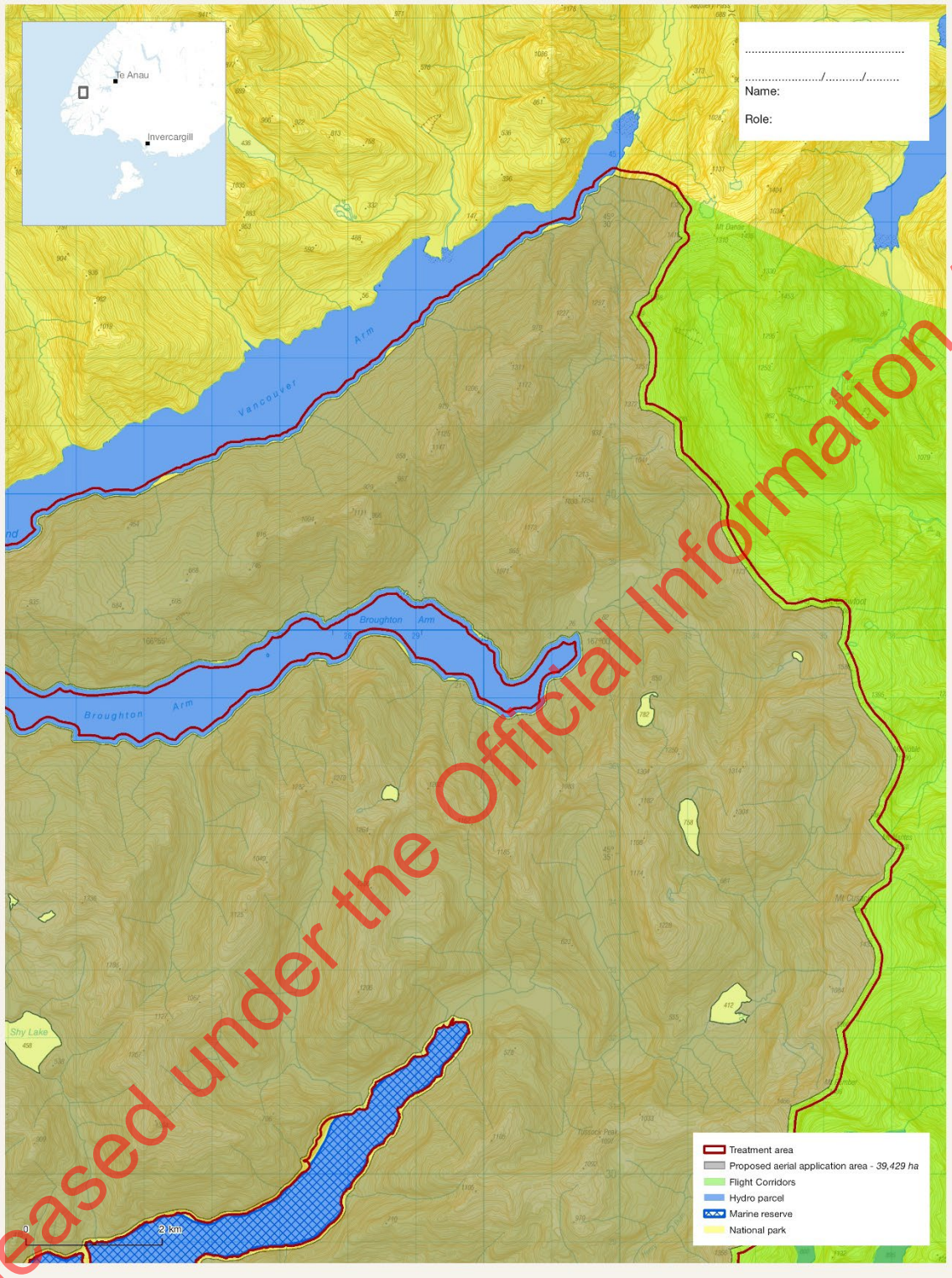
- Empty transportation vehicle/s truck decks will be cleaned once they are returned to the 9(2)(g)(ii) [redacted] facility, next door to the storage facility.
- The helicopter bucket and loader will be washed down with high pressure water after first removing any visible pellets remaining.
- The loading site itself will be searched for baits then washed down with high pressure water.

Section C Project Task list

Se work allocation DOC-7110715

Section E Maps





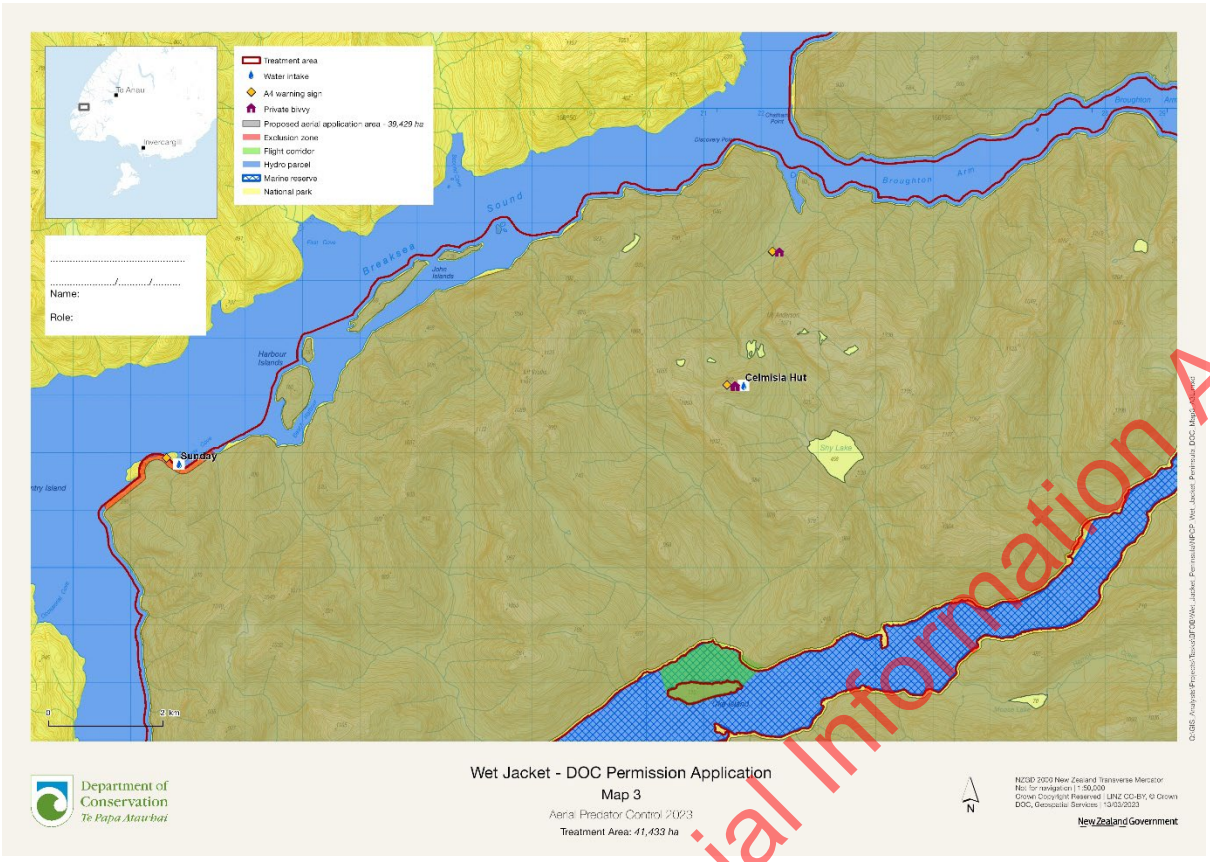
Department of Conservation
Te Papa Atawhai

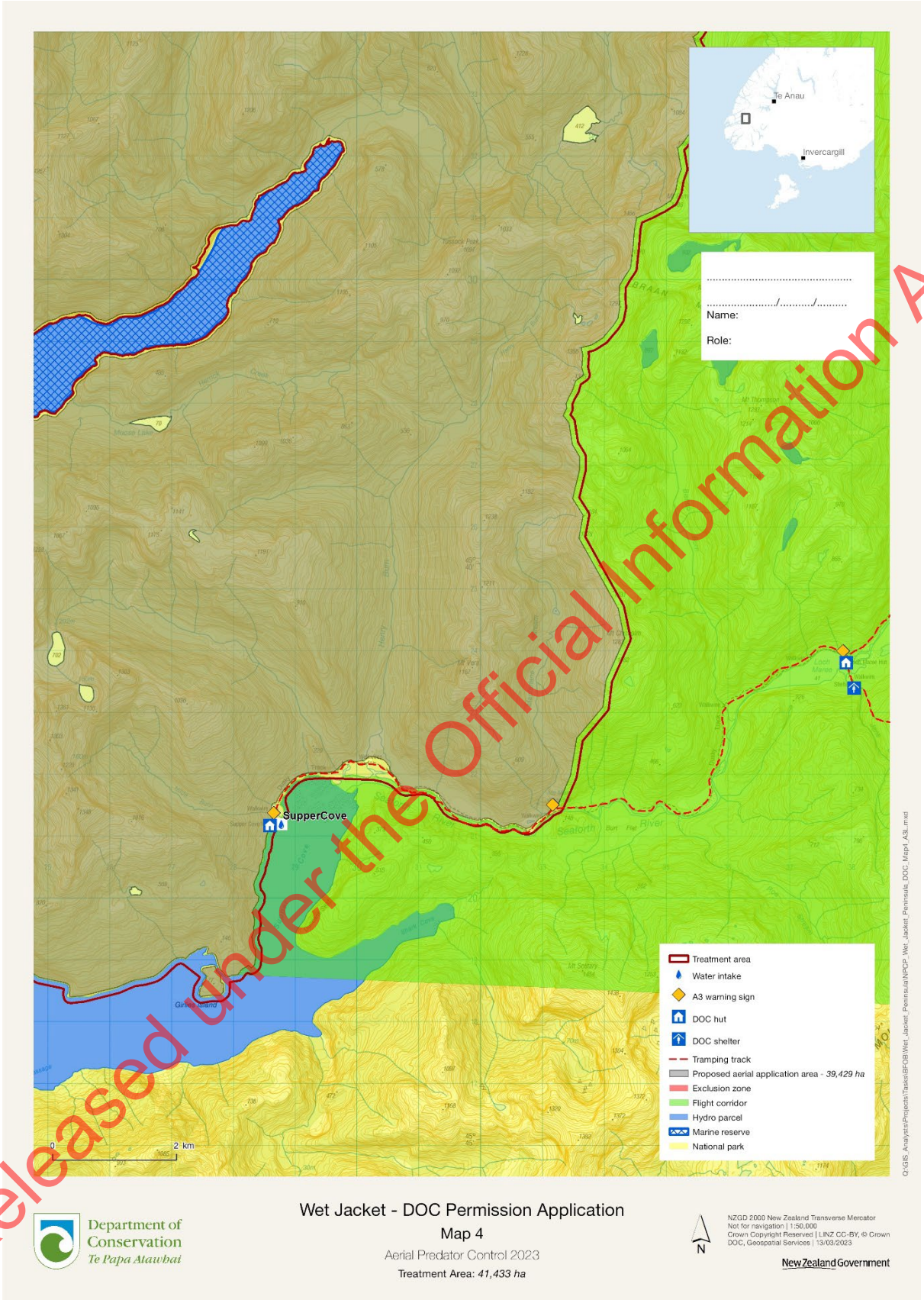
Wet Jacket - DOC Permission Application
Map 2
Aerial Predator Control 2023
Treatment Area: *41,433 ha*

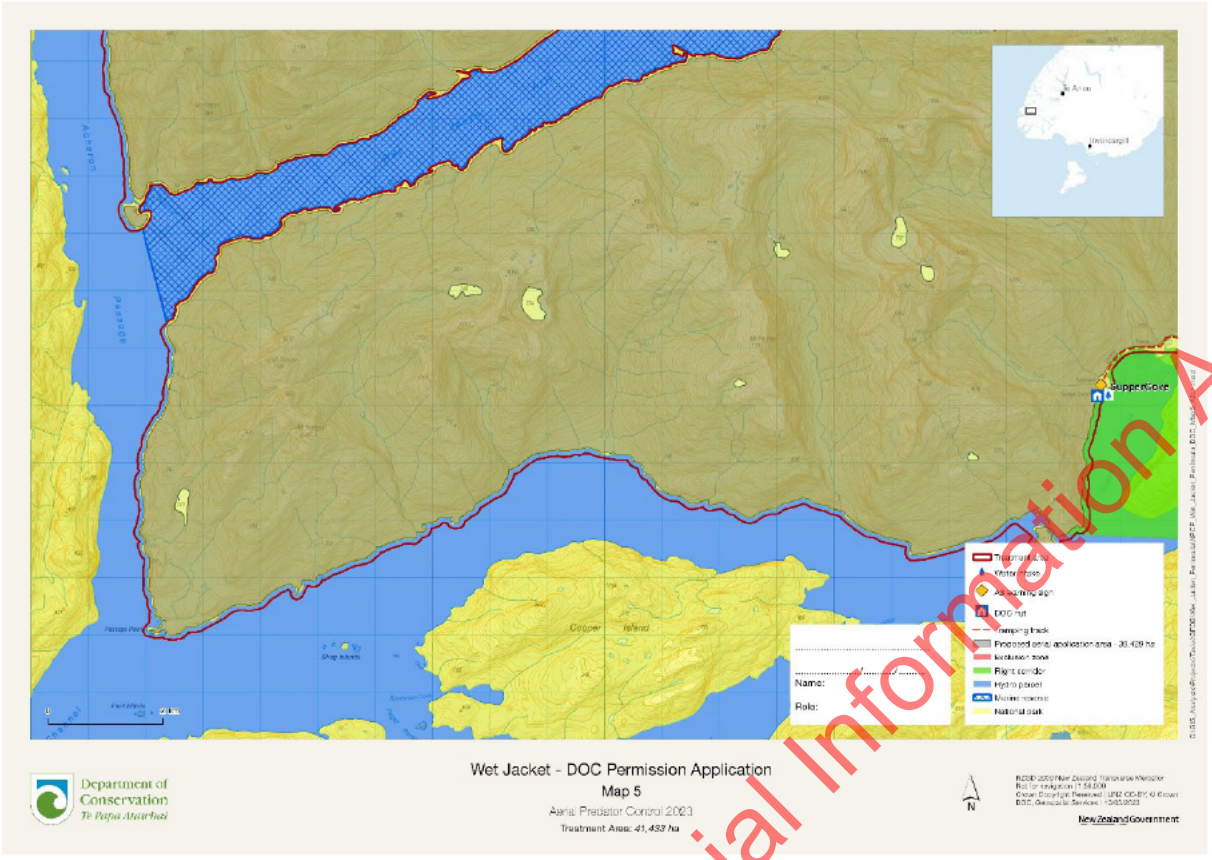
N

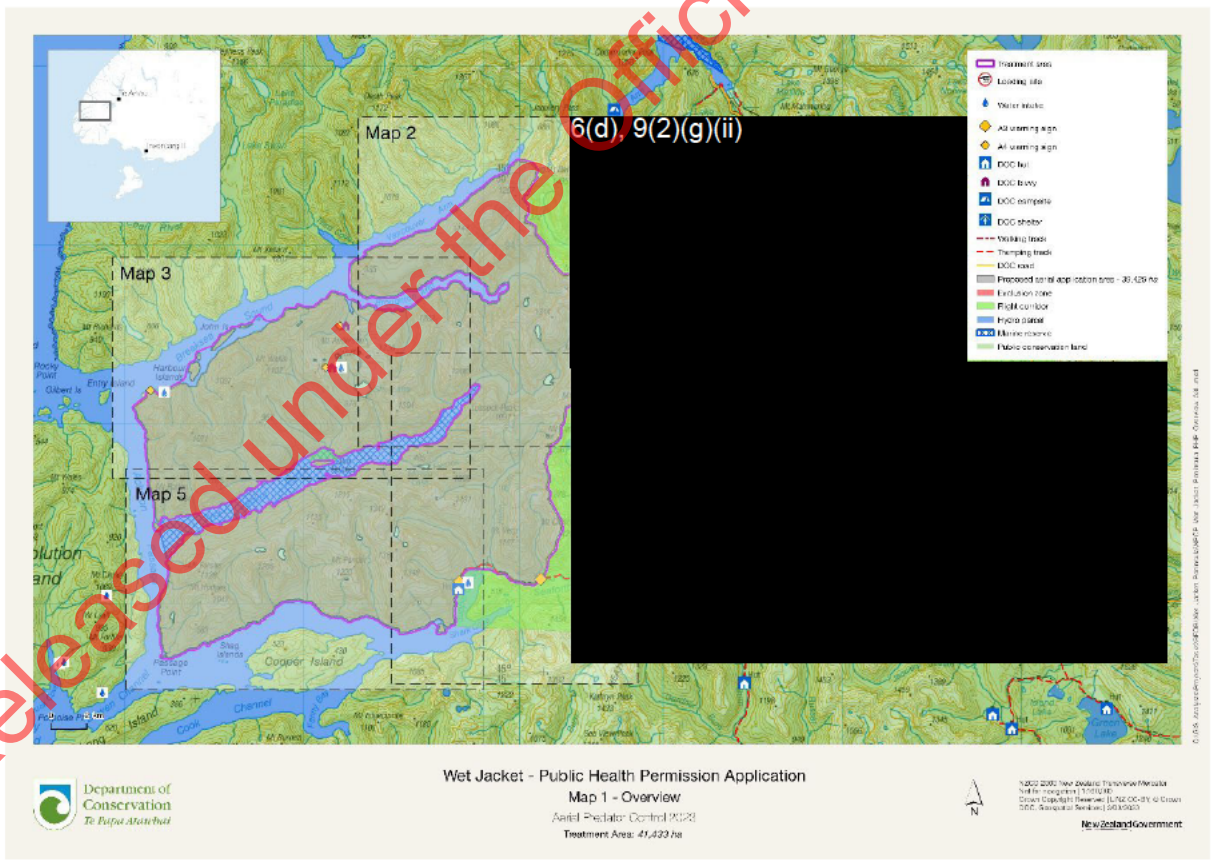
NZGD 2000 New Zealand Transverse Mercator
Not for navigation | 1:50,000
Crown Copyright Reserved | LINZ CC-BY, © Crown
DOC, Geospatial Services | 15/03/2023

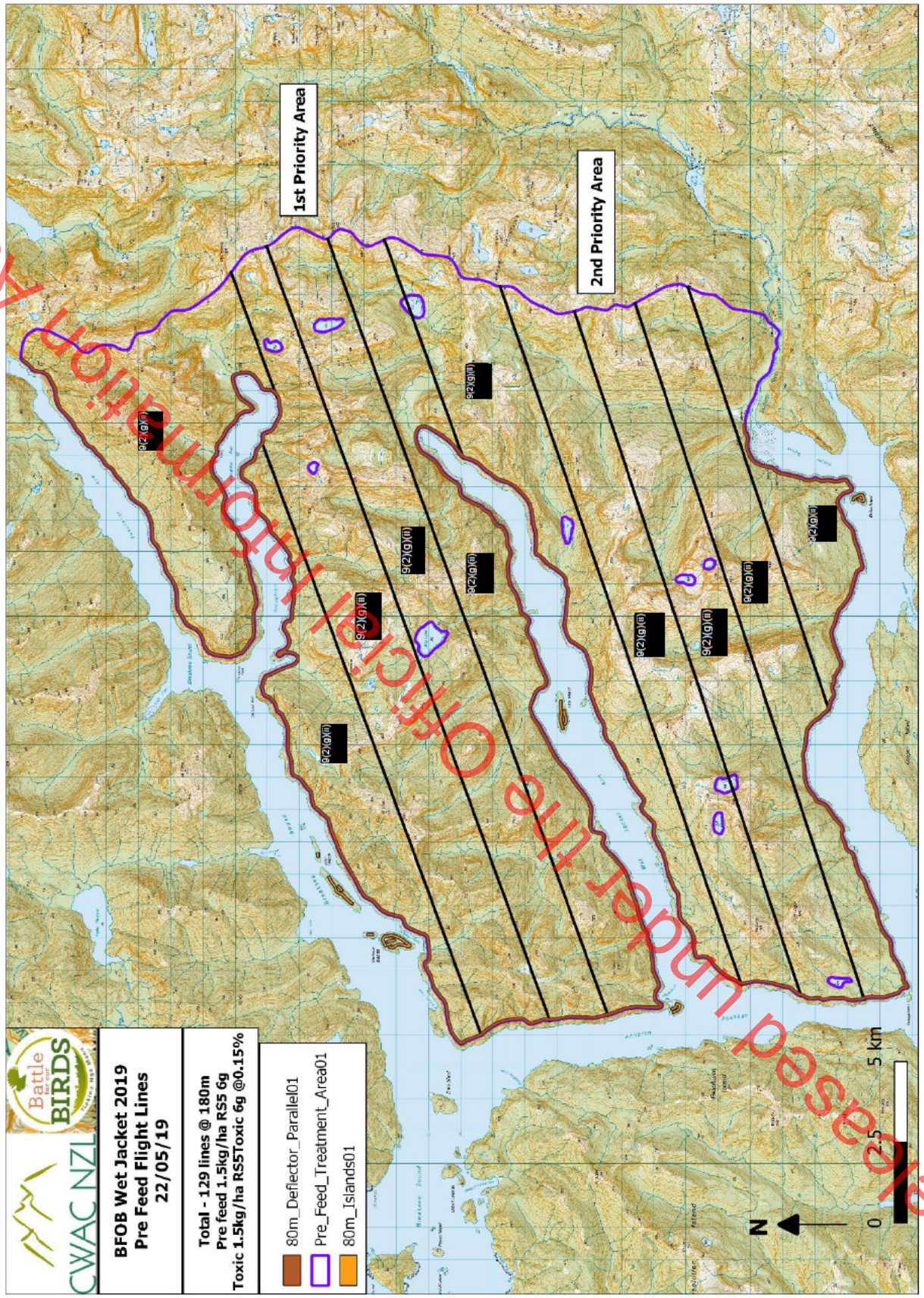
New Zealand Government











Save Our Iconic Kiwi – Fiordland
2022-23 Annual Report

Written June 2023 by Chris Dodd

Contents

Context

A sample population of southern Fiordland tokoeka is being monitored at Shy Lake, between Wet Jacket Arm and Breaksea Sound in western Fiordland. The goal is to determine if aerial 1080 alone can control stoats to a level where tokoeka populations can average a significant population growth over the control cycle period; and what the timing of that period should be. This will then be used to inform expanded pest control to increase Fiordland tokoeka populations in other areas. Basic behavioural and biological information is also being collected for the first time for the southern Fiordland tokoeka taxon. This report focuses on the work at Shy Lake and gives a brief outline of other SOIK work in Fiordland in the 2020-21 financial year. For more context on Save Our Iconic Kiwi and the rationale for the work in Fiordland, see the SOIK Implementation Plan 2018-2022 (DOC-5538590). For the previous report on the first two seasons at Shy Lake, see DOC-3227231 and DOC-6028979. For further information on anything in this report, contact Chris Dodd at the DOC Te Anau office.

This was the sixth season of recruitment monitoring at Shy Lake. The first 1080 operation took place in June 2020 and after two seasons that saw chick survival rates increase to up to 25%, Stoats were once again seen regularly on nest camera's.

Nesting 2022-23 season

Adult males were fitted with transmitters carrying Wildtech Ltd's Chick Timer Haast v4.4 software. Females carried Wildtech's GSK Diagnostic v2.0 software. The Chick Timer appeared successful in almost all cases at determining the onset of incubation. Two males have variable activity patterns and the software doesn't pick up on their incubation; in these cases it's also difficult to choose a reliable date from manual collection of the raw data. Overall the software does an excellent job and we now rely on it for all but the known difficult males.

See Appendix 1 for a map of the study area and this season's nests.

First clutch eggs were laid between approx. 13 July and 27 September. Second clutch eggs were laid between 24 November and 1 January. 70 days was used as the estimated incubation period, with predicted first emergence of the chick from the nest a further 5 days later. Without having cameras in the nest, we don't know exactly how accurate our hatch date estimates are; however the 75 days from onset of incubation to first emergence seems to be a pretty good estimate.

All nests were monitored with trail cameras, starting approx.. 40 days from lay date and continuing until the nest was resolved. Cameras were checked approximately fortnightly. 6 Powerex Pro rechargeable AA batteries would changed approximately fortnightly. 16 GB SD card was used and proved mostly adequate with exception of two occasions when cards were filled week before it was replaced. Footage taken was a 20 s video, taken repeatedly if the passive infra-red sensor camera continued to be triggered. The rest time between videos was 1 s but it is likely that some comings and goings of chicks and maybe predators were missed by the camera. It is a recognised issue that all passive infrared cameras will miss some things. Most cameras are all the same brand (Browning Dark OPS PRO XD) to try to ensure consistency, one Exodus II was used while all the Brownings were in use.

Transmitters on adults males only, combined with the size of the bird and bill, usually made it easy to tell which kiwi of the pair was seen on camera. There was no evidence of a third bird helping at any of the nests, although at one nest a third un-tx'd bird, (thought to be last season's chick) was regularly seen at the nest along with the un-marked female. More than 2 adults were never observed on camera at once. Daytime incubation was done by the male, the female would usually changeover at approx. 20:00-21:00 until 00:00 – 01:00 each night.

Table 1 summarises nests, chicks and trailcam footage of predators. After two seasons of minimal Stoat detections, sightings rose to 53%, still lower than before the 2020 drop, where 67 – 89 % of nests had stoat visits detected. One Possum was seen at a nest very close to the hatch date for that chick, although there was nothing to prove predation. Weka visits have remained consistent with the past two seasons. Kea visits rose to 27% many of these visits were from one individual banded bird as happened in the 20/21 season. A Weasel recorded at one nest was the first seen at the Shy Lake, a possible increase of this species may be linked to the reduction in Stoat numbers in recent years. Hatching success was at 70% this was a return to similar figures to the pre-drop seasons and continues to suggest that higher levels of disturbance leads to lower hatching rates.

The first Stoat was seen on camera on 9th October. Prior to the 1080 drop in 2020, Stoats had been seen on camera almost as soon as they were set up in early September, since then they're first appearance on camera has been in mid-

October often just prior to chicks hatching. Nine chicks were predated by stoats, only one surviving for more than a month. The remains of one was found on a Kea perch, it is suspected that this may have been predated by the Kea although scavenging could not be ruled out.

Table 1: Summary of 2022/23 southern Fiordland tokoeka breeding season at Shy Lake

Category	Number	Comments
Males with tx	13/12	One monitored male dropped his Tx mid-way through the first clutch
Females with tx	3	Two, mates of Monitored males and one who's mate was not on transmitter
Pairs monitored	13	Dropped to 12 for second clutch after one dropped transmitter
1st clutch nests inferred from tx activity / found	12 / 13	One nest was abandoned the night after we found it; this nest is therefore excluded from the totals below due to human interference.
2nd clutch nests inferred from tx activity / found	8/7	Only birds whose nest failed or chick died before late October re-nest. Not all birds failing this early re-nest.
Nests (with more than 1 week's trailcam footage) visited by stoats	8/15	The proportion of nests (53 %) with stoat visits detected this year rose sharply from 13 % last year. Although still below the pre-1080 seasons (67 – 89 %).
Nests visited by possums	1/15	
Nests visited by kea	4/15	The proportion of nests visited by kea rose to 27 % from 7 % in 21/22; many of the visits from a single, highly motivated banded individual. This was a similar story to the 19/20 season. The remains of one Tokoeka chick was found at a Kea perch it is suspected that this could be predation by Kea although it may have been scavenged
Nests visited by weka	2/15	One nest was very regularly visited, with 11 visits over the incubation period
Nests visited by Weasel	1/17	The first record of weasel at Shy Lake, this may be directly linked to the reduction of Stoats numbers in recent years
Nest abandoned, probably due to human disturbance	1/17	Excluded from totals below.
Egg hatched	12/17	Hatching success rates of 70.6 % were similar to pre-1080 drop seasons (67 % and 64 %); may reflect increased disturbance by stoats and possums.
Chick disappeared, fate unknown	3/13	Arrived a little later than predicted, and disappeared early before we could fit a tx.
Chick dead, stoat predation confirmed	9/13	Confirmed by field sign e.g. stoat scat, den, puncture wounds, stash site etc.
Chick dead, kea predation	1/13	Chick found at Kea perch, predated or possibly scavenged
Chicks surviving	0/13	

Comparing Fiordland tokoeka taxa

The breeding biology of southern Fiordland tokoeka remained unknown prior to this study.

There was no evidence of family groups or more than 2 adults at nests, as is seen on Rakiura; but this may well be an artefact of poor recruitment rather than innate biology.

Table 3 compares breeding statistics between southern and northern Fiordland tokoeka. Several years of data are summarised from the Clinton and Murchison Mountains studies, while Shy Lake is in its infancy, and so comparisons should be drawn with caution. Early indications are that the southern Fiordland tokoeka at Shy Lake nest more often and produce more eggs than their northern counterparts in the Murchison Mountains and Clinton, but chick survival is lower. This increased egg production is possibly directly linked to increased predation of chicks making a second nesting attempt in the season more likely.

Table 2: Breeding statistics of Fiordland tokoeka taxa

	Shy Lake southern FT 2022/23 season	**Shy Lake** southern FT 2021/22 season	**Shy Lake** southern FT 2020/21 season	**Shy Lake** southern FT 2019/20 season	**Shy Lake** southern FT 2018/19 season	**Shy Lake** southern FT 2017/18 season	**Murchison Mntns** northern FT 2003-2009 seasons	**Clinton Valley** northern FT 2001-2005
Males monitored	13 Males	16 Males	16 males (excludes one nest deliberately not found)	17 males	16 males	13 males	45 different males	21 different males
Nests monitored	17: 11 first clutch, 6 second clutch	15: 10 first clutch, 5 second clutch	14: 11 first clutch, 3 second clutch	22: 15 first clutch, 7 second clutch	21: 15 first clutch, 6 second clutch	16: 13 first clutch, 3 second clutch	105	41: 30 first clutch, 11 second clutch
Proportion of males recorded nesting (not all NFT males were monitored every season of the projects)	12/13 = 92%	10/15 = 66.7%	13/17 = 76 %	14/17 = 82 %	14 or 15/16 = 88 or 94 %	13/13 = 100 %	34/45 = 76 % nested at some point during project	14/21 = 67 % nested at some point during project, but some only monitored for one season. 47-78 % depending on season.
Eggs per male per year	1.3	1.0	0.94	1.29	1.38	1.3	0.82	0.79
Infertile or very early embryo death	Unknown	2/15 +13.33	Unknown	Unknown	1/14 known = 7 %	1/13 known = 8 %	16 %	22 %
Hatching success	12/17 + 70.6 %	12/15 = 80%	12/14 = 86 %	10/22 = 45 %	14/22 = 64 %	10/15 = 67 %	47 %	78 %
Chicks survival (first 183 days)	0	3	2	0	0	0	37 % in trapped area 17 % in untrapped area	16 %
Chicks predated by stoats (known and suspected)	76.9	58.3 %	58 %	80 %	86 %	100 %	78 %	69 %

NB. Two nests in 2017-18, 1 in 2018-19, 2 in 2020-21 and 1 in 2022-23 have been excluded from some of the percentage calculations, where there's reason to believe that human disturbance or influence may have adversely affected the outcome.

Pest & phenology monitoring

Three sets of 5 lines of tracking tunnels were run at Shy Lake. Together with a set at Mt Forster and a set at Henry Burn, both between Wet Jacket Arm and Dusky Sound. A further set of 4 lines was run this year at Beach Harbour, which were added as part of a wider spread of monitoring as opposed to specifically for the Wet Jacket Peninsulas kiwi study. These were considered representative of the Wet Jacket Peninsulas pest control block. All lines were run overnight for rodents, and 21 nights for mustelids and rodents, in August, November, February and May, except for beach Harbour which is run overnight for rodents in November, February and May, and 21 night mustelid survey in February only.

Tunnel tracking rates for mustelids and rodents were reduced to zero after the June 2020 1080 operation (Appendix 2) and rodent tracking remained at zero or less than 1% for at least 20 months through to February 2022. Rat numbers were climbing by August 2022, reaching 5.2%, the highest rat tracking rate to date for the project.

Tunnel tracking rates for mustelids were reduced to zero after the June 2020 1080 operation. A climb in rates from November 2020 – May 2021 was from the Henry Burn site, on the eastern edge of the block, where reinvasion might be expected to be detected first. Although the tracking tunnel network continued to not detect stoats, the more sensitive trailcam network showed a slow increase in stoat detections at Shy Lake by February - May 2021.

The trailcam network originally set up in collaboration with Manaaki Whenua Landcare Research continued throughout this year, with surveys run according to DOC-5990928 in conjunction with the tracking tunnel surveys. See Appendix 3 for a map of the camera network. The trailcam system appears to have fulfilled its promise to be a more sensitive tool than tracking tunnels in detecting stoats at low numbers. A paper is being written on the results from the first few years of the trail camera survey, led by [redacted] of Manaaki Whenua. Further analysis of the trailcam data was sought, and this was undertaken by Joris Tinnemans (DOC Science Technician, Landscape Threats Science Team), at time of writing a report is pending.

14 seedfall funnels are run in the Shy Lake area for monitoring mountain and silver beech seed. Seedfall collection runs between Feb-May each year.

Pest control

The second Wet Jacket Peninsulas SOIK aerial 1080 operation took place over approx. 40 000 ha in mid June 2023. The operation again took place with low rodent numbers, 4.1% in Feb 2023 and lower possum numbers than in 2020; 10% WTI in March 2023 as opposed to 42% before the first 1080 operation. Stoat numbers had risen to 28% tracking in Feb 2023.

For further detail on the operation, see the Wet Jacket 1080 Operation Homepage DOC-7028991 and the Wet Jacket Operational Plan DOC-7205093.

Territory mapping

The SOIK Fiordland tokoeka monitoring plan DOC-3156071 calls for territory mapping at six sites throughout Fiordland over the course of five years, on an ongoing basis. Trips follow the protocol DOC-5597576. The Second year of monitoring at Mystery Burn and Point Burn valleys in the Murchison Mountains went ahead this season after a late cancelation due to Covid in 2022. The trip took place from February 13-20, 2023. The trip report will be written by Hugh Robertson.

Finance

The budget for the Shy Lake study for 2022/23 financial year was $121'250 excluding salaries and wages. We finished the year aprox. $39'000 underspent (excluding salaries). The main reasons for the underspend were:

- lower kiwi chick survival than budget allowed for, meaning less monitoring required and less transmitters to buy;

Staffing

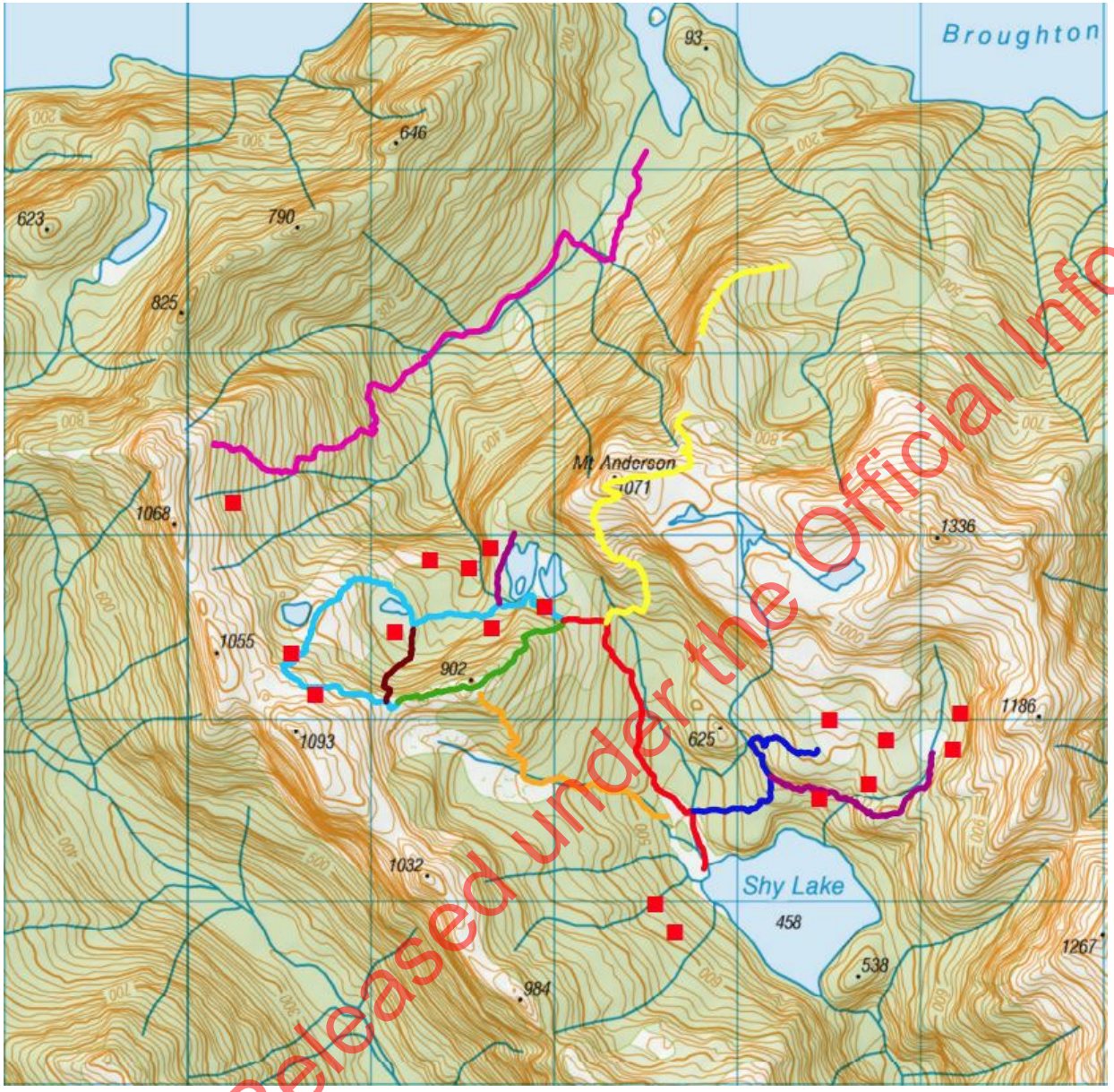
The SOIK Shy Lake project was extended for another three years to allow for further monitoring through a second 1080 drop. Chris Dodd joined the team as project lead from the beginning of August 2023, with Monty Williams adding his knowledge and experience of the site to the team, both roles are fixed term three year contract. Casual waged workers, salaried staff from the SSI region and occasionally contractors were used for field support, at times we struggled to find people with the requisite skills, but some experienced field workers should be more available after a busy season with Island incursions

9(2)(a), 9(2)(g)(ii) and 9(2)(a), 9(2)(g)(ii) continued in their respective roles of combined predator control lead and SOIK operations planner. In August 2023 Peter McMutrie replaced Troy Watson as supervisor for Chris and Dulkara Martig become supervisor for Monty. Jamie McAulay continued as senior ranger.

Engagement & advocacy

The Kiwi Diaries, A three-part series for DOC's YouTube channel was due to release in June 2023 and set to coincide with this winter's 1080 drop. Belle Gwilliam from the DOC media team (digital content advisor) had previously visited Shy Lake in October 2020 and May 2021 returned along with Lucy Holyoake (Digital Channels Analyst) in October 2022 to film the third part of the series and put finishing touches to previous episodes

Both 9(2)(a), 9(2) and Doddy were interviewed for DOC Sounds of science podcast in May 2023 released in conjunction with the Kiwi Diaries.

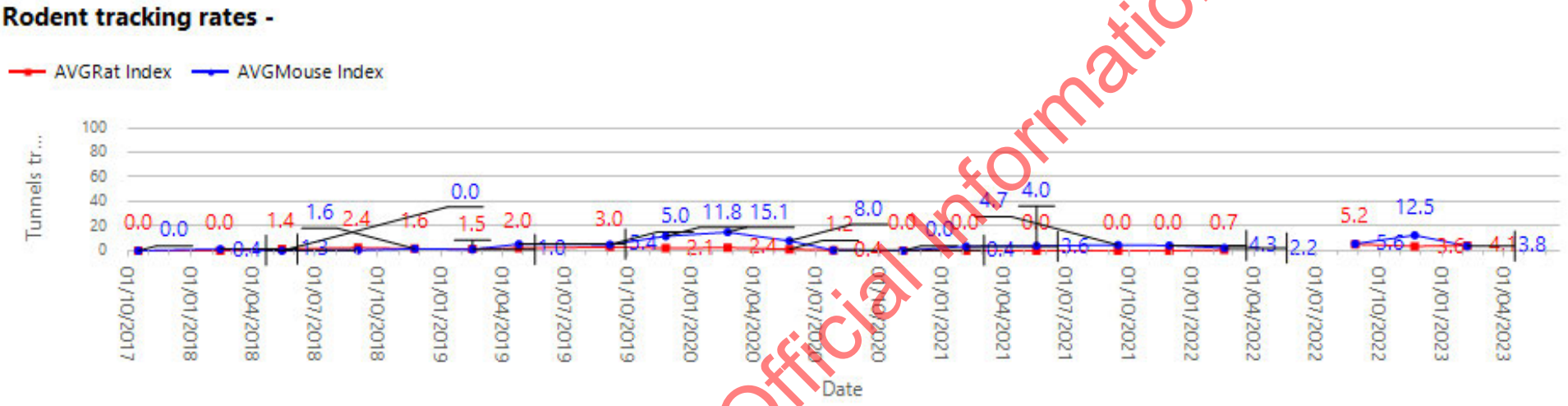


Appendix 1: Map of Shy Lake study site with 2023 season kiwi nests

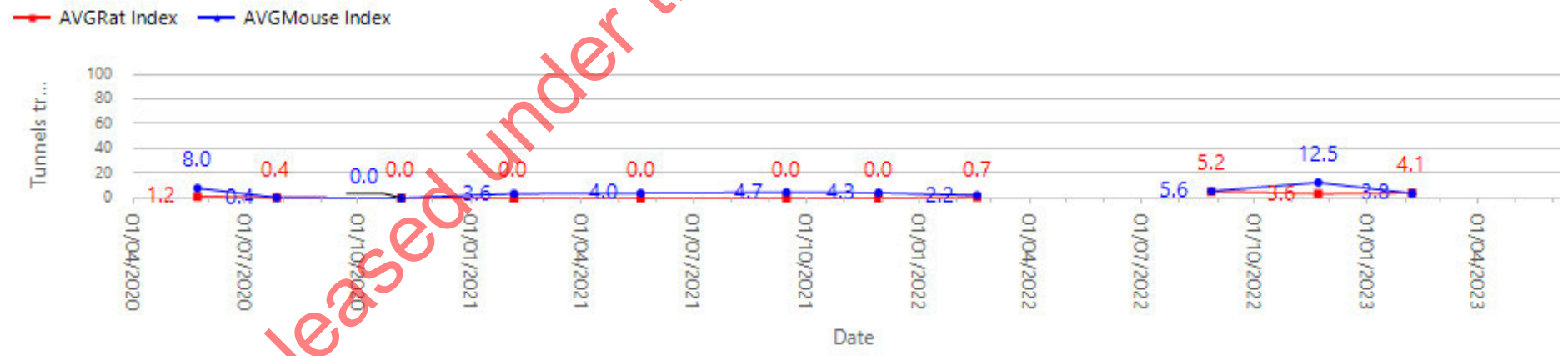
Red blocks = nests
Coloured lines = tracks

Appendix 2a: Wet Jacket Peninsulas rodent tracking, 2017-2023

Rodent tracking rates – 1 night survey, Wet Jacket Peninsulas, Oct 2017 – Feb 2023

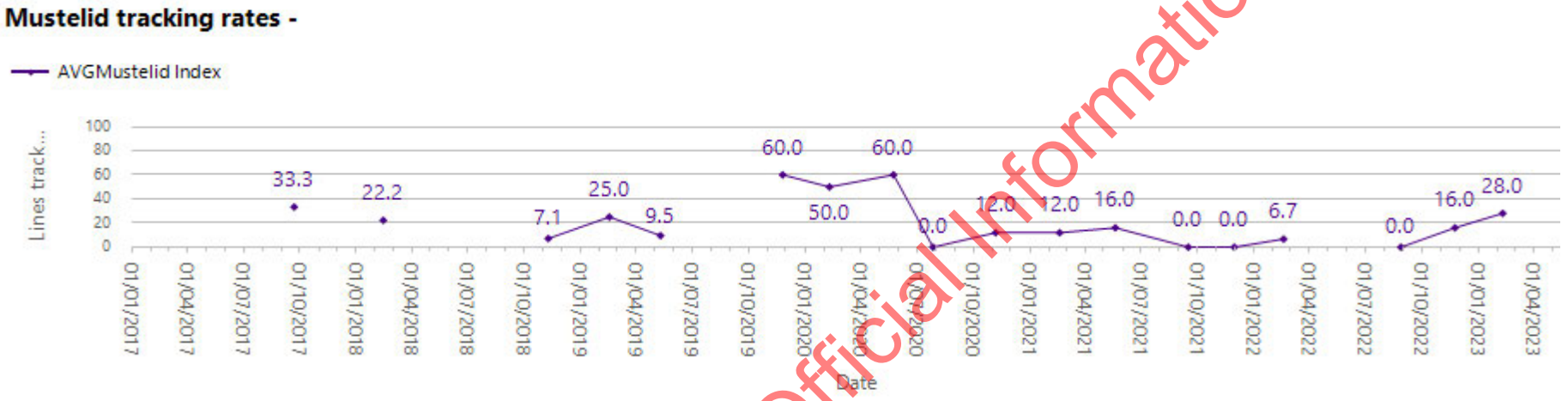


Rodent tracking rates – 1 night survey, Wet Jacket Peninsulas, May 2020 – Feb 2023

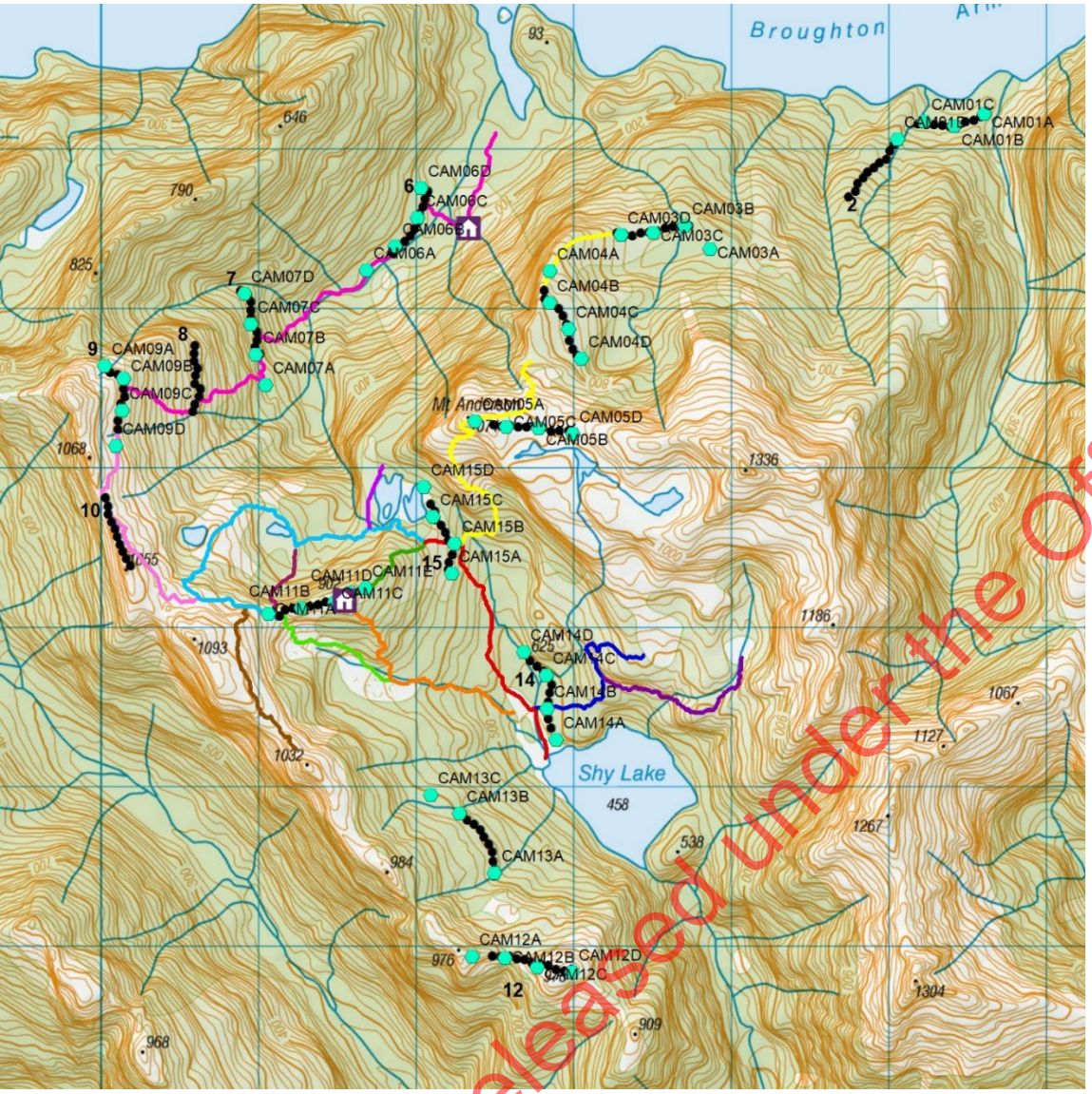


Appendix 2b: Wet Jacket Peninsulas mustelid tracking, 2017-2023

Rodent tracking rates – 21 night survey, Wet Jacket Peninsulas, October 2017 – February 2023



Appendix 3: Map of mustelid trailcam monitoring network



Black dots = tracking tunnel
Turquoise hexagons = mustelid cameras
Coloured lines = tracks

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 04/03/2020 – 06/03/2020

Personnel: 1. Denis Stojanovic 3. Michael McMillan 5. Hannah Morris
2. Tom McDermott 4. 9(2)(a) 6.

Weather: Hot and sunny.
Transport in: Haast Heli - 9(2)(a)
Transport out: Haast Heli - 9(2)(a)

Tasks completed: There was no time/weather for a January trip, and this was supposed to be the February trip. Added lid screws to all traps. Weight tested all traps. Replaced some missing traps. Cleared/marked track where required (using silky saw).

Results: Stoats: 5 Rats: 45 Other: 0

Outstanding tasks:

263	gone
246	gone
248	missing
222	gone
34	destroyed
129	gone
128	needs more flagging and staples for rebar
152	split by lid screw
167	box wall below screw is split
179	gone
175	not found
125	not found
79	new Kea spec double set 200 installed
6	new Kea spec double set 200 installed
227	new Kea spec double set 200 installed
203	new Kea spec double set 200 installed
204	new Kea spec double set 200 installed

Heath Sinclair
Ranger, Biodiversity
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 18/05/2020 – 19/05/2020

Personnel:	1. Emily Wilson	3. Michael McMillan (Team Leader)	5.
	2. 9(2)(a)	4.	6.

Weather: Sunny.
Transport in: Haast Heli - 9(2)(a)
Transport out: Haast Heli - 9(2)(a)

Tasks completed: Trap checks on all lines. Notes taken on trap/tunnel style for each trap. Emily's spanner stripped so she was unable to open the last 14 boxes. Possibly the screw holes will need to be drilled bigger.

Results: Stoats: 13 Rats: 15 Other: 0

Outstanding tasks:

- Get ratchet spanners or small battery drills

86	not found
87	not found
18	Crushed by tree
34	Crushed by tree
263	new Kea spec double set 200 installed
256	rusty traps
252	rusty traps
248	missing
246	missing
224	not found
222	missing
220	not found
153	1 trap has broken spring. Still sets but needs replecing
128	needs more flagging and staples for rebar

Heath Sinclair
Ranger, Biodiversity
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 11/08/2020 – 12/08/2020

Personnel:	1. Heath Sinclair	3. 9(2)(a) (Fox guides)	5.
	2. 9(2)(a)	4.	6.

Weather: Sunny, cool
Transport in: Haast Heli - 9(2)(a)
Transport out: Haast Heli - 9(2)(a)

Tasks completed: Trap checks on all lines. 4 traps deployed: 220, 222, 224 and 87. New traps flown in (15 at Toetoe, 12 at Creswicke). Deployed new traps at end of trap, could be easier to do at start so trappers can set them and heli can just drop and move on.

Results: Stoats: **21** Rats: 18 Other: 0

Outstanding tasks:

- Get ratchet spanners or small battery drills
- Lots of stoats – follow up with Colin

86	Found
87	new Kea spec double set 200 installed
18	Crushed by tree
34	Crushed by tree. One trap removed.
263	new Kea spec double set 200 installed
256	rusty traps
252	rusty traps
248	missing
246	missing
224 Chain to tree or relocate somewhere safer	new Kea spec double set 200 installed
222	new Kea spec double set 200 installed
220 –	new Kea spec double set 200 installed
153	1 trap has broken spring. Still sets but needs replecing
128	needs more flagging and staples for rebar

Heath Sinclair
Ranger, Biodiversity
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 19/11/2020-20/11/2020

Personnel:	1. Denis Stojanovic (Gorge)	3. 9(2)(a) (Toetoe)	5.
	2. Ruslan Bayterimov (Kea)	4.	6.

Weather: Day 1: Sunny and warm; Day 2: Overcast, slightly drizzly at times

Transport in: Haast heli - 9(2)(a)

Transport out: Haast heli - 9(2)(a)

Tasks completed: Trap checks on all lines – rebaited with egg + erayz. 18 traps flown in – 9 dropped at Creswicke, 9 at Toetoe.

Results: Stoats: 16 Rats: 20 Other: 1 weasel

Notes:

LT18	only new trap set,
LT34	old trap broken, new trap set
LT46	broken
LT51	not found
LT73 and **LT74**	new trap set in between just because extra trap
LT105	not found
LT129	missing
LT179	not found
LT228	two traps – old trap on undercut bank, track may need remarking/routing
LT248	missing
LT246	missing

Outstanding tasks:

Denis Stojanovic
Ranger, Biodiversity
Haast Awarua Field Centre

Department of Conservation
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FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 7-8th March 2021

Personnel:
1.Inge Bolt
2.Hannah Morris
3.Denis Stajanovich
4.John Longden
5. 9(2)(a)
6. 9(2)(a)
7. 9(2)(a)

Weather: Clear. Calm and cool to warm

Transport in: Heli services 500 (9(2)(a))

Transport out: Heli services 500

Tasks completed:
Trap check and rebait using Erays and eggs
Seed traps set (except one)
Seed search for Coprosma woolii
Hut maintenance
Apple tree control
New trap placement.

Results: Stoats: Rats: Other:

Notes:
New traps placed @ 13 stored at Jackson creek.
New traps installed @ LT003, LT114, LT115, LT116, LT117, F006, F007, F008, F009, F010, F011, F012, F013, F014
Mechanisms removed @ LT003, LT114, F006, F007, F008, F009, F010, F011, F012, F013, F014
All tracks need clearing of small shrubs and fern
Apple trees cut and poisoned
Toe toe hut work done to make gas compliant
Toilet at toe toe hut cleaned, tank not emptied, but still has a good amount of space, developing a pooh cone
Concern that non authorized people may be using hut – consider key change
Many people using Creswick hut, bring tent next time, two sleeping mats in bin- just in case hut is full
No sleeping bags at ToeToe – BYO sleeping bags
Gecko sighting on Gorge track approximately half way
No coprosma seeds found

Outstanding tasks:
Large apple tree needs chainsaw and poisoning
Emergency stash at Kea flat needs sorting and restocking
Emergency food at Toetoe hut needs restocking
No sleeping bags at ToeToe – BYO sleeping bags

Gas cylinder to ToeToe required, fly empty out.
Blackberry at Harpers Flat needs attention
Track clearing, some marking required (all tracks)
? onduline covers to go out for geckos
Walk the line app for LB traps
? check for coprosma woolii seeds again

Inge Bolt
Ranger Bio Assets
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 24-25th May 2021

Personnel: 1. Cathy Alexander
2. 9(2)(a)
3. John Longden
4. 9(2)(a)

Weather: Clear. Very cold in shaded gullies. Some gusts on the first morning

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Erays and eggs - Cathy on Toetoe, 9(2)(a) on Kea, and John & 9(2)(a) partly checked Gorge traps (see notes below). All flew in from Pleasant Flat.
New trap placement – John and 9(2)(a) were mostly involved with shifting loads of new traps to replace old ones in the current trapping network.
Hut maintenance

Results: Stoats: 12 Rats: 18 Other: Weasel – 1
Mouse – 4

Notes:
Total of 64 new traps were flown into the valley.
78 traps flown in 14 bundles into carry sites on Creswicke zone, on both sides of the river.
22 more traps to fly into valley – 21 into Harper Flat and one into Jackson Creek.
12 sling loads still to be bundled and flown out of Jackson creek, total of 61 traps plus 6 by heli landing.
26 traps still to fly out of Harper in 5 sling loads.
No new traps were installed on this visit.
The following traps on Kea line were not found: 87, 108 (and trap 14 was missed)
All tracks need clearing of small shrubs and fern
Due to unforeseen staff shortage, the Gorge section of the trapping was not fully completed – only traps 114 to 148 were checked.
Due to short daylight hours and a delay in our heli flight, some traps on Kea Flat were also not checked – traps 37 to 31.
Onduline sheets were flown in but not deployed – 20 sheets are at Toetoe biv and 20 are at Creswicke biv.
Hut inspection was done at Toetoe biv by Mike Detlaff on the 24th of May.
Gas bottle at Toetoe biv was replaced (1 big one and one small ones were flown in)
Many outstanding tasks from previous trapping trip were not completed due to the change in team members at short notice.

Outstanding tasks:
Emergency food at Toetoe hut needs restocking
Empty gas cylinder at ToeToe needs flying out

Large apple tree needs chainsaw and poisoning
Emergency stash at Kea flat needs sorting and restocking
Blackberry at Harpers Flat needs attention
Track clearing, some marking required (all tracks)
Walk the line app for LB traps
? check for coprosma woolii seeds again
GPS point for 246, 248 and any other moved traps
Install all new traps

Cathy Alexander
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 16-17 September 2021

Personnel: 1. Denis Stojanovic
2. Casey Guise
3. Stacey Lockie
4. 9(2)(a)

Weather: Patchy cloud. Some strong gusts in places (Broderick Pass)

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Erayz and eggs – Denis and Casey on Toetoe, 9(2)(a) on Kea, and Stacey checked Gorge traps. All flew in from Pleasant Flat.

Results: Stoats: 9 Rats: 26 Other: Weasel 2, Mouse 1

Notes:
Large Gas bottle at Toetoe biv leaks when connected. Small bottle OK.
Door to coprosma enclosure smashed. Needs replacement

Outstanding tasks:
Emergency food at Toetoe hut needs restocking
2 gas cylinders (1 full, 1 empty) at ToeToe need flying out

Large apple tree needs chainsaw and poisoning
Emergency stash at Kea flat needs sorting and restocking
Blackberry at Harpers Flat needs attention
Track clearing, some marking required (all tracks)
Walk the line app for LB traps
GPS point for 246, 248 and any other moved traps
Install all new traps

Denis Stojanovic
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 04-05 November 2021

Personnel:
1. Hannah Morris
2. Heath Sinclair
3. Rheanne Sullivan
4. 9(2)(a)
5. 9(2)(a) [redacted]

Weather: Sunny, very warm.

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a) [redacted])

Tasks completed:
Trap check and rebait using Erayz and eggs – Hannah on Toetoe, Heath on Kea, Jim checked traps from Harpers to 179. Rhe checked the rest and did Creswicke loop traps. All flew in from Pleasant Flat. 9(2)(a) and 9(2)(a) looked for traps bundles on Creswicke loop. Only one bundle located and installed on Creswicke loop. 101 and 110 trap bundles completed. Bat ARs set, Lizard ACOs set. Emergency bins checked.

21 traps flown into Harpers flat. Dropped by airstrip. Stakes not included so need to bring enough stakes and staples for 21 boxes. 1323173, 5130275

Results: Stoats: 9 Rats: 11 Other: mouse x1

Notes:
Toetoe: Leaky gas bottle at Toetoe flown out, new gas bottle flow in.
Biv emergency food bin flown in. ACO foam at Biv ready to be set up. 4 Onduline retreats installed around ToeToe biv. - Toetoe biv only had 10 onduline at Biv? 3 Bat recorders set on Toetoe Loop.
Creswicke: Door to coprosma enclosure smashed. Needs replacement – 9(2)(a) took photos and measurements. No onduline were found at Creswicke hut?
Rhe set some ACOs at Denis's Lizard spot (gorge line). Tree foams set on Creswicke loop also. Find other trap bundles on creswicke loop?!

Kea Camp:
1 Bat recorder at kea loop, 1 at kea stream, 1 above rafters. 3 ACO retreats set at Kea camp.

ToeToe and Gorge Emergency bins checked.

Outstanding tasks:
Bring in AR recorders

Find onduline?
Large apple tree needs chainsaw and poisoning
Check Blackberry at Harpers Flat - photos
Track clearing, some marking required (all tracks)
GPS point for 246, 248 and any other moved traps
Find trap bundles and GPS drop spots
Install all new traps
Get coprosma door repaired.
Look for little hand drill – near trap 116 possibly?!

Hannah Morris
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 14th-15th December 2021

Personnel: 1. Hannah Morris 3. 9(2)(a) [redacted]

2. John Longden

Weather: Sun/cloud, wind and rain 2nd day

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Fresh rabbit meat – Hannah on Gorge, 9(2)(a) on Kea, John L on ToeToe.
Hannah- Could not find ACOs on gorge line – didn't spent to much time looking due to late flight in. Foams checked on Creswicke loop. Foam 11 ripped off and on ground. Bundle of 5 traps found on loop – 5m from track. Couldn't find second back loop bundle. Forgot to look for riverside bundle. Found missing drill at trap by hut. Swallows nesting at Creswicke hut. Track cut looks good – still a lot of windfalls that needs cutting on gorge line. This is ruffly where Jim got up to (starting from harpers) 1327091, 5130808. Blackberry at Harpers Flat looks all dead.
John – Hut work at ToeToe. Last few traps missed due to early pick up.
9(2)(a) – Last 4 traps missed due to early pick up.

Results: Stoats: 11 Rats: 9 Other: mouse x1

Notes:
Toetoe: Hut work completed by John L
Creswicke: Door to coprosma enclosure measured. Needs replacement.

Outstanding tasks:
Bring in AR recorders
Find onduline?
Large apple tree needs 12mm Drill and poisoning E1336277
N5135354
Track clearing, some marking required (all tracks)
GPS point for 246, 248 and any other moved traps
Find trap bundles and GPS drop spots
Install all new traps

Hannah Morris
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 20-21st Jan 2022

Personnel: 1. Hannah Morris
2. Denis Stojanovic
3. 9(2)(a)

Weather: Sunny, very warm and some showers

Transport in: Haast Heli services 500

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Erayz and eggs – Hannah on Gorge, Denis on Kea, 9(2)(a) on ToeToe. All flew in from Pleasant Flat.

21 traps flown into Harpers flat. Dropped by airstrip. Stakes not included so need to bring enough stakes and staples for 21 boxes. 1323173, 5130275

Results: Stoats: 20 Rats: 6 Other: mouse

Notes: AR battery changed and AR35 moved to trap 61. New AR on Creswicke loop.

Outstanding tasks:
Large apple tree needs chainsaw and poisoning
Check Blackberry at Harpers Flat - photos
Track clearing, some marking required (all tracks)
Install all new traps
Get coprosma door repaired.

Hannah Morris
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 23-24th Feb 2022

Personnel:
1.Hannah Morris
2. Denis Stojanovic
3. 9(2)(a)
4 9(2)(a)
5 9(2)(a)
6. Jack Stewart
7. 9(2)(a)

Weather: patchy cloud. Cooler in the evenings.

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Erayz and eggs – Hannah & 9(2)(a) on ToeToe, 9(2)(a) Kea flat to Harpers. Jack and 9(2)(a), Rafters to Kea.
Trap install -, Denis and 9(2)(a) on Gorge, 9(2)(a) and 9(2)(a) on Creswicke. Hannah and 9(2)(a) on ToeToe.
Track work- Jack and 9(2)(a) scrub bar kea upper loop and down to Jackson creek. Still some more srub bar work to do around Jackson creek.

Gorge line trap install completed. A few traps missed on Harpers flat. – check this next time.
Creswicke loop trap install completed. Bundle 64 on Kea also done.
Bundle closest to ToeToe Biv completed + mechanism pulled out. Need to bring out on next trip.
Trap bundle of 6 washed away on ToeToe loop. Mechanisms left on deck at Creswicke hut. Need to grab them ASAP. Also Radio lost in between Creswicke and rafters. Around the slip area where track is confusing. Gorge line: old box pick up from beach, 1326800, 5130983

Lizards – No lizards found. Foam set on ToeToe loop. More Onduline set on Gorge line.

Long line to drop trap bundles in to gorge line from Harpers.

Results: Stoats: 7 Rats: 12 Other: mouse

Notes: ARs still to come in, 1 on ToeToe, Two Kea flat.

Outstanding tasks:
Large apple tree needs chainsaw and poisoning
Check Blackberry at Harpers Flat - photos
Tracking cutting, ToeToe loop.

Install all new traps
Get coprosma door repaired.

Hannah Morris
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 11th - 12th May 2022

Personnel:
1.Hannah Morris
2. Denis Stojanovic
3. 9(2)(a)
4 9(2)(a)
5. 9(2)(a)
6. 9(2)(a)

Weather: Sunny. Cold in the mornings/evenings.

Transport in: Haast Heli services 500 (9(2)(a))

Transport out: Haast Heli services 500 (9(2)(a))

Tasks completed:
Trap check and rebait using Erayz and eggs – Hannah Trap 129 to Kea, 9(2)(a) ToeToe, 9(2)(a) Gorge line, 9(2)(a) and Mike installed trap bundle around Kea flat. 9(2)(a) Installed new gate on coprosma enclosure. Denis long lined traps on kea loop, Kea stream, Jackson creek and down to Barron Creek.
Traps installed Kea line trap LT044-LT035.

Results: Stoats: Rats: Other:

Notes: ARs still to come in, 2 Two Kea flat. Collect stockings and trap mechanisms, check how many traps at Jacksons creek bundle still.

Outstanding tasks:
Large apple tree needs chainsaw and poisoning
Bring out mechanisms from Creswicke and Toetoe biv
Tracking cutting, ToeToe loop.
Install traps on Kea, and Toetoe loop. long line more traps on Toetoe

Hannah Morris
Ranger, Biodiversity Monitoring
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 17th & 18th January 2023

Personnel: 1.Sarah Mockett 3.Tom Robinson 5.
2.Kate Dobbie 4. 6.

Weather: Good

Transport in: Heli services 500([redacted])

Transport out: Heli services 500

Tasks completed: Trap check and rebait using Erayse & Majo. Tom on Kea line, Sarah at Toetoe and Kate on Gorge. Has been very dry & for some reason we caught 4 Tui on Gorge line.

Results: Stoats: 9 Rats: 14 Other: 4 Tui, 1 unknown

Notes:

Outstanding tasks: Trapbox replacement to be completed. .

Tom Robinson
Ranger Bio Assets
Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF:

Mohua Protection, Landsborough Valley

Date: 23[23rd] and 24[th] February 2023

Personnel:
1. Jack Stewart
2. 9(2)(a)
3. 9(2)(a)
4. Cory Wilson
5. Tom Robinson

Weather: Sunny/Windy

Transport in: Backcountry Helicopters (9(2)(a))

Transport out: Backcountry Helicopters (9(2)(a))

Tasks completed:
Trap check and rebait using Erayz and Mayo – Tom on Gorge line, 9(2)(a) on ToeToe and Jack on Kea.
Seedfall stockings on Kea put out. Some maninence and to come in next trip (Near seedfall tunnel/trap LT70 and top of lower loop). Old trap mechanisms flown out from ToeToe with roughly 1/3 of mechs at Creswicke. Another 40 or so left next to Creswicke hut to come out in future.
9(2)(a) installed boil water signage at Toe Toe biv & did filled out the annual hut check form.

Traps installed

Cory and 9(2)(a) were working on the Trap replacements on Kea line.

Results: Stoats: 9 Rats: 15 Other: 0

Notes: 2 ARs still to come in on. Fly out remaining trap mechanisms from Creswicke, check how many traps at Jacksons creek bundle still.

Outstanding tasks:
Large apple tree needs chainsaw and poisoning.
Bring out mechanisms from Creswicke.
Tracking cutting, ToeToe loop. Lots of fresh windfall on upper Gorge line.
Install traps on Kea, and Toetoe loop. long line more traps on Toetoe. 3 new trap boxes in clearing across creek at bottom of Gorge loop to replace old boxes at bottom of loop.

Tom Robinson
Ranger, Biodiversity Monitoring

Haast Awarua Field Centre

Department of Conservation
Te Papa Atawhai

FILE REF: NHT 02 04 22

Mohua Protection, Landsborough Valley

Date: 18 August 23

Personnel: 1.Tom Robinson 3 9(2)(a) 5.
2.Heath Sinclair 4. 6.

Weather: Clear. Calm and cold. Snow on ground above Creswick

Transport in: Heli services 500(Nate)

Transport out: Heli services 500

Tasks completed: Trap Check and inventory of what types of boxes are out there.

Results: Stoats: 7 Rats: 102 Other: 11 mice. 1 Weasel

Notes:

Outstanding tasks: Finish trapbox change over. A big push in November I imagine. I've saved more detailed notes on an excel file you'll see in the trip planning folder

Tom Robinson
Ranger Bio Assets
Haast Awarua Field Centre

Printed by: 9(2)(a), 9(2)(g)(ii)
District: Mahaanui

Status of Op Report: Verified
Source: Pestlink

Operational Report for Possum, Ship rat, Stoat Control in the Landsborough, Macfarlane and Clarke Valleys

25 Nov 2019 - 09 Dec 2019

9(2)(a), 9(2)(g)(ii)
15/05/2020
Department of Conservation
South Westland

Contents

1. Operation Summary

Operation Name Possum, Ship rat, Stoat Control in Landsborough, Macfarlane and Clarke Valleys

Operation Date 25 Nov 2019 - 09 Dec 2019

District South Westland **Region:** Western South Island

Pestlink Reference 1920SWS04

Field Trial -

Treatment Area Landsborough, Macfarlane and Clarke Valleys **Size (ha)** 33695.00

Conservation Unit Name(s)	GA Id(s)
Conservation Area - Cook River to Haast River	2804986
Hooker / Landsborough Wilderness Area	2805015

Treatment Block Details

Treatment Blocks	Size (ha)	Grid Ref	GIS Ref
Landsborough TNM	33695.00	BY14 31025 34425	

Contact Name 9(2)(a), 9(2)(g)(ii)
Contractor Name Vector Control Services
Contractor Phone Number 9(2)(a), 9(2)(g)(ii)
Performance Based ? -

Treatment Dates	Start	Completion
Landsborough TNM	25 Nov 2019	09 Dec 2019

Target Pest Details

Treatment Blocks	Target Pests	Control Method	Name
Landsborough TNM	Possum, Ship rat, Stoat	Pesticide Aerial	Landsborough TNM

Conservation Outcome(s)

Protect mohua population from stoat predation in 2019 (a mega-mast year). Maintain and enhance populations of rat and stoat vulnerable species. Advance knowledge of how aerial 1080 used for pest control benefits breeding success of bird species. Maintain and enhance populations of possum vulnerable plant species.

Result Target(s)	Treatment Area/Block	What we got
• Less than 5% rat tracking up to 3 months after operation	Landsborough, Macfarlane and Clarke Valleys	2.1%
• Less than 5% possum residual trap catch up to 3 months after operation	Landsborough, Macfarlane and Clarke Valleys	Due 2021-23
• 0% stoat tracking index up to 3 months after operation	Landsborough, Macfarlane and Clarke Valleys	1% +/- 1%

Outcome Targets	What we got
• Maintaining foliar cover of Fuchsia extorticata, Aristotilia serrata, Peraxilla tetrapetala and Peraxilla colensoi at 50% or above by 2020	
• Less than 5% of individuals of the species listed above to have evidence of browse by 2020	
• Maintain mohua (Mohoua ochrocephala) population estimates at similar or greater levels than the 2018 monitoring results	
• Mistletoe populations (Perxilla tetrapetala and Peraxilla colensoi) to be increasing or stable by 2020	

2. Introduction

2.1 TREATMENT AREA

Animal pest species

Common Name	Scientific Name
Ship rat	Rattus rattus
Stoat	Mustela erminea
Possum	Trichosurus vulpecula
Mouse	Mus musculus
Hare	Lepus europaeus occidentalis
Norway rat	Rattus norvegicus

Non-target species

Common Name	Scientific Name
Red deer	Cervus elaphus scoticus
Himalayan tahr	Hemitragus jemlahicus
Chamois	Rupicapra rupicapra

Target benefit species

Common Name	Scientific Name
bellbird	Anthornis melanura melanura
whio	Hymenolaimus malacorhynchos
South Island fantail	Rhipidura fuliginosa fuliginosa
grey warbler	Gerygone igata
South Island kākā	Nestor meridionalis meridionalis
kea	Nestor notabilis
New Zealand pigeon	Hemiphaga novaeseelandiae
long-tailed cuckoo	Eudynamys taitensis
bush falcon	Falco novaeseelandiae "bush"
-	Acanthisitta chloris
shining cuckoo	Chrysococcyx lucidus lucidus
silvereye	Zosterops lateralis
tomtit	Petroica macrocephala
tūī	Prosthemadera novaeseelandiae novaeseelandiae
scarlet mistletoe	Peraxilla colensoi
red mistletoe	Peraxilla tetrapetala
tree fuchsia	Fuchsia excorticata
yellowhead	Mohoua ochrocephala
rock wren	Xenicus gilviventris
long-tailed bat	Chalinolobus tuberculatus
yellow-crowned kākāriki	Cyanoramphus auriceps

Threatened species

Common Name	Scientific Name

Concurrent pest operation details

Concurrent pest operations	Contact Name	VPNContact Office
Landsborough Trapping Network - Harpers Bluff to McKerrow Creek	9(2)(a), 9(2)(g)(ii)	System

Himalayan Tahr Control	9(2)(a), 9(2)(g)(ii)	5377	South Westland - Weheka
Weed Control	9(2)(a), 9(2)(g)(ii)	5377	South Westland - Weheka

Geographical location

The Landsborough, Macfarlane and Clarke Valleys is situated 33 km West of Haast.

TREATMENT BLOCK DETAILS:

Treatment block	Landsborough TNM	
Vegetation type	Silver beech with areas of podocarp at lower altitudes	
Bioclimatic zone	lowland sub-montane montane sub-alpine alpine	
Climate characteristics:		
Rainfall	5000 mm	
Temperature:	**Average Summer**	20.0
	Average Winter	8.0
Snow level	1500 m	
Altitude	100-1700 m	
Community and Iwi interests	The Landsborough Valley, while quite remote, does see a reasonable number of visitors. There are five huts in the valley but only three are within the treatment area: Toe Toe Biv, Historic Rangers Hut and Creswick Flat Hut. There was an exclusion area around each of these huts during the operation. The other two huts are a private hut at the confluence of the Clarke and Landsborough Rivers and a private Deerstalkers Association hut at the start of the valley (both of which are outside the treatment area). There are also two "rafters camps" used for a commercial rafting operation. These are located opposite Toetoe flat and at the upstream end of Harpers flat, both of which were excluded from the treatment area. Access to the treatment area can be gained via the 4x4 track to Strutt Bluff then a route up valley, by aircraft (there are three operational airstrips in the treatment area, all of which had exclusions), or to a certain extent by jet boat. Experienced hikers visit the valley thr	
Historic sites	The Rangers hut in the lower valley is a historic 1930's deer cullers hut.	

2.2 MANAGEMENT HISTORY

Management history was not chosen to be shown in this operational report. This history is, however, available via Pestlink

3 Outcomes and Targets

3.1 CONSERVATION OUTCOMES

Protect mohua population from stoat predation in 2019 (a mega-mast year). Maintain and enhance populations of rat and stoat vulnerable species. Advance knowledge of how aerial 1080 used for pest control benefits breeding success of bird species. Maintain and enhance populations of possum vulnerable plant species.

3.2 TARGETS

3.2.1 Result Targets

The result targets for the treatment area were:

- Less than 5% rat tracking up to 3 months after operation
- Less than 5% possum residual trap catch up to 3 months after operation
- 0% stoat tracking index up to 3 months after operation

3.2.2 Outcome Targets

The outcome targets for the treatment area were:

- Maintaining foliar cover of Fuchsia extorticata, Aristotilia serrata, Peraxilla tetrapetala and Peraxilla colensoi at 50% or above by 2020
- Less than 5% of individuals of the species listed above to have evidence of browse by 2020
- Maintain mohua (Mohoua ochrocephala) population estimates at similar or greater levels than the 2018 monitoring results
- Mistletoe populations (Perxilla tetrapetala and Peraxilla colensoi) to be increasing or stable by 2020

4 Consultation, Consents & Notifications

4.1 CONSULTATION

VCS and DOC shared the consultation responsibilities. A communication plan was created by DOC to facilitate primary consultation with key stakeholders (DOC-5879517). These stakeholders include Te Runanga o Makaawhio, emergency services, health services, local government and concessionaires that utilise the target area.

Iwi consultation with Te Runanga o Makaawhio and Ngai Tahu was undertaken by Mark Davies, Director of Operations for the West Coast. The outcome was that Makaawhio reinforced their position that they do not support the ongoing use of 1080. However, they are pleased with the research effort going into long term removal options and will not actively oppose the current use of 1080.

There are some concessionaires who operate within the area. There is one private hut on the boundary of the block at the confluence of the Clark and Landsborough. This is an area of interest to the Tahr interest group and the NZDA. Of the parties spoken to there were no concerns raised.

Consultation outcomes

Consultation was undertaken with neighbouring grazing license holder up the Haast River, [redacted], and resulted in a buffer zone being removed from the operational area so that his stock would not be affected (DOC-6104817).

Lessons learned

Consultation with grazing license holders needs to begin more than 12 months in advance so license holders have adequate time to move cattle if the risk from operations cannot be mitigated. This will minimise buffer/exclusion area and hence potential reinvasion zones for pests. Due to the delay of the operation as a result of poor weather the caution period extended into the Haast roar timing. Some hunters were upset by this and claimed they had not been warned in advance. It needs to be made clear in all roar communications that if 1080 is planned in the previous year then the caution period may affect the roar timing. Hunters may still hunt but it is at their own discretion.

4.2 CONSENTS

Consent	Consent date	File Reference	Permission ID
Public health permission	01/10/2019	DOC-6083933	19/1236/CBGRYPH
DOC consent (AEE)	09/10/2019	DOC-6072849	6072849
[redacted] Grazing Consent	29/10/2019	DOC-6104817	N/A

Lessons learned

Start the consent process as soon as possible as it can be time consuming

4.3 NOTIFICATION

VCS were responsible for mailing identified parties a letter and Key Facts sheet outlining the proposal and contractor/subcontractor's role for all subsequent consultation/notifications

All parties including Iwi, healthcare practices, vet clinics, meat processors, concessionaires and other interested parties were notified either by mail, email or phone.

Those requiring 24 hour notice were identified and 24 hour notice was carried out before the operation commenced.

Public notification of the aerial operation was placed in The Hokitika Guardian, West Coast Messenger and ODT.

Lessons learned

Make sure details are correct in the communications plan. DOC and VCS both completed communication plans, which needed to be merged together - created extra work. Better communication regarding responsibilities required at initiation of contract.

5 Methods

5.1 TARGET SPECIES

Treatment Block Landsborough TNM

Control method	Name	Target pest species
Pesticide - Aerial	Landsborough TNM	Possum Ship rat Stoat

Treatment Block	Control Method	Name	Target Pest Species
Landsborough TNM	Pesticide - Aerial	Landsborough TNM	Possum Ship rat Stoat

Trade name of pesticide	0.15% 1080 Pellets RS5 Orillion
Name of pesticide	Sodium fluoroacetate
Type of bait	Cereal pellet
Toxic loading	1.5 g/kg
Bait quality sampling	Not Conducted

Bait Details

	Pre-feed	Toxic
Bait type	Cereal pellet	Cereal pellet
Lure/ mask/ deterrent	Cinnamon	Cinnamon
Lure/ mask/ deterrent	0.15%	0.30%
Dye	None	Green
Individual Bait Weight	6.0g	6.0g

Sowing Rate Details

Pre-feed				Toxic			
Date	**Rate(kg/ha)**	**Wind Speed**	**Direction**	**Date**	**Rate(kg/ha)**	**Wind Speed**	**Direction**
25/11/2019	2.11	Calm	South	09/12/2019	2.06	Light	SE

Time between pre-feed and toxic	14
End of Caution Period Date	09/08/2020
Aircraft type	Squirrel AS 350 Other Jet Ranger LongRanger
Number of Aircraft	7

Sowing gear details

Description	Capacity
Under-slung buckets ranging from 300 to 900kg capacity, including a trickle sowing bucket. Broadcast usable swath width ranging between 180-200m. Broadcast maximum swath width ranging between 188 and 246m.	900 kg

Type of navigational guidance system used	TracMap
Loading Method	300kg bait bags loaded into loader hopper. Loader hopper then loaded into heli bucket.

Complaints and Incidents

Prefeed: Needed 12 extra bags of bait, but this was delivered quickly. Tractor broke down on last load - would have been a bigger issue if it was earlier in the day. Toxic: Two helicopters sowed a different pattern to the others - required additional flying to cover missed areas. Last load of the day was only 2/3 full which resulted in a low sow rate.

Other Details about this method

-

Deviations from planned operation

Prefeed: Contractor GIS analyst was involved in a different operation, therefore a DOC GIS analyst was urgently called in on the day. Toxic: The operation occurred after extreme weather that closed the West Coast and East Coast roads, so two DOC staff had to be called up last minute from Invercargill. Contractors were flown down from Hokitika by helicopter.

Lessons Learned

Need to have contingency plan for truck unloading - could use one of the Heli operators loaders (with forks attached) for unloading if a breakdown occurs. Include heli operators in discussion prior to operation regarding application on boundaries. Ensure pilots are still concentrating at end of operation, and do not leave until final GIS lines have been uploaded. Would be beneficial to have helicopters on site the night before, however this means accommodating pilots overnight (challenging during busy season).

5.2 ENVIRONMENTAL EFFECTS

5.2.1 Effects on Non-Target Species

The standards in Pesticides Use No.1 and the Kea COP are listed below as they relate to non-target species. Information on the effect of 1080 on non-target species can be viewed in the DOC Permission Application.

Performance standard(s)	Followed ?	Monitored ?
PU#1 Standard 7. The boundaries of the bait preparation and loading site are marked and loading site signs docCM-6122609 erected. At the end of every day of the operation (including final day), the loading site and any storage area must be fenced so that people do not inadvertently enter the site.	Yes	N/A
PU#1 Standard 8. If there is any likelihood that farm stock has been exposed to 1080, the owner must be advised as soon as possible and stock removed from the area.	Yes	N/A
Warning signs will remain standing until the end of the caution period	Yes	Yes
Kea COP standards 1-5	Yes	N/A

Effectiveness of performance standards

Performance standards were followed. No reports of non-target species affected by toxin.

Bykill of non-target species

A dead deer was reported by a track checker, however the cause of death was not investigated.

5.2.2 Effects on Soil and Water Quality

Toxins may have a negative effect on water quality

Effects on Soil and Water Quality Not Applicable

5.2.3 Effects on Ecosystems

-

Effects on Ecosystems Not Applicable

5.2.4 Effects on Human Health

Any contact with 1080 poison is likely detrimental to human health. Contractors loading bait into helicopter buckets are the only persons with direct contact with 1080 bait and strictly follow Safe Handling Sheet #1. The public health permission DOC-5961241 contains conditions that relate directly to human health.

Performance standard(s)	Followed ?	Monitored ?
MOH Permission Conditions 10, 12, 13 and 16	Yes	N/A
1080 Safe handling sheet #1	Yes	Yes

Effectiveness of performance standards

No reports of ill health

6 Monitoring Results and Outcomes

6.1 RESULT MONITORING - TARGET SPECIES

Result target(s)

Less than 5% rat tracking up to 3 months after operation

Less than 5% possum residual trap catch up to 3 months after operation

0% stoat tracking index up to 3 months after operation

6.1.1 Target Species Monitoring Method: **Tracking tunnels**

Species monitored

Norway rat - Rattus norvegicus , Ship rat - Rattus rattus in Landsborough, Macfarlane and Clarke Valleys

Monitor method details

5 sites in the Landsborough Valley, each made up of 5 lines spread altitudinally (except for valley Floor site). Each line consists of 10 baited tracking tunnels. FTT indices relate to the percentage of tunnels recording rodent footprint tracking during a one-night period across the network of tracking tunnels (240 tunnels in total). Monitored twice annually (November and February), with the valley floor sites monitored an additional 2 times annually (May and August)

Deviations

Nil

Target pest result details

Pre	During/Post

Monitoring dates	01/11/2019	07/01/2020
Results	46.7%	2.1%

Result target met? Yes

Lessons Learned

Nil

6.1.2 Target Species Monitoring Method: **Residual trap-catch index (RTCI)**

Species monitored Possum - Trichosurus vulpecula in Landsborough, Macfarlane and Clarke Valleys

Monitor method details

Approximately 20 lines spread across the Thomas Valley, Roaring Billy Valley, and McFarlane Valley. Approximately 20 lines spread across the Clarke Valley and the Landsborough Valley. Each line consists of 10 raised-set leg hold traps, randomly spaced in accordance with NPCA protocol (NPCA 2005). The RTC rate is an expression of how many animals are caught per 100 trap nights. Monitoring is undertaken every two-four years. Due 2021-23.

Deviations

Nil

Target pest result details

	Pre	During/Post
Monitoring dates	-	Due 2021-23
Results	-	Due 2021-23

Result target met? Monitoring incomplet

Lessons Learned

Nil

6.1.3 Target Species Monitoring Method: **Tracking tunnels**

Species monitored Stoat - Mustela erminea in Landsborough, Macfarlane and Clarke Valleys

Monitor method details

4 sites in the Landsborough Valley, each made up of 3-7 lines spread altitudinally. Each line will use 5 baited tracking tunnels. FTT indices relate to the percentage of tunnels recording stoat footprint tracking during a twenty-one-night period across the network of tracking tunnels (180 tunnels in total). Monitoring twice annually in November and February.

Deviations

Nil

Target pest result details

	Pre	During/Post
Monitoring dates	03/11/2019	07-10/01/2020
Results	10% +/- 10%	1% +/- 1%

Result target met? No

Lessons Learned

The tracking is likely to have just recorded one individual stoat, present near an exclusion zone. In future exclusion zones need to be minimised as much as possible

6.2 RESULT MONITORING - ENVIRONMENTAL EFFECTS

6.2.1 Non Target Species

Monitoring of: **Warning signs**

Monitor Method details

Warning signs are checked regularly throughout caution period to ensure they are still standing, legible and have not been vandalised.

Deviations

Nil

Monitoring dates 10/12/19 - 09/08/2020

Results Ongoing monitoring. Signs replaced when necessary.

Lessons Learned

As lead agency, DOC contact details and logo should also be included on warning signs

6.2.2 Soil and Water Quality

No monitoring of soil and water quality was undertaken.

6.2.3 Ecosystems

No monitoring of ecosystems was undertaken.

6.2.4 Human Health

Monitoring of: **PPE and staff safety on site**

Monitor Method details

PU #1 Standard Designates a "Safety Officer" on loading site who audits and ensures adherence to safety standards.

Deviations

Issues not having a clearly identifiable Safety advisor on site, and dedicated emergency response staff.

Monitoring dates 09/12/19

Results No incidents

Lessons Learned

Staff to be identified in contract as emergency management support Improve emergency action plans to include identification of safety advisor

6.3 OUTCOME MONITORING

Outcome targets

Maintaining foliar cover of Fuchsia extorticata, Aristotilia serrata, Peraxilla tetrapetala and Peraxilla colensoi at 50% or above by 2020

Less than 5% of individuals of the species listed above to have evidence of browse by 2020

Maintain mohua (Mohoua ochrocephala) population estimates at similar or greater levels than the 2018 monitoring results

Mistletoe populations (Peraxilla tetrapetala and Peraxilla colensoi) to be increasing or stable by 2020

No monitoring of outcomes was undertaken

7 Costs

GL Account	Description	Actual Costs	Notes
61003	Postal charges, couriers, freight, postage	9(2)(b)(ii)	
62102	Travel-Domestic Expenses	$175.00	
62322	Bait Supplies	9(2)(b)(ii)	
62337	Field Operations supplies	$125.00	
62372	Field Services - Outsourced Trade Work	9(2)(b)(ii)	
62203	Vehicle fuel costs,diesel,petrol,cng	$52.00	
60431	Uniforms	$315.00	
60431	Salary	$19,925.00	Salary coded to Landsborough BFOB has been added with Landsborough/Moeraki/Mcfarlane BfoB
60431	Wages	$6,010.00	
Total		$1,549,322.00	

8 Recommendations

8.1 FUTURE MANAGEMENT AT THIS TREATMENT AREA

As and when it is required.

If treating the Macfarlane, Roaring Billy or Thomas valleys then consultation with grazing license holder needs to begin more than 12 months in advance to ensure cattle can be excluded from the treatment area

8.2 GENERAL RECOMMENDATIONS

Need to have a single Emergency Response Plan. When using a contractor, the DOC template should be provided to ensure all requirements are covered. Communication is vital between DOC, contractors and sub-contractors before the operation, so that all operational details are understood and potential issues and contingency plans are discussed.

9 Acknowledgements

Thank you to the people below who have contributed to the operation or have supplied information for the writing of this report. Thanks to the contractors VCS, 9(2)(g)(ii) [redacted] for completing this operation smoothly. Special thanks to [redacted]

9(2)(a), 9(2)(g)(ii) who stepped in last minute to enable the operation to proceed when road closures barred access for the West Coast support staff.

The following DOC staff were involved

Name	Position	Office
9(2)(a), 9(2)(g)(ii)	Ranger Supervisor Biodiversity	Haast
	Operations Manager	Westland Tai Poutini National Park
	Supervisor Biodiversity/Threats	Fox Glacier
	Logistics Lead Battle for our Birds	Hokitika
	Logistics Support Officer Battle for our Birds	Hokitika
	Regional Lead Battle for our Birds	Hokitika
	Geospatial Information Analyst	Hokitika
	Ranger	Fox Glacier
	Ranger Biodiversity	Fox Glacier
	Regional Lead Battle for our Birds	Invercargill
	Geospatial Information Analyst	Invercargill

10 Approval

This operational report was approved by 9(2)(a), 9(2)(g)(ii), Operations Manager, on 15 May 2020

11 References

Work Plan

Task List DOC-5585016 DOC Operational Plan DOC-5721993 VCS Operational Plan DOC-6109876

AEE

DOC Permission DOC-6072849

Application for DOC consent to use pesticide

DOC application DOC-6073209

Communication record

DOC Communication plan DOC-5879517 VCS Communication log DOC-6067092

Result monitoring details

N/A

Bait and carcass monitoring report

N/A

Outcome monitoring report

N/A

Other references

Landsborough BFOB Homepage DOC-5707456

2021 Annual Progress Report:

Benefits of long-term predator control for forest bird populations in the Landsborough Valley, South Westland, over 24 years (1998-2021)

Colin O'Donnell
Biodiversity Group
Department of Conservation
Private Bag 4715, Christchurch 8140

Summary

1. Long-term responses of indigenous forest bird populations to sustained use of aerial 1080, in conjunction with trapping, in the Landsborough Valley have been measured consistently over 24 years since 1998.
2. This report summarises latest bird population trends following the November 2021 monitoring session.
3. All species were predicted to decline if predator control was ineffective, and we predicted that mohua would be locally extinct by now if management was ineffective (Elliott 1996, O'Donnell 1996; O'Donnell et al. 1996).
4. Mohua, the primary indicator of recovery, continues to increase. Since 2018, mohua have been the most frequently counted forest bird on the counts. In 2021, 517 were counted compared to 485 in 2020 and 444 in 2018. At their lowest, there were only c.14 mohua left in the study area (1991).
5. Counts of most species (8) continued to increase (mohua, bellbird, brown creeper, fantail, tūī, rifleman, grey warbler, yellow-crowned kākāriki).
6. Counts for kākā, tomtit, kererū, kea, NZ falcon and shining cuckoo have remained more-or-less stable or are increasing at a very slow rate.
7. Two species have declined steadily through the monitoring period (long-tailed cuckoo, silvereye)
8. Overall, the number of indigenous birds continue to increase and appear to have more than doubled since predator control commenced.

Context/background

i. Predator induced declines in forest birds are well documented in New Zealand (e.g. Elliott et al. 1996; O'Donnell et al. 1996; Moorhouse et al. 2003; Innes et al. 2010).
ii. The Landsborough Valley has one of the best remaining bird faunas in Westland (O'Donnell & Dilks 1994), but it was suffering steady declines following predator irruptions in years following heavy beech seeding (e.g. Elliott 1996; O'Donnell 1996).
iii. Predator control consisting of valley-wide stoat traps and periodic aerial 1080 drops to control possums and rats commenced in the late 1990s.
iv. The response of the forest bird community to ongoing pest control has been monitored intensively since 1998, with occasional monitoring efforts since 1985. Some counts were missed because of bad weather during the monitoring window.
v. Mohua and kākā are the primary indicators of success of predator control operations in the valley. Mohua are vulnerable to impacts of rats and stoats and the species was

predicted to go extinct without management, while kākā are vulnerable to possums and stoats (O'Donnell & Hoare 2012).

vi. The Landsborough bird count dataset is the Department of Conservation's longest dataset monitoring bird populations through repeated aerial 1080 drops.

Purpose of the project

To measure the long-term responses of indigenous forest birds to sustained use of aerial 1080 in conjunction with trapping in the Landsborough Valley.

Methods

Pest control: Introduced mammalian pests have been controlled at the study site since late 1994. Three techniques have been used: best practice trapping aimed at stoats; ground control (trapping and poisoning) aimed at brushtail possums; and aerial bait application using baits impregnated with the toxin sodium monoflouroacetate (1080) aimed at possums and, from 2009, rats and (through secondary poisoning) stoats.

Since formal bird counts commenced in the study area in 1998, consistent methods of pest control have been applied. Aerial applications of 1080-laced baits have been undertaken in July 1998 (7,340 ha), June 2000 (3,750 ha), December 2004 (16,420 ha) October 2009 (12,170 ha), winter 2014 (25,533 ha), winter 2016 (28,283ha) and spring 2019 (46,758 ha).

Bird monitoring: Initially, bird monitoring involved recording how frequently birds occurred along 1-km line transects. However, we found that this method didn't provide enough power to detect changes in abundance, so we changed to a more intensive method involving point counts in 1998. From then on, standardised five minute point counts (Dawson 1981) were undertaken annually (but excluding 1999–2001 and 2019 due to bad weather).

Counts were undertaken over 2-3 consecutive days by a team of 3 expert bird counters. All bird species seen and heard within 5-minute periods were counted at 112 stations. Counts were carried out between 0900 and 1500 h to avoid times of the day when conspicuousness of birds is most variable (dawn and dusk). Stations were at c.200-m intervals along a transect through habitats representative of the valley. The transect followed the forest edge from McKerrow Creek down to Fraser Creek, then turned inland and ran back up the valley, parallel with the edge but 200−500 m into the forest. One count per station was conducted, except for the central 65 stations, which were counted twice on each occasion (n = 177 counts).

Bird count analysis: **Graphs presented in this report are preliminary** simple regression analyses aimed at visualising broad trends annually. Final trend analyses will be more comprehensive and likely involve using Generalised Additive Models, which account for the influence of factors that may influence counts (e.g. weather each year).

O'Donnell & Hoare (2012) summarised and published the trends after the initial 12 years of monitoring (to 2009). In this analysis they averaged count data across stations within each year. Using linear modelling, they assess linear population trends for each species. Models

contained log-transformed mean counts as the response variable and year as the predictor variable were used in the published analysis.

Previous summary reports
Project report 2009: O'Donnell & Hoare (2012), NZ Journal of Ecology 36: 131-140[1].
Project report 2017: DOC-5510265.
Project report 2019: DOC-5729267.

Data
DOC File DOCDM-562615.

Results 2021
Overall, the numbers of indigenous birds appear to have doubled over 24 years (Figure 1). This contrasts with a steady decline in numbers of introduced species (Figure 2).

Counts of most species continued to increase, with the slopes of regressions increasing further between 2020 and 2021 (Table 1).

Mohua, the primary indicator of recovery, continues to increase, and was, for the first time, the most frequently counted forest bird on the counts in November 2018. Since 2018, mohua have been the most frequently counted forest bird on the counts. In 2021, 517 were counted compared to 485 in 2020 and 444 in 2018. At their lowest, there were only c.14 mohua left in the study area (1991).

Mohua trends demonstrate a significant increase in the mean number of birds counted per 5-minute count since management commenced, although there are some fluctuations (Figure 3). However, there was a rat plague in 2010 that was not managed - mohua and other species numbers dropped markedly, and it took 7 years for numbers to recover from that population crash.

Regression analyses indicate that numbers of 8 species (mohua, bellbird, brown creeper, fantail, tūī, rifleman, grey warbler, yellow-crowned kākāriki) have continued to increase, although the rates of increase in bellbird and grey warbler indices are showing signs of stabilising (Figures 4 - 10).

Counts for kākā, kea, tomtit, shining cuckoo, NZ falcon and kererū have remained stable or are increasing at a very slow rate (Figures 11 – 16). All seven species were predicted to decline if predator control was ineffective (based on other studies). Species such as kākā, kea and kererū are highly mobile, moving among different food sources at landscape scales

[1] O'Donnell CFJ; Hoare J.M. 2012.Quantifying the benefits of long-term integrated pest control for forest bird populations in a New Zealand temperate rainforest. New Zealand Journal of Ecology 36: 131-140. **Link:** http://newzealandecology.org/nzje/3022.pdf or https://www.researchgate.net/publication/262565385_Quantifying_the_benefits_of_long-term_integrated_pest_control_for_forest_bird_populations_in_a_New_Zealand_temperate_rainforest_New_Zealand

much larger than the Landsborough Valley. Therefore, they are still subject to threatening pressures at times of the year when they are outside of the valley.

Counts for silvereye and long-tailed cuckoo appear to be declining (Figures 17 – 18). The reasons for this are unknown, however, the dramatic increase in larger, more aggressive honeyeaters (tūī, bellbird) may signal that silvereye are being outcompeted. Long-tailed cuckoos parasitise nests of mohua and brown creeper, so would have been affected by earlier declines in these species. These cuckoos are never in the valley during the 1080 operations; they are a migratory species that is wintering on Pacific Islands and may be influenced by conditions during migration (e.g. cyclones on Pacific island wintering grounds).

Table 1. Slopes of species regression slopes (simple regression) in the Landsborough Valley, 2017-2021

Species	R^2 2017	R^2 2018	R^2 2020	R^2 2021
Total indigenous species	0.62	0.64	0.62	0.73
Total introduced species	-0.26*	-0.29	-0.28	-0.3
Bellbird	0.25	0.23	0.22	0.15
Brown creeper	0.31	0.39	0.49	0.57
Fantail	0.0001	0	0.12	0.24
Grey warbler	0.18	0.19	0.17	0.13
Kākā	0.004	0.01	0.0003	0.03
Kea	0.05	0.05	0.02	0.002
Kererū	0.05	0.03	0.002	0.05
Long-tailed cuckoo	-0.46*	-0.5	-0.41	-0.36
Mohua	0.42	0.52	0.62	0.69
NZ falcon	-	0.26	0.2	0.08
Rifleman	0.22	0.23	0.26	0.31
Shining cuckoo	-	0.02	0.02	0.01
Silvereye	-0.36*	-0.44	-0.49	-0.51
Tomtit	0.02	0.002	0.004	0.008
Tūī	0.56	0.61	0.55	0.56
Yellow-crowned kākāriki	0.12	0.09	0.13	0.11

*= declining populations

Figure 1. Total native birds - Landsborough Valley

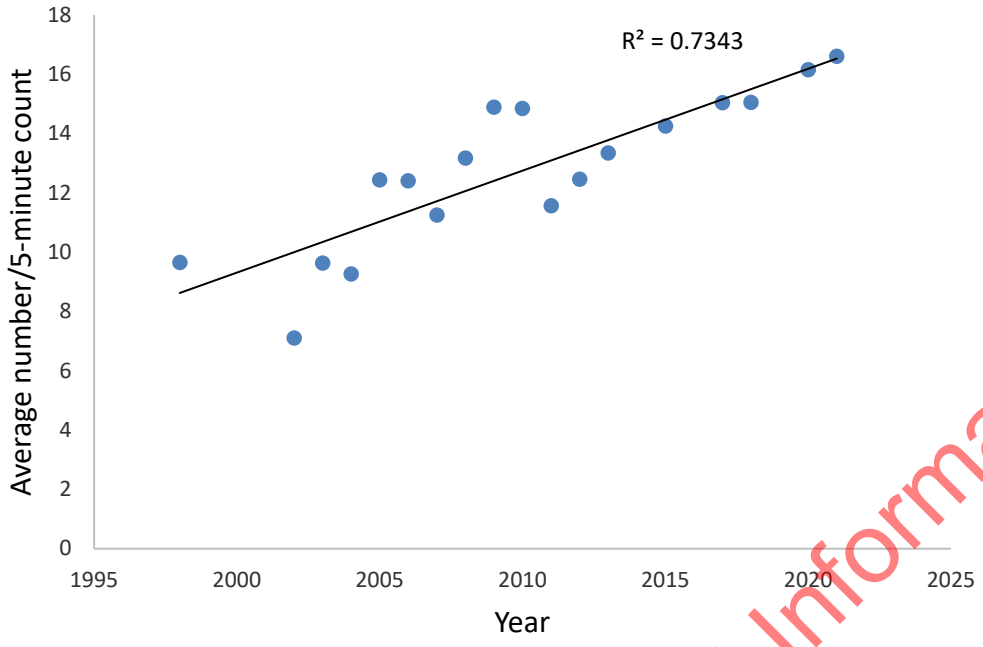


Figure 2.- Total introduced birds -Landsborough Valley

Figure 3. Mohua trends - Landsborough Valley

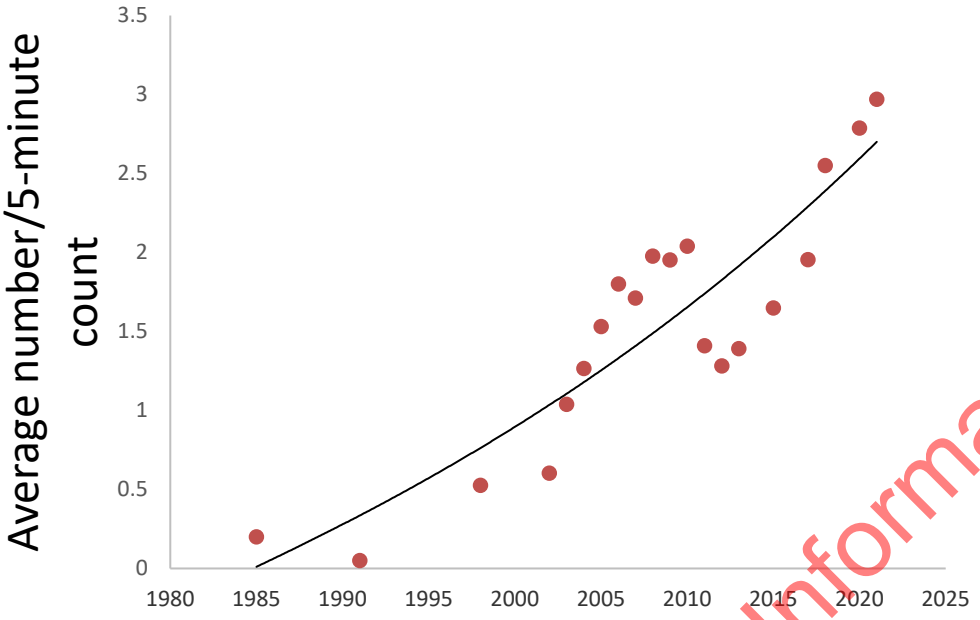


Figure 4. Tui trends - Landsborough Valley

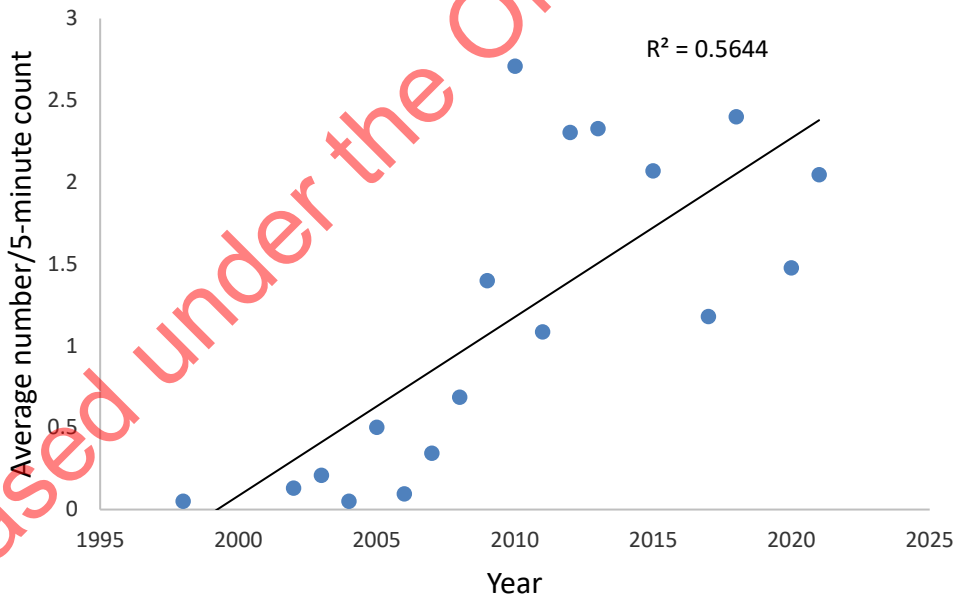


Figure 5. Bellbird trends - Landsborough Valley

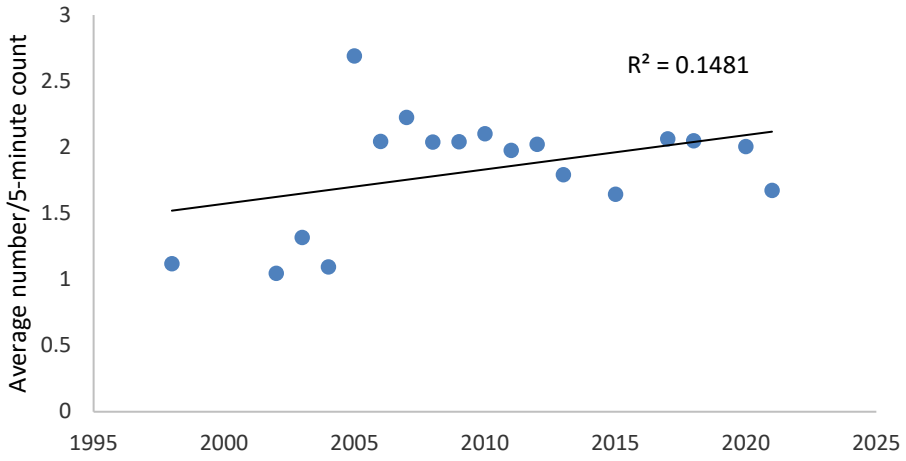


Figure 6. Brown creeper trends - Landsborough Valley

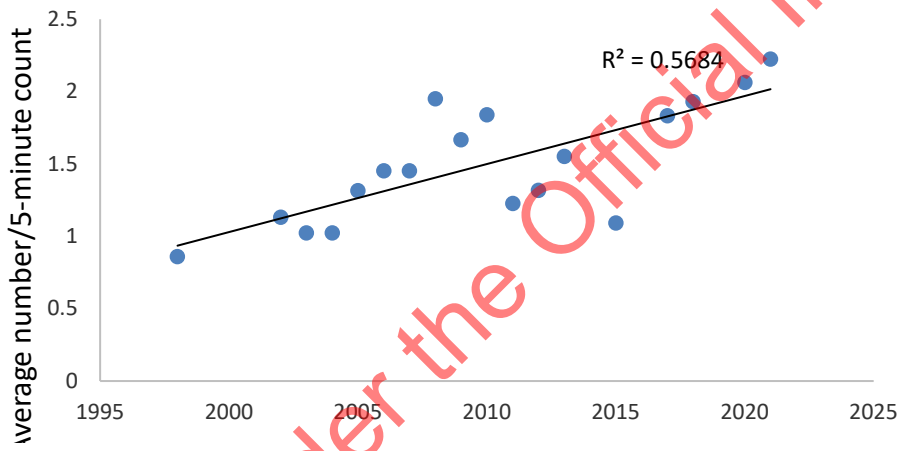


Figure 7. Fantail trends - Landsborough Valley

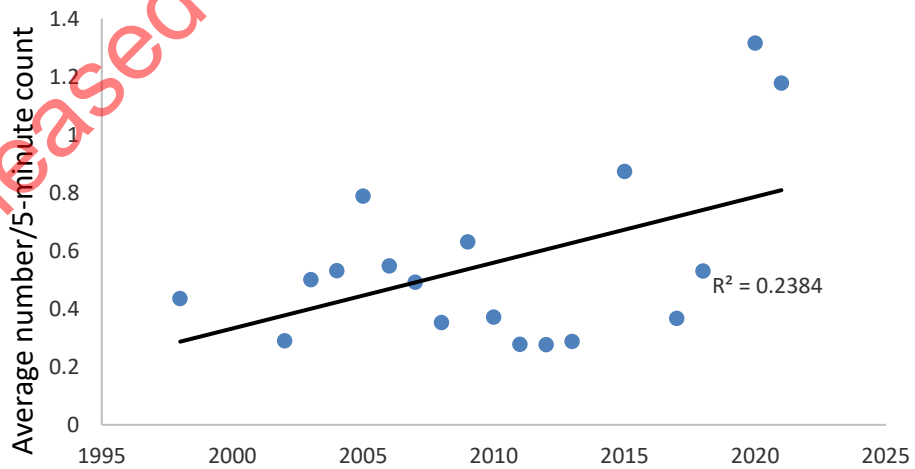


Figure 8. Rifleman trends - Landsborough Valley

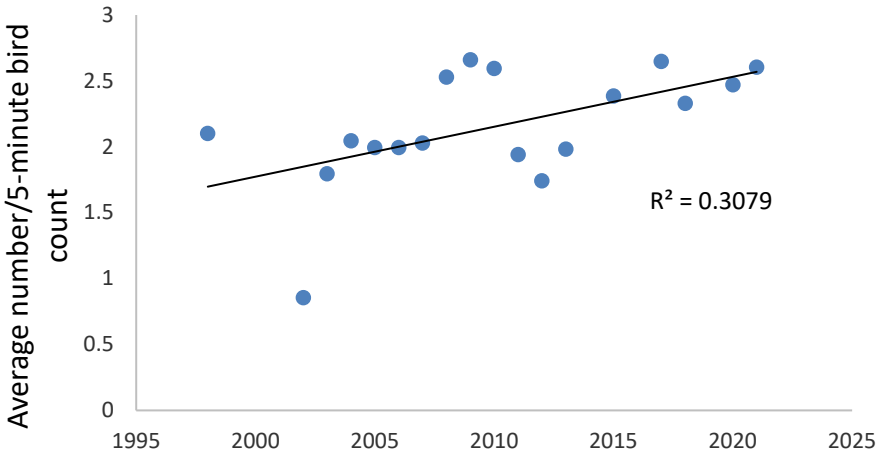


Figure 9. Grey warbler trends - Landsborough Valley

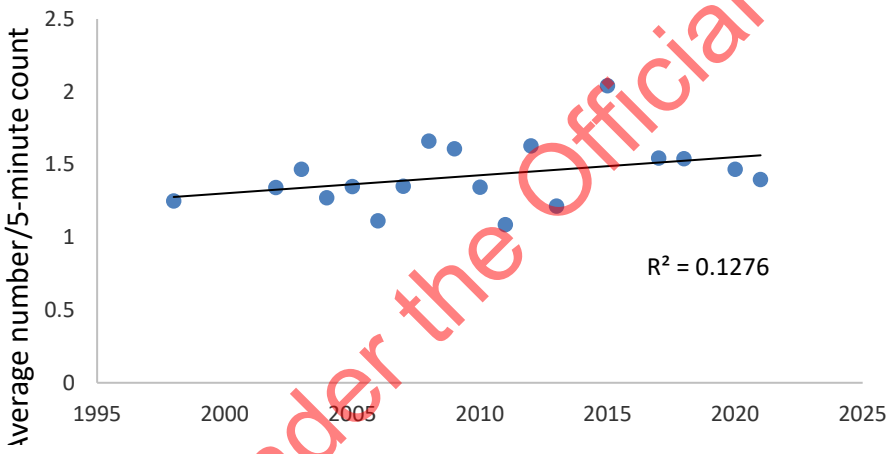


Figure 10. Kākāriki trends - Landsborough Valley

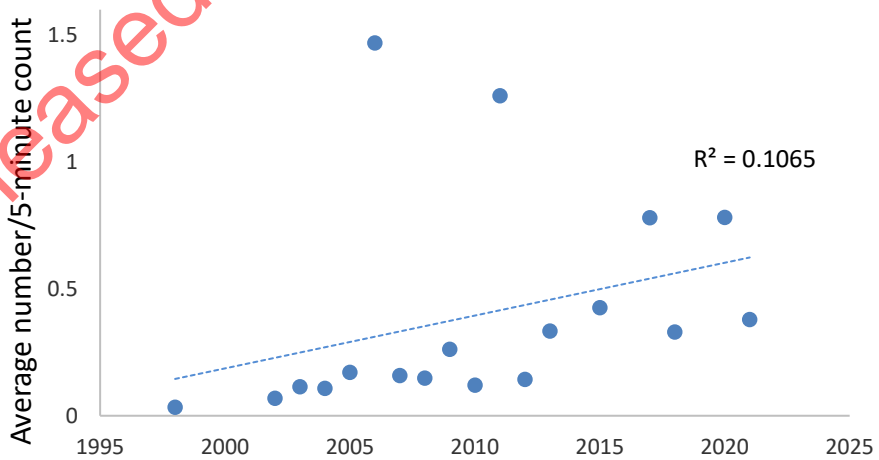


Figure 11. Kākā trends - Landsborough Valley

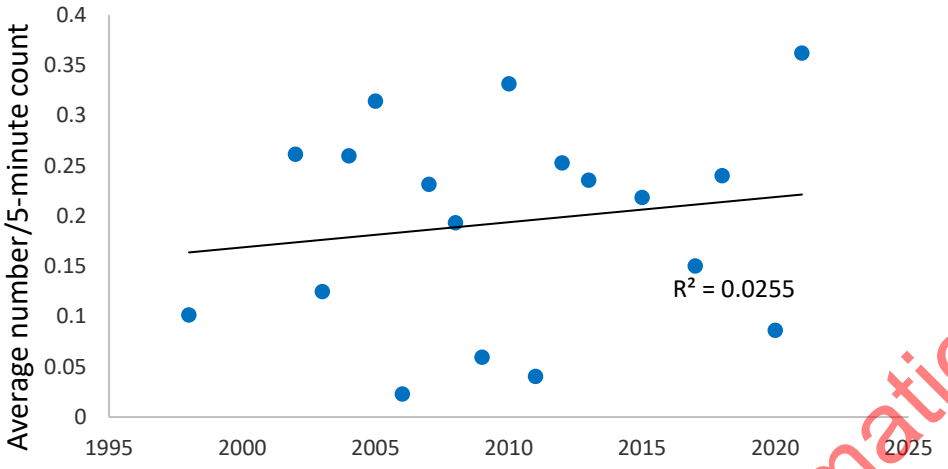


Figure 12. Kea trends - Landsborough Valley

Figure 13. Tomtit trends - Landsborough Valley

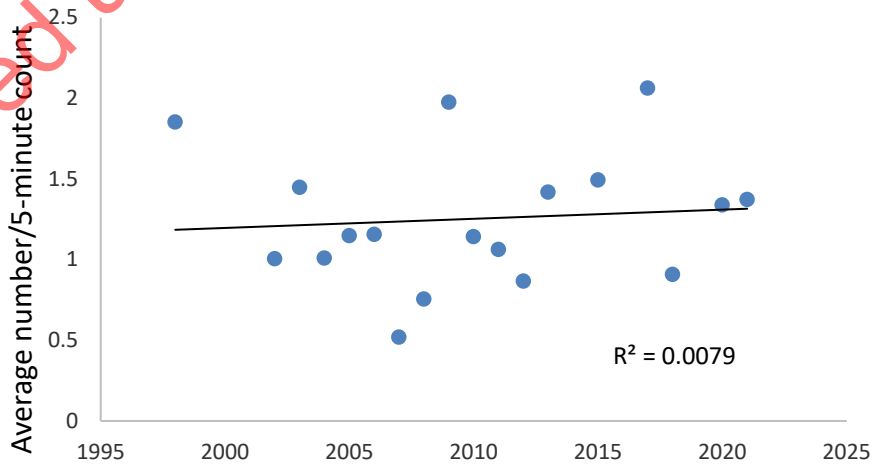


Figure 14. Shining cuckoo trends - Landsborough Valley

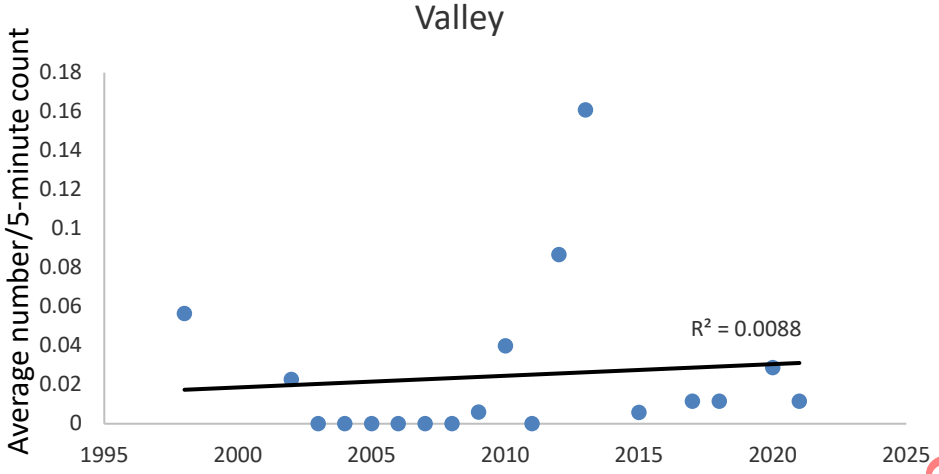


Figure 15. NZ Falcon trends - Landsborough Valley

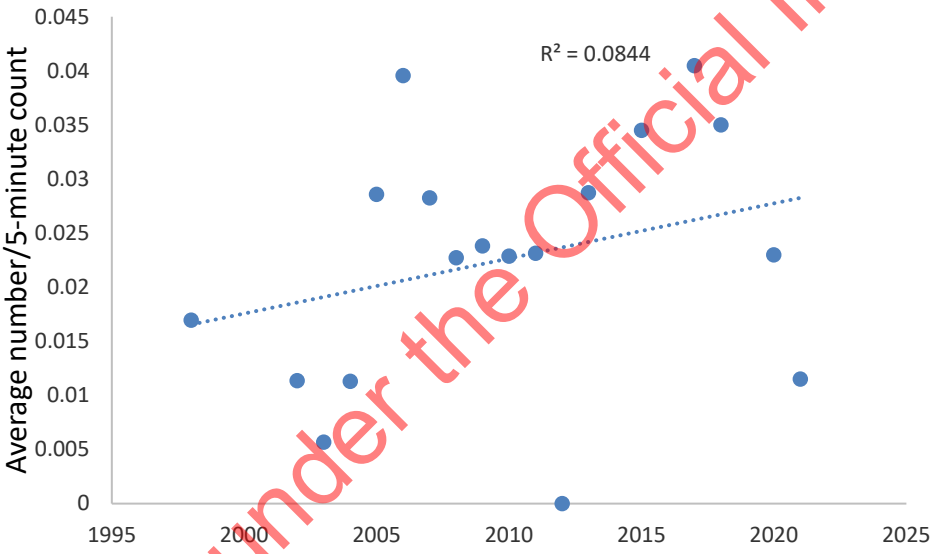


Figure 16. Kereru trends - Landsborough Valley

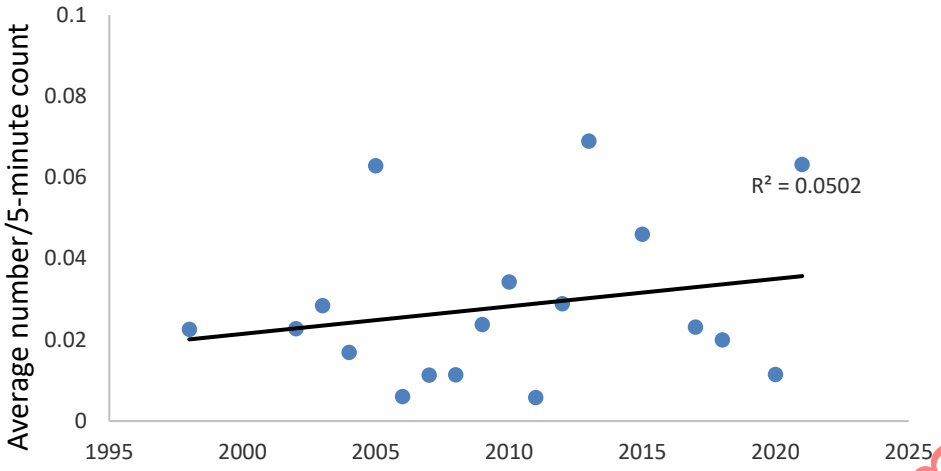


Figure 17. Long-tailed cuckoo trends - Landsborough Valley

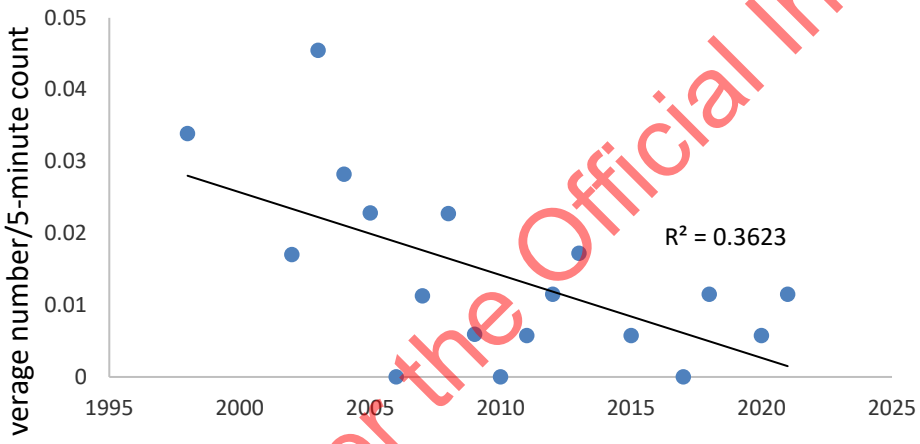
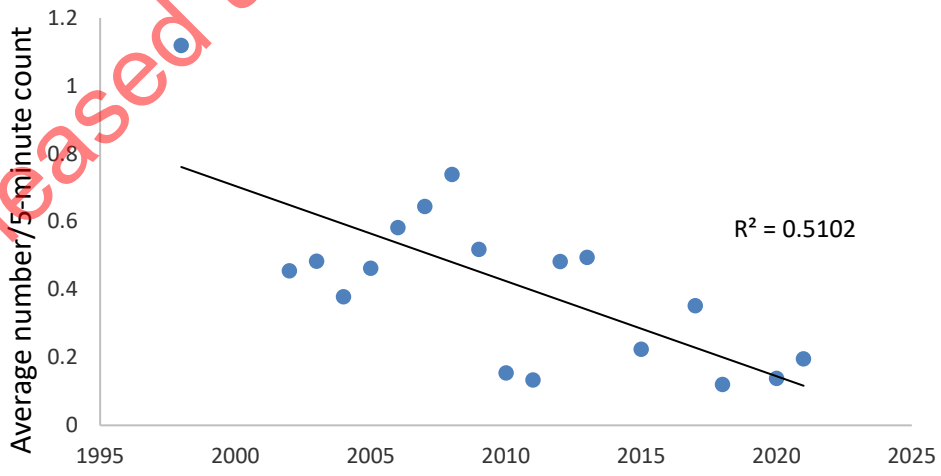


Figure 18. Silvereye trends - Landsborough Valley



Acknowledgements
Monitoring of birds in the Landsborough is managed by DOC (Haast & Franz Josef Offices) with data analysis undertaken by the DOC Terrestrial Science Unit (Biodiversity Group, Christchurch). 2021 counts were conducted by Glen Newton, Paul van Klink and Colin O'Donnell with assistance from Heath Sinclair and Hannah Morris. Bird counts over the whole monitoring period have been conducted by Megan Hieatt, John Lyall, Karen Mayhew, Glen Newton, Colin O'Donnell, Josh Stephens, Paul van Klink and Ron van Mierlo.

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O'Donnell, C.F.J.; Dilks, P.J.; Elliott, G.P. 1996. Control of a stoat *Mustela erminea* population irruption to enhance mohua (yellowhead) *Mohoua ochrocephala* breeding success in New Zealand. NZ Journal of Zoology 23: 279-286.

9(2)(a), 9(2)(g)(ii)
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Landsborough Tahr Ground Control 2022

Summary of work completed

9(2)(a), 9(2)(g)(ii) (Wild Balance), and 9(2)(a), 9(2)(g)(ii) (Wild Animal Control DoC Biodiversity Ranger), carried out a combined effort of 162 hours of ground control at Hinds Flat in the Landsborough Valley February 11th – 17th 2022. In total 284 tahr were confirmed culled and another 438 (males and females) seen. Jaws and rumen samples were collected on 23 individual tahr for a PhD project. All adult nannies were wet (had juveniles) and in good body condition. Overall, the contract went very smoothly due to diligent preparation and clear communication between the Department of Conservation and Wild Balance.

Kea and kaka were sighted daily on the tops, and one whio was present on the Landsborough River near the Hinds Flat campsite.

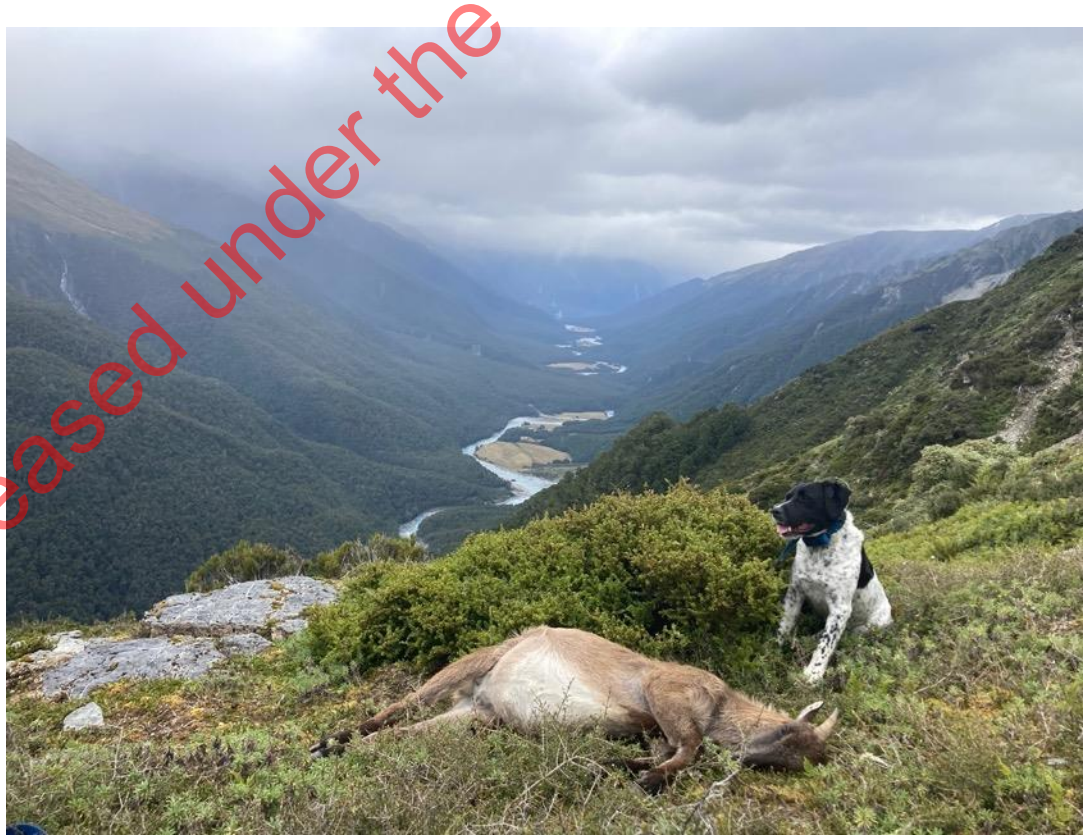

Figure 1: Looking down the Landsborough Valley, February 2022.

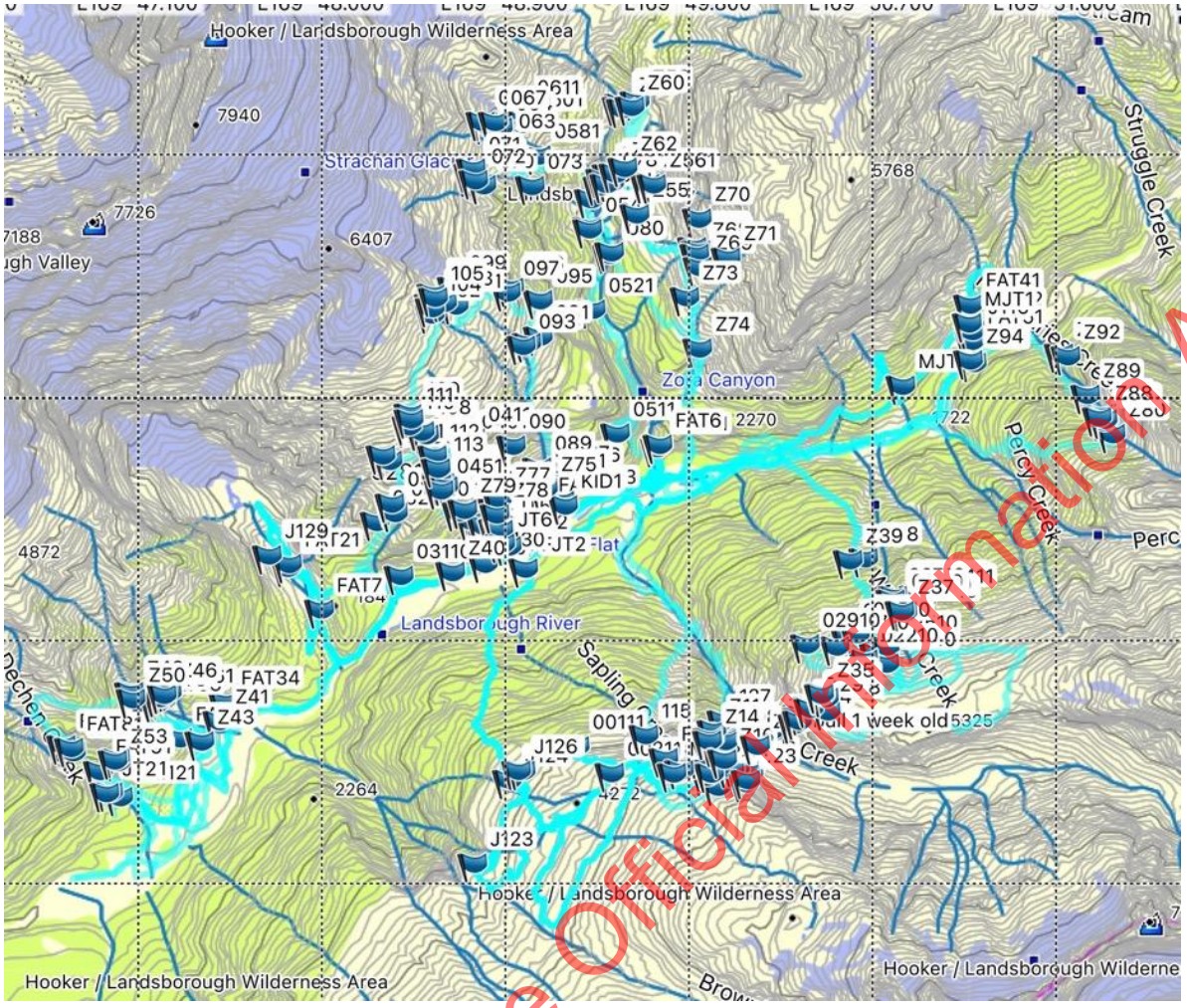

Figure 2: Map of all tracks and waypoints of kills at Hinds Flat, Landsborough Valley, February 2022.

Methods used

Indicating with a dog

When hunting the beech forest we found on average we could cull one tahr for every one hour of hunting time. The dogs were also very useful in the alpine scrub and tussock tops for indicating, ie, taking us to unseen mobs of tahr and giving us an indication of distance so we could ensure we stayed quiet and were ready to shoot the tahr when located.

Thermal during the day

Using thermal gear to locate tahr was very effective on cold overcast days and early mornings, but as the day warmed up it became ineffective due to the heat. This was usually from about 11am until late evening.

Thermal at night

We trialed one thermal run down the river from camp shooting tahr in the bluffs and creeks above the flats which was extremely effective. In total, 22 tahr were killed in three and a half hours of hunting time.

Most of the tahr were culled using a variety or combination of indicating with dogs, visibly spotting from a distance with binoculars and/or thermal monocular. Once spotted the most successful method was to get positioned under the mob and shoot them while they were in bluffy steep areas where they feel safer.

Ground hunting for tahr in this way was relatively successful. Mobs that were close by, but not yet being culled, stayed undisturbed considering the gunshots in the near vicinity.

As tahr are highly strung and rather wild (in comparison to goats), unless they felt safe in bluff systems, mobs would start running away immediately after the first gun shot. Consequently, a high percentage of mobs not in bluffs were disappearing into the bush and not able to be culled.

Vegetation damage

The forest, alpine scrub and tussock is extremely degraded and damaged to the point where there are a lot of areas of no regeneration in the beech forest, on slips, alpine scrub and tussock. Some areas were completely bare exposing the soil. Given this, the bush and alpine scrub was relatively easy to traverse (dependent on terrain). In places, there were very prominent 'cattle tracks' from tahr moving across the alpine faces.

Figure 3: Spaniard heavily browsed by tahr in the Landsborough Valley, February 2022.

Figure 4: Alpine scrub severely damaged by tahr browse. Note the scarring from teeth marks on the branches within reach and the regeneration of surrounding vegetation continually being eaten down. Landsborough Valley, February 2022.

Figure 5: An example of how open the beech forest is from being heavily browsed by tahr as high as they can reach. Note the ferns are almost entirely eaten back to their stumpy bases. Landsborough Valley, February 2022.

Figure 6. An example of a well-used tahr bed within the beech forest, Landsborough Valley February 2022.

Figure 7: Another example of how decimated the beech forest is due to heavy browsing by tahr. Note the height of browse and the ferns chewed back to their bases, Landsborough Valley, February 2022.

Figure 8: Tussock eaten back to ground level by tahr, Landsborough Valley, February 2022.

Figure 9: Young dry female tahr indicated on a steep face in open beech forest, true right of Zora Canyon, Landsborough Valley, February 2022.

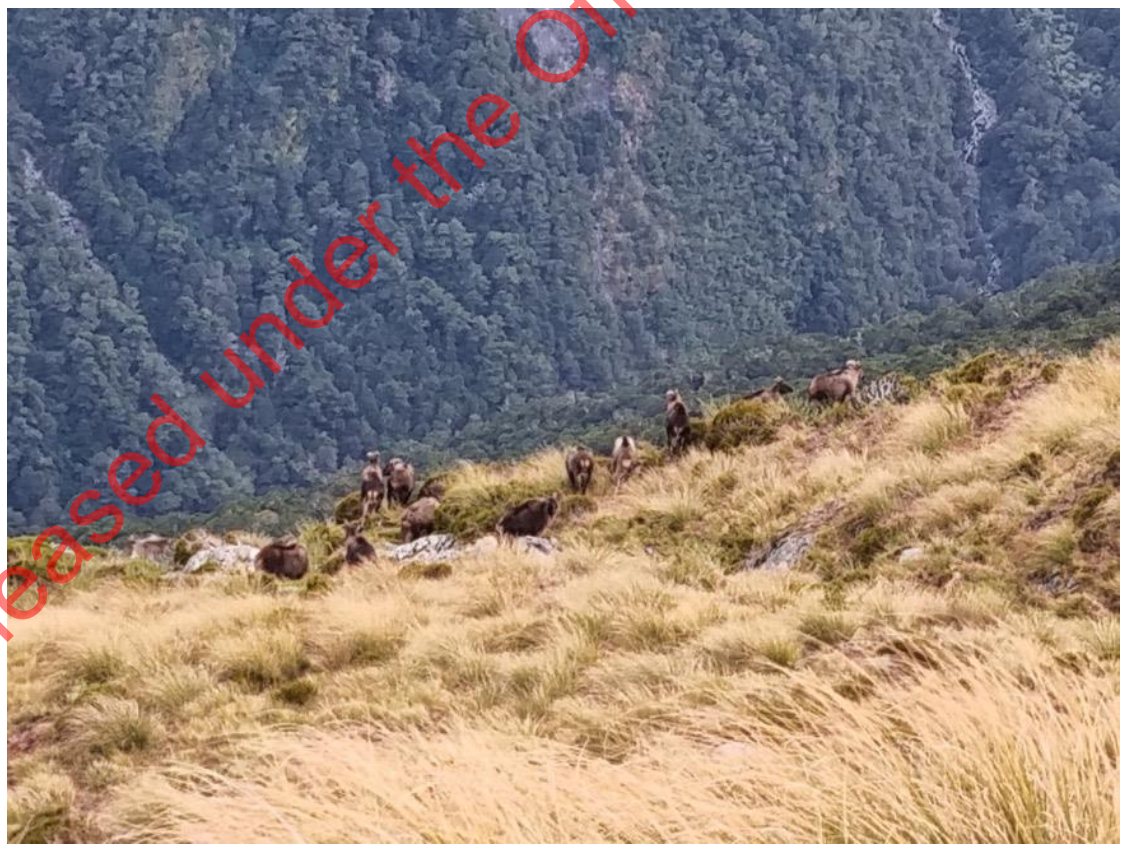

Figure 10: A mob of adult male tahr that were left undisturbed, Landsborough Valley, February 2022. In general, the majority of male tahr seen were in separate mobs from the nannies and juveniles.

Health and safety

Health and safety factors were managed very carefully to ensure the contract ran smoothly, with some key areas being:

- All ground cullers on the job were very experienced in hunting steep rough terrain.
- Each hunter kept in contact via radio, GPS tracking and an inreach.
- The job was undertaken during a good weather window (in particular this takes flexibility and communication between all parties involved).
- The contract was carried out within both Wild Balance and the DoC's health and safety requirements.

Recommendations

After completion of this contract we have a few recommendations:

- Create an overarching objective for the tahr population within the Landsborough Valley so there is a clear transparent density/management goal to work toward achieving.
- To achieve any recognizable impact on tahr numbers, significantly more hours of ground hunting is recommended.
- Every hunter has access to a thermal monocular and thermal scope.
- Thermal hunting at night could be trialed on the tops if a hunter was to be camped in strategic places (close to hot spots).
- Within a season and dependent on weather, it would be worth trialing a culling trip before nannies kid to cut down the number of individual tahr that were in each mob.
- While at our main base camp on the valley flats we discussed the advantage of having a helicopter at camp as Josh (Wild Balance ground hunter) is a trained commercial pilot. This would enable hunters to have drop offs for one-two nights in strategic places to hunt late evenings, early mornings and nights. It would dramatically cut down the amount of time spent by hunters traveling/not effectively hunting getting to the productive hot spots. This recommendation would need a bit of research into the financial feasibility (would only be recommended to be carried out if it could reduce the overall cost per tahr culled).
- Look at the feasibility of a summer ballot (for landing access) to encourage recreational hunters into high numbered areas.

Conclusion

Ground hunting tahr in this way was overall a success with 284 tahr culled in 162 hours. Visible damage was realized across the landscape from a high density of tahr. Beech forest, tussock and alpine scrub was all suffering from heavy browse. More intensive culling is highly recommended alongside a management plan that has achievable long-term objectives.

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Landsborough Tahr Ground Control 2023

Summary of work completed

9(2)(a), 9(2)(g)(ii) completed 80 hours of ground control at Zora Canyon in the Landsborough Valley February 9th – 13th 2023. In total 163 tahr were confirmed culled and roughly twice that (males and females) seen. All adult nannies were wet (had juveniles) and in good body condition. Overall, less tahr were seen compared to last year but we still killed about the same amount per day (less mobs running away in the distance).

Kea were sighted daily and in good numbers on the tops.

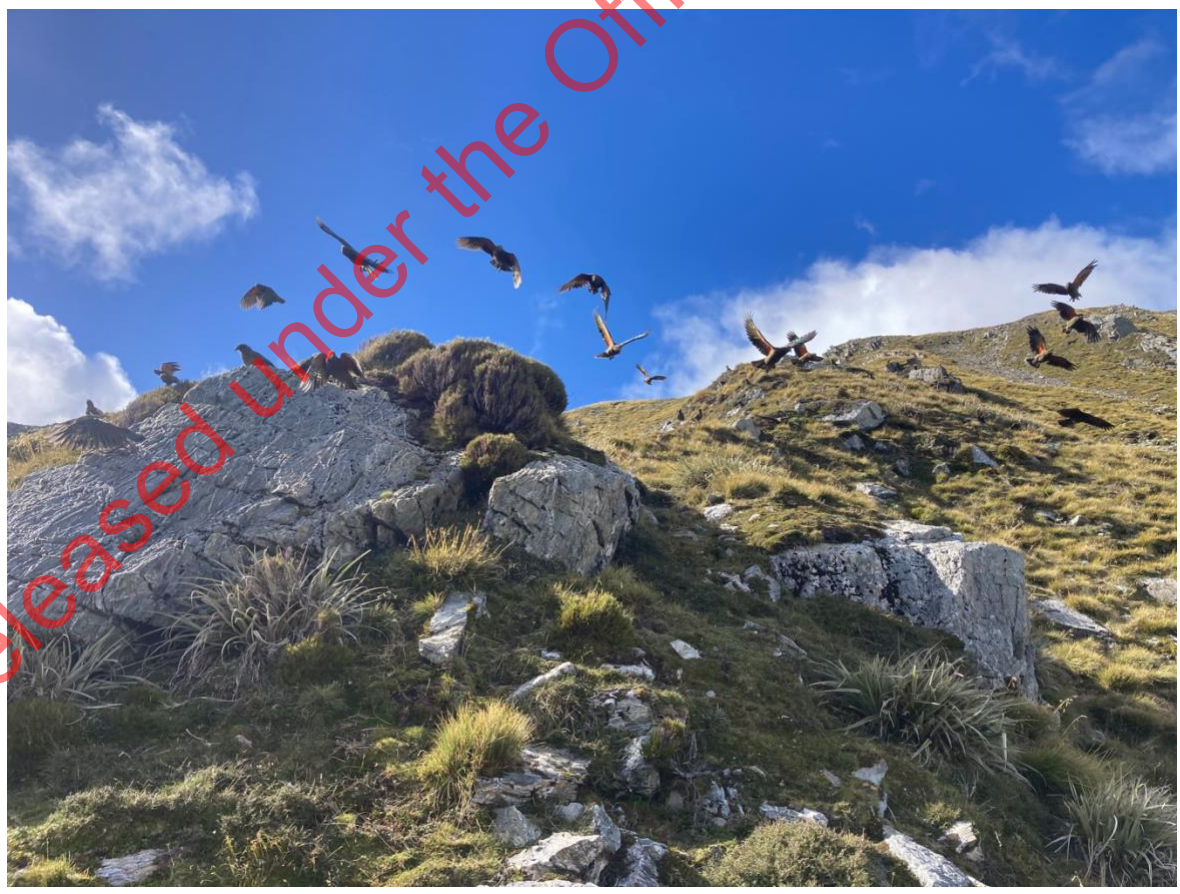


Figure 1: Kea (27+) putting on a display, true left Landsborough Valley, opposite Zora Canyon, February 2023.

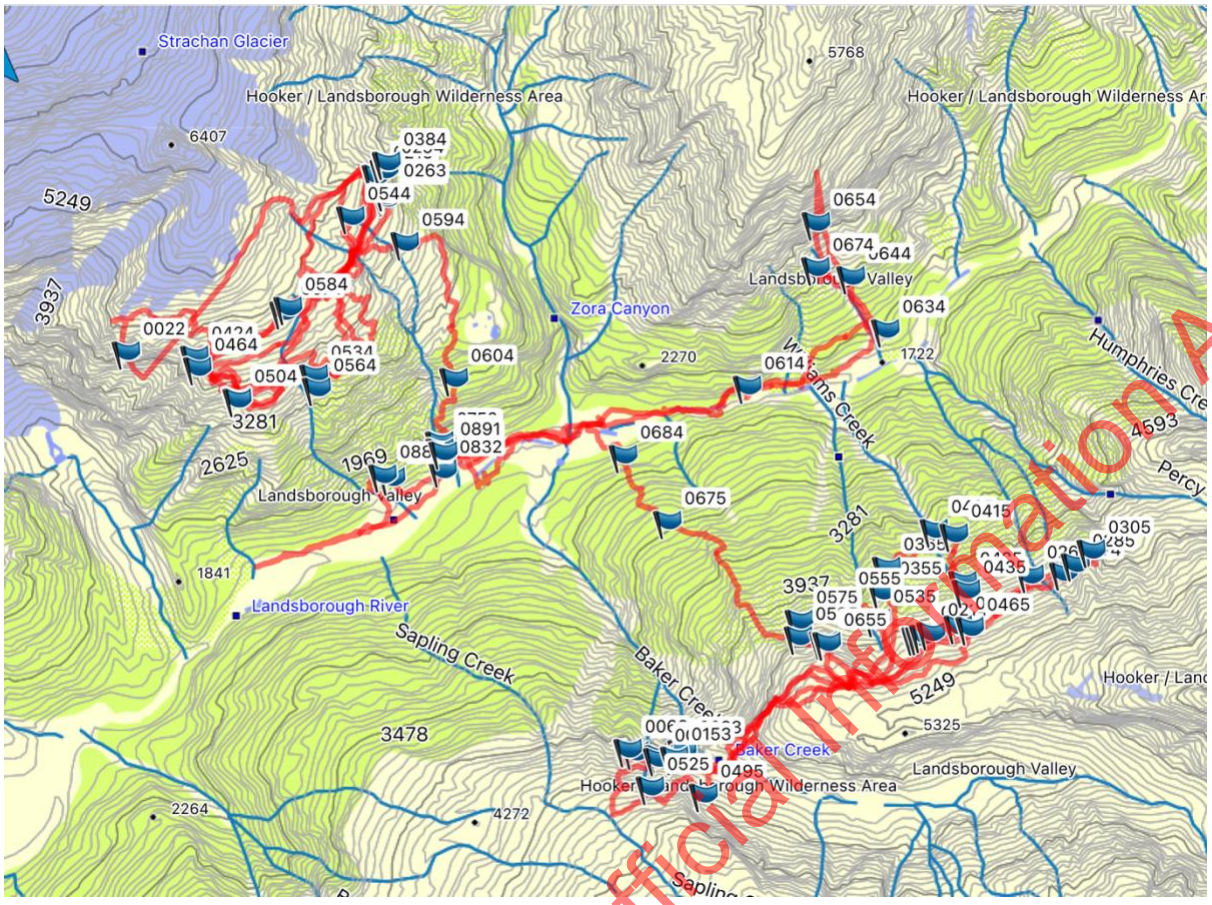


Figure 2: Map of all tracks (red lines) and waypoints of kills (blue flags) in Zora Canyon, Landsborough Valley, February 2023.

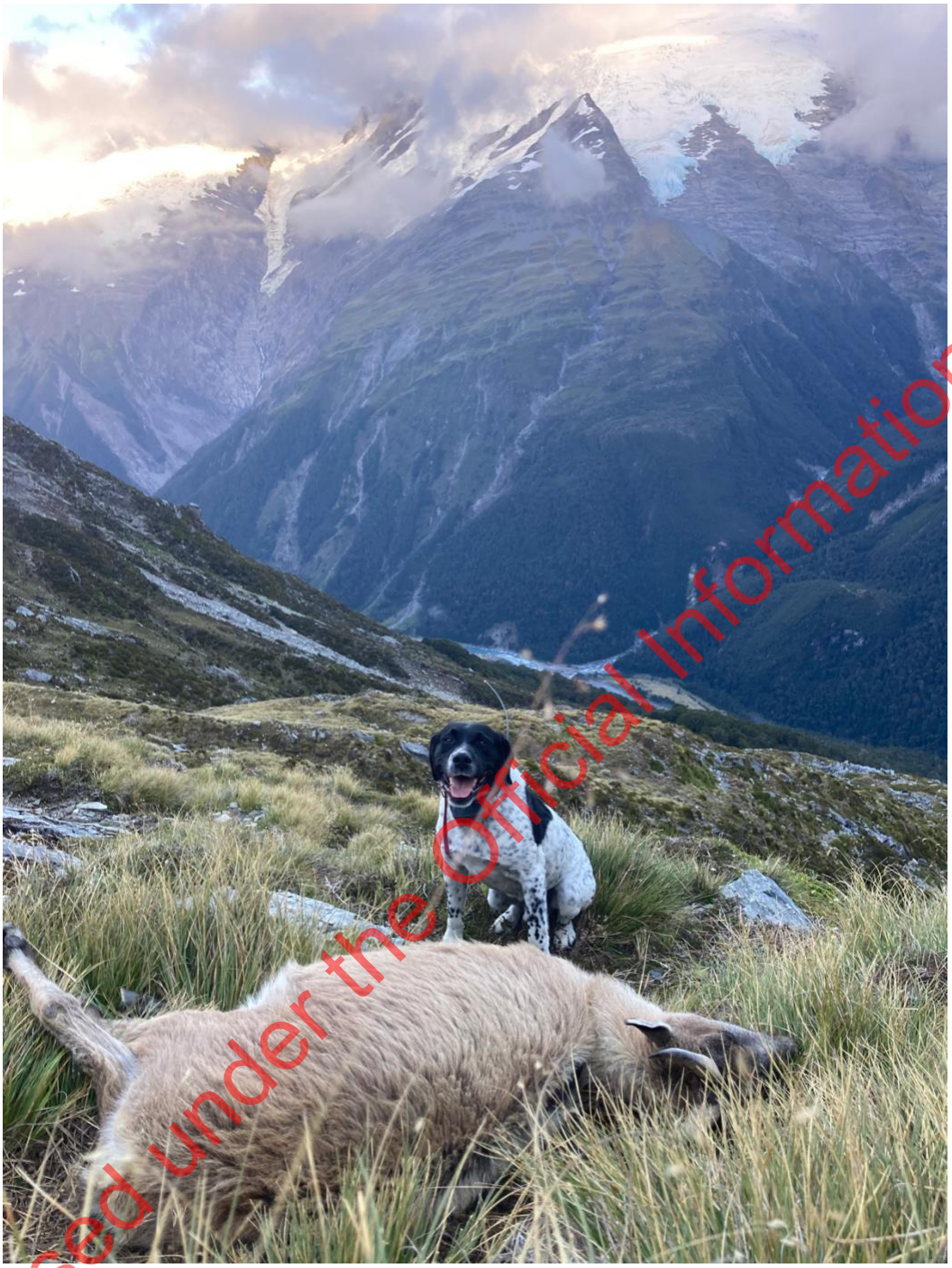


Figure 3: Bounce and a nanny tahr, Landsborough Valley, February 2023.

Methods used

Indicating with a dog

When hunting the beech forest we found on average we could cull one tahr for every one hour of hunting time. The dogs were also very useful in the alpine scrub and tussock tops for indicating, ie, taking us to unseen mobs of tahr and giving us an indication of distance so we could ensure we stayed quiet and were ready to shoot the tahr when located.

Thermal during the day

Using thermal gear to locate tahr was very effective on cold overcast days and early mornings, but as the day warmed up it became ineffective due to the heat. This was usually from about 11am until late evening. This trip, each hunter was placed in a strategic hot spot that were located last year. We camped there for three nights hunting early morning and late evening.

Thermal at night

We trialed one thermal run down the river from camp shooting tahr in the bluffs and creeks above the flats which was extremely effective. In total, 30 tahr were killed in four hours of hunting time, with 15 coming from one mob.

Most of the tahr were culled using a variety or combination of indicating with dogs, visibly spotting from a distance and/or thermal monocular. Once spotted the most successful method was to get positioned under the mob and shoot them while they were in bluffy steep areas where they feel safer.

Ground hunting for tahr in this way was relatively successful. Mobs that were close by, but not yet being culled, stayed undisturbed considering the gunshots in the near vicinity.

As tahr are highly strung and rather wild (in comparison to goats), unless they felt safe in bluff systems, mobs would start running away immediately after the first gun shot. Consequently, a high percentage of mobs not in bluffs were disappearing into the bush and not able to be culled.

Figure 4: Two juvenile tahr culled low in a rocky creek, Landsborough Valley, February 2023.

Vegetation damage

The forest, alpine scrub and tussock is extremely degraded and damaged to the point where there are a lot of areas of no regeneration in the beech forest, on slips, alpine scrub and tussock. Some areas were completely bare exposing the soil. Given this, the bush and alpine scrub was relatively easy to traverse (dependent on terrain). In places, there were very prominent 'cattle tracks' from tahr moving across the alpine faces, similar to last year.

Figure 5: Bare patches and vegetation heavily browsed by tahr in the Landsborough Valley, February 2023.

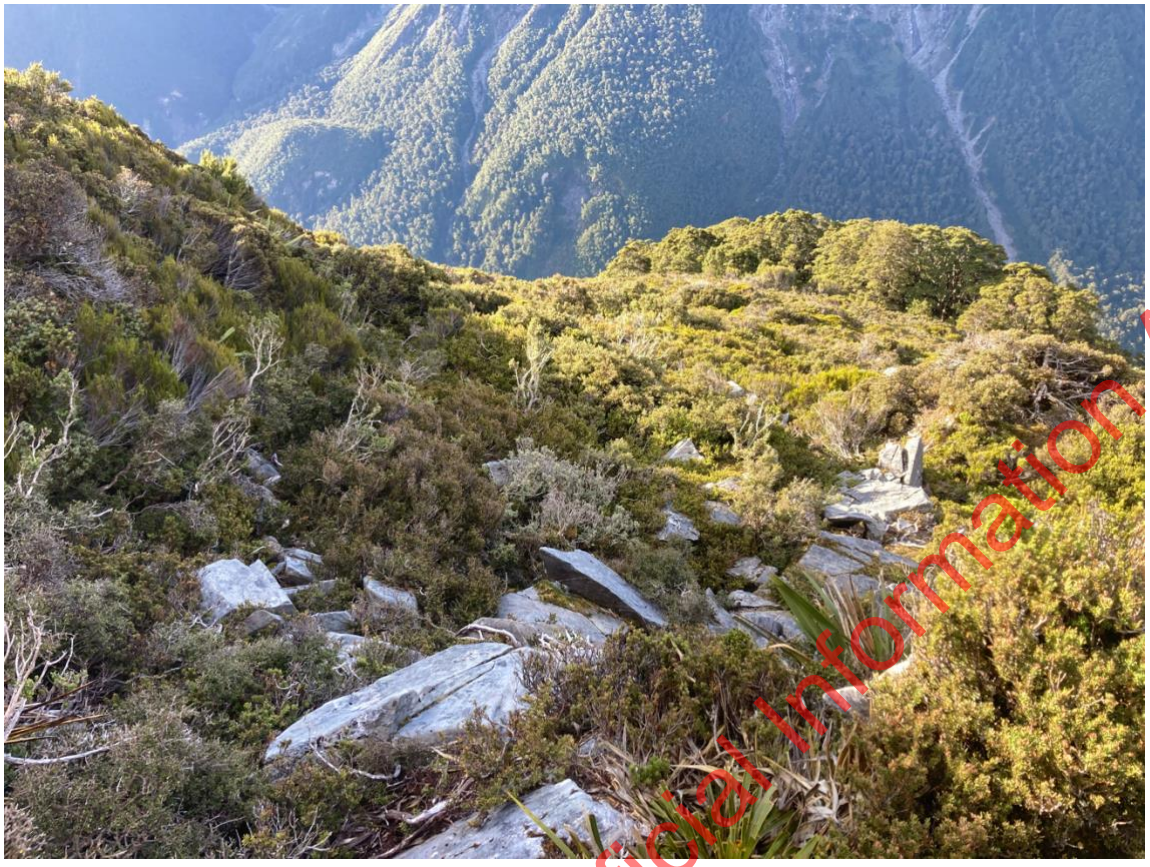


Figure 6: Heavily browsed alpine scrub, just above the beech forest in the Landsborough Valley, February 2023.

Figure 7: Heavily browsed vegetation by tahr in the Landsborough Valley, February 2023.

Health and safety

Health and safety factors were managed very carefully to ensure the contract ran smoothly, with some key areas being:

- All ground cullers on the job were very experienced in hunting steep rough terrain.
- Each hunter kept in contact via radio, GPS tracking and an inreach.
- The job was undertaken during a good weather window (in particular this takes flexibility and communication between all parties involved).
- The contract was carried out within both Wild Balance and the DoC's health and safety requirements.

Recommendations

After completion of this contract we have a few recommendations:

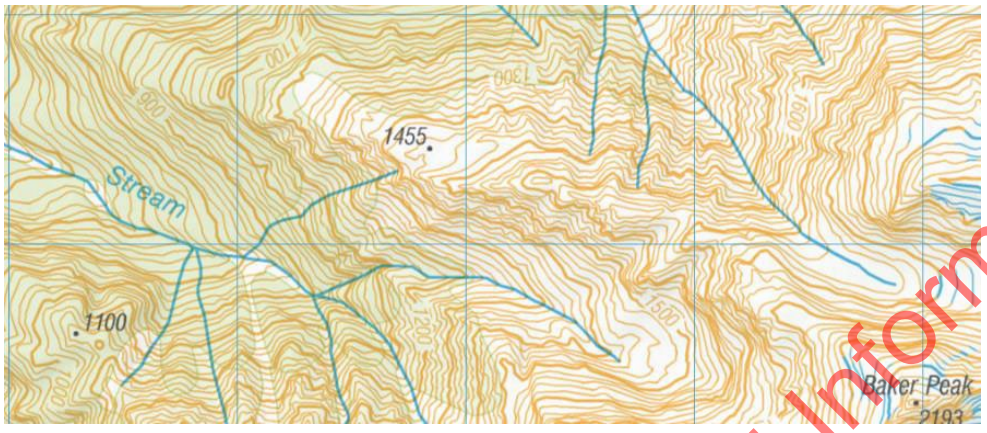
- Create an overarching objective for the tahr population within the Landsborough Valley so there is a clear transparent density/management goal to work toward achieving.
- To maximize the cost of getting the helicopter in there, it would be most beneficial to hunt for ten days.
- To achieve any recognizable impact on tahr numbers, significantly more hours of ground hunting is recommended.
- Within a season and dependent on weather, it would be worth trialing a culling trip before nannies kid to cut down the number of individual tahr that were in each mob.
- Look at the feasibility of a summer ballot (for landing access) to encourage recreational hunters into high numbered areas.

Conclusion

Ground hunting tahr in this way was overall a success with 163 tahr culled in 80 hours. Visible damage was realized across the landscape from a high density of tahr. Beech forest, tussock and alpine scrub was all suffering from heavy browse, much the same as last year, however the vegetation will take a while to recover. More intensive culling is highly recommended alongside a management plan that has achievable long-term objectives.

Landsborough Feb 2023 ([redacted] thoughts and observations)

I was dropped on tops the ridge between McKerrow and Kea Cks TR Landsborough Thursday 9th Feb 2023 to undertake ground control for a few days at that location followed by decent to the flats on TR at Dechen Ck. These are my observations from that work.



- Tahr at this site were wary for 12-24 hours after being dropped off. All were in the scrub/bush and group sizes was small.
- Biggest group size seen on this tops site was 7. (bigger mobs were seen looking across to the vast faces north of McKerrow creek where there were tahr every time I looked even when they'd been shot up)
- Mostly I was dropping onto animals holding in the scrub in small groups of 1-3 animals, many were hard to access due to steep bluffy gutters south side of the ridge into kea stream
- The amount of foot accessible ground at this site was limited for me without unnecessary risk
- No animals were seen in the Kea stream head basin (not sure why)
- Most animals on tops site were nanny and juv/kid. Bulls were mostly in heavy scrub near bushline
- Kea numbers were high on this ridgeline with one group of 23 seen together consisting mostly of juveniles
- 7 wren were seen in two family groups along the southern edge of the rocky ridge looking into Kea stream at between 1300-1500m Alt (pair with 2 juv another pair with one juv)
- Lots of frogs/tadpoles present in the tarns near the bushline

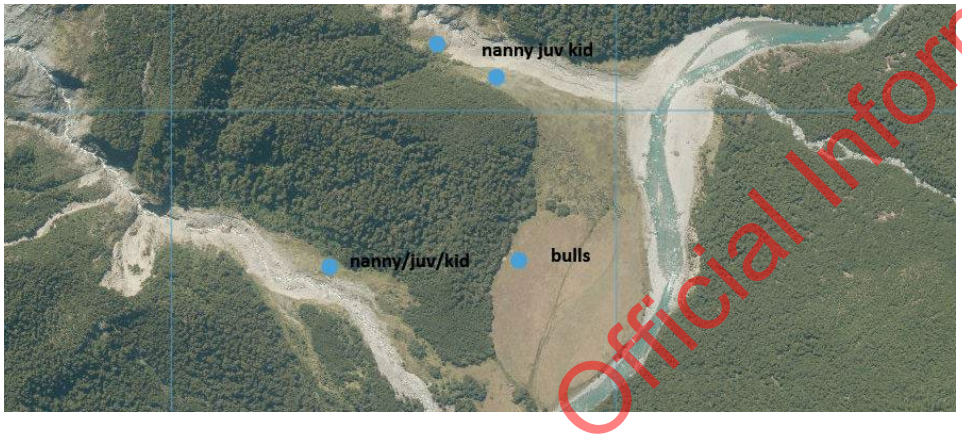
- Very little tahr sign on the bush below the tops (some tracking and faeces up to 2-300m into bush but then nothing)
- Comms were possible on channel 2 to Haast, comms were good with others on channel 15 set to set.

I descended to the basecamp site located beside the best river crossing on the Landborough in this area near Dechen Ck. Tahr sign was encountered on the spur and in the bush from around the 700m alt mark above Kea Flat. All tahr seen in the bush above Kea flat were bulls. No tahr seen on Kea Flat as was middle of the hot day. Would be worth hunting the flat but wasn't possible due to trip getting cut short due to possible cyclone effects.

Minimal animal sign seen on the main riverbed between Kea Flat and Dechen Flat, mostly it appeared few solitary animals wandering.

The Landsborough crossing below Dechen Ck provided no problems in normal river flow crossing TL to TR, bouldery and waist deep not too swift but may be more difficult crossing TR back to TL because of the angle of the crossing.

- From basecamp the on Dechen flats both creek fans were mown like a bowling green and had a lot of recent tahr sign damage not evident further downstream.
- Dogs would be useful tracking down stragglers in the bush after these mobs were shot up
- It was Nanny juv and kid groups that were on these fans
- Some bulls were seen on the main Dechen flat but the grass was chest high seeding Chionochloa and animals totally hidden in that high grass



I had a set of thermal binos but no scope. (had a light if required) I carried these around scanning on tops and brief scans from basecamp but found most of the rock/riverbed too hot. I tried first thing in the morning most rocks were still too hot for thermal and I didn't locate any additional animals by using thermal. I think [redacted] shot some on Dechen creek fans as he had a thermal scope.

The killing power of the copper bullets is questionable. In general animals not dying quickly unless spine is hit. There were many richochets after the bullet passed through the animal.

I would have liked to try the 308 copper as they may be better killers and may give longer range.

I would be more careful myself with ensuring battery powered devices had backup batteries as I had Inreach drained by accidentlally turning on in the full pack plus I only took one handheld battery for sched on tops and was close to running down. The dog collar gps provided had a flat battery soon as it was turned on and the second battery for it only lasted two days and the device wouldn't charge on the generator at basecamp or my portable powerpack so luckily my phone app was able to track and mark further kills and tracking.

I did note that tahr damage overall was much more noticeable that when I managed Unit 6 1998-2004 especially on lower gravel fans Dechen and Hinds Flats. Prior to 2004 we would be seeing very few tahr on TR below Hinds Tarns (mostly bulls) and low numbers below Baker Creek on TL. [redacted] the pilot also mentioned to numbers they had been shooting between Franz and the Cook and numbers in those areas were low prior to 2004 apart from Waikukukpa tops. Changes over time.

Overall it was an enjoyable and productive trip and clearly showed ground control can be effective as a control and provide targeted control to specific areas.

9(2)(a), 9(2)(g)(ii)

Feb 2023