

**Application for Use of Pesticide for
Possum Control in the Perth Valley,
South Westland.**

March 2019

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1. INTRODUCTION	2
2. OUTCOMES AND TARGETS	5
3. CONSULTATION AND CONSENTS	6
4. METHODS	7
5. FURTHER INFORMATION	10
APPENDIX 1: DOC PERFORMANCE STANDARDS	11
APPENDIX 2: MAPS	14
APPENDIX 3: COMMUNICATION RECORD	3
APPENDIX 4: CONSENTS	4
APPENDIX 5: ASSESSMENT OF ENVIRONMENTAL EFFECTS	5

1. Introduction

1.1 Overview

Zero Invasive Predators Ltd (ZIP) is collaborating with the Department of Conservation and Predator Free 2050 Ltd on a research and development programme over an approximately 12,000 hectare block within the Perth Valley.

The purpose of this research programme is to test and refine a predator management approach to completely remove possums from large areas, and prevent them from re-establishing.

The work will also seek to develop this approach for ship rats and stoats.

If successful, the approach will have significant beneficial outcomes for native plants and animals in the Perth Valley. It could also help pave the way for a predator-free New Zealand, by demonstrating what is possible in native forest habitats.

The approach being developed has three main parts:

- Natural barriers to prevent or slow the movement of predators back into the block (e.g. rivers, alpine tops) will be reinforced with a network of traps.
- ZIP will then attempt to completely remove possums and rats from within the block using a rigorous method to apply aerial 1080, known as '1080 to Zero'. This document forms the permission application to conduct this aerial operation.
- Finally, predators that either survive the 1080 treatment or reinvade the block from beyond its boundaries will be detected using traps and any emerging population removed before it can re-establish within the site.

This project builds on the promising results of '1080 to Zero' trials carried out by ZIP and DOC during 2016 and 2017, and the 'river barrier' trial by ZIP in 2017 (refer to ZIP website for details). The aim this time, for the first time ever, will be to maintain a possum-free site in perpetuity.

As mentioned, the project proposes the aerial distribution of cereal bait containing 1080 over part of the research project area between March and September 2019 (weather dependent), in dual aerial operations using different bait approx. 6 weeks apart.

It is the same operation that was intended to be undertaken in 2018, but was postponed by ZIP following ongoing poor weather and the emerging evidence of possums persisting at high elevation in deep snow which would have put the complete removal goal at risk.

The use of aerial 1080 is part of a research and development project, and therefore we consider the parameters of the *Aerial 1080 in Kea Habitat Code of Practice* do not apply. We seek exemption from this COP for this operation, and provide a separate risk assessment and mitigation plan to support that consideration.

It is proposed that the following pesticide uses will be applied:

- Pesticide Use #1, 1080 loaded at 0.15% in 6g Orillion Wanganui #7, at rate of 4 kg/ha (2 kg/ha with 50% swath overlap); and ACP RS 5 cereal pellets sown aerially, at rates of 2 kg/ha (1 kg/ha with 50% swath overlap).

Preferred timing of the operation is from 18th March (1st prefeed) ending 30 June, 2020. This timing has been chosen in attempt to avoid big and constant snowfall events, such that caused the postponement of this operation last year.

Permission is sought for an operation starting on 18th March 2019 and ending on or before 30th June 2020.

**1.2
Treatment
area**

Part Waitangi Forest Conservation Area and part Adams Wilderness Area, Whataroa/Perth catchment, South Westland.

13,383 Hectares (PHU/DoC consent area)

**1.3
Treatment
block(s)**

Treatment Block 1: Perth Aerial possum control area – 8,659 hectares.

**1.4
Geographical
location**

The area to be treated lies in the mid to upper reaches of the Perth River catchment (a major tributary of the Whataroa River), upstream of Pauline Stream. This includes the Barlow River, part of Scone Creek, Bettison Stream and upper Perth River catchments up to the spine of the Southern Alps.

The nearest town is Whataroa, 16 km downstream to the north west.

**1.5
Adjacent land
tenure and
uses**

Adjacent land to the treatment area is all Crown Public Conservation Land, as part of the Waitangi Forest Conservation Area (Stewardship Area) or the Adams Wilderness Area (Conservation Area).

The closest privately owned land is on the Whataroa River TL at Tommy Creek, 10km downstream from the consent boundary.

**1.6
Nearby
residential
areas or
facilities**

There are no permanent dwellings within the operational area.

The nearest residential areas/dwellings are farming residences on the east side of Whataroa, on the Whataroa River plain 12km downstream from the operational area.

The treatment area does not affect any water supply catchments servicing these areas.

**1.7
Community
interests**

There are 3 DoC tracks in the treatment area along with 1 hut - refer to accompanying maps. The 4 tahr ballot landing/camping sites have been removed from this year's ballot, so they do not require further consideration.

As the operation is to be conducted over the autumn/early winter period, and the planned operation is well known within the community, visitor use should be low. The Perth Valley tracks are classed as advanced tramping or expert level and are not expected to have many, if any, users at this time of the year.

**1.8
Management
history**

The Department of Conservation has undertaken possum control (in the form of ground and/or aerial control) over the forested sections of the treatment block five times since 1997. Typically the treatment area has been the Whataroa-Perth Valleys (i.e. larger than the proposed operation), but only to the upper extent of the bushline.

The last operation was an aerial 1080 operation in October 2012 – the Whataroa was broadcast sown at 2kg/ha with 12g bait, while the Barlow section (north of Perth River and east of Barlow river) was cluster sown with 6g bait at 0.5kg/ha. The immediate post-operational monitoring recorded 0.5% RTC possum. Based on the possum monitoring carried out in 2017, the next aerial operation was not scheduled until 2020.

2. Outcomes and targets

2.1

Conservation outcome(s)

This projects outcomes are:

1. To completely remove possums and permanently prevent their re-establishment at a landscape-scale site where possum control is needed to conserve the site's biodiversity values
2. To develop new knowledge, tools and techniques about how to completely remove and prevent the re-establishment of ship rats and stoats

2.2

Target(s)

The target for the 1080 to Zero operation is the complete removal of possums (and ship rats) from the project area. In addition, we are targeting stoat removal to below detectable levels.

This will be assessed by the following means:

For possums and ship rats:

- A grid of chew cards spaced 700m x 10m run permanently for a minimum of 16 weeks. Our modelling suggests that, if surviving rats have bred post-toxin baiting, this detection array will detect the first generation of rats with 90+% confidence.
- Based on the ranging behaviour of 'lonely' possums post-control (ZIP pers. comm, OSPRI research) with movements of 80-100 ha seen, we expect to detect surviving possums on the same grid within that 16 week period.
- In addition, motion activated cameras will be deployed at a 1 per 35 ha density throughout the grid to provide confidence in the absence of detection (for possums).

For stoats:

- A network of cameras paired with automated lure dispensers (at a density of 1 per 35ha) will be used to record pre and post-operation stoat detections. It is expected from this data to be able to model the probability of success, or at least the likely population reduction.
- In addition, we are planning to release a small sample of radio-collared stoats into the treatment area, prior to the operation, to give us some robust kill/survival data.

3. Consultation and consents

3.1 Consultation

As part of the development and implementation planning for this project extensive consultation has been carried out by ZIP staff.

This has included meetings with and presentations to;

- Iwi and rūnanga.
- Concessionaires and tourism (guided hunting) operators.
- NZDA and the NZ Game Animal Council
- Local communities and interest groups.
- Operational neighbours.
- Local government
- Public Health staff.

It is within this environment of strong public interaction and information sharing that the proposed ZIP Perth aerial operation sits.

For details of the specific actions carried out for this operation refer to Communications & Consultation Record attached.

3.2 Consents

The following documents are attached as Appendix 4:

- Proof of public health permission application¹
- Copies of landowner/occupier consents (if obtained in writing)
- Other:
- Other:

¹ The complete public health permission (including application form) must be sighted before DOC permission will be granted.

4. Methods

4.1 Treatment block 1

Perth Aerial possum control area – 8,659 hectares.

Pesticides—aerial

Phase One:

Pesticide use HSR002424 1080 0.15% in Orillion Wanganui #7 cereal pellet aerially applied

Target pest
Possums

Brand name of pesticide	Orillion Wanganui #7, 1080 @ 1.5g/kg, 6gm cereal pellets
Lure/mask (& %)	Double orange, 0.3% w/w
Type of pre-feed (lure/dye)	Orillion Wanganui #7, 6gm cereal pellets lured with double strength orange, dyed green to support the kea mitigation strategy
Number of pre-feeds	2
Sowing rates for pre-feed	Prefeed 2.0kg/ha (+/- 10% due to slight overlap in baiting swath)
Sowing rates for toxic bait	Toxic 4.0kg/ha (+/-10%) being 2.0kg/ha sowing rate with 50% swath overlap
Other details about this method See 'Taonga Species Risk Assessment and Mitigation Plan' for more information on the reason and purpose of dyeing ALL bait green.	

Treatment block 1

Perth Aerial possum control area – 8,659 hectares.

Phase two:

Pesticide use HSR002424 1080 0.15% in Orillion RS5 cereal pellet aerially applied

Target pest
Possums

Brand name of pesticide	Orillion RS 5, 1080 @ 1.5g/kg, 6gm cereal pellets
Lure/mask (& %)	Double cinnamon 0.3% w/w
Type of pre-feed (lure/dye)	Orillion RS 5, 6gm cereal pellets lured with double strength cinnamon, dyed green to support the kea

	mitigation strategy
Number of pre-feeds	2
Sowing rates for pre-feed	Prefeed 2.0kg/ha (+/- 10% due to slight overlap in baiting swath)
Sowing rates for toxic bait	Toxic 2.0kg/ha (+/-10%) being 1.0kg/ha sowing rate with 50% swath overlap
Other details about this method See 'Taonga Species Risk Assessment and Mitigation Plan' for more information on the reason and purpose of dyeing ALL bait green	

Treatment block 1

Perth Aerial possum control area – 8,659 hectares.

Phase three: Spot treatment

Pesticide use HSR002424 1080 0.15% in Orillion RS5 cereal pellet aerially applied Target pest Possums

Brand name of pesticide	Orillion RS 5, 1080 @ 1.5g/kg, 6gm cereal pellets
Lure/mask (& %)	Double cinnamon 0.3% w/w
Type of pre-feed (lure/dye)	Orillion RS 5, 6gm cereal pellets lured with double strength cinnamon, dyed green to support the kea mitigation strategy
Number of pre-feeds	1
Sowing rates for pre-feed	Prefeed 1.0kg/ha (+/- 10%),
Sowing rates for toxic bait	Toxic 2.0kg/ha (+/-10%) being 1.0kg/ha sowing rate with 50% swath overlap
Other details about this method Phase 3 (spot treatment) is the application of toxic baits on to any discrete area within the treatment block that has been identified through detection searching as having rats present. The area(s) to spot treat is/are likely to be between 100-500 hectares but could be larger, depending on the extent of area 'infected' (as determined from surveillance of monitoring devices).	

Additional Notes.

The toxic sowing application will involve sowing over and clearing the Perth Valley tracks above the Barlow confluence and also over Scone hut. In addition, all waterways will be sown over. An important aspect of the project design is that there are no gaps or exclusions. MOH are supportive of this approach. Details on managing this are in the PHU Permission application (copy attached).

**4.2
Justification
for
proposed
method:**

Perth Aerial
possum
control area –
8,659
hectares.

This operation forms part of the research and development project in the Perth Valley area, which is being supported by DOC and PF2050 Ltd. If successful, this project will make a significant contribution to the Government's interim 2025 goals for the Predator Free 2050 programme to "Eradicate predators from blocks of at least 20,000 hectares without the use of fences" and "Achieve a breakthrough science solution capable of eradicating at least one small mammal predator".

The '1080 to Zero' operation is proposed as the methodology to completely remove possums (and ship rats and stoats) as the initial step in that project. The method is built on the earlier successful trials on Mt Taranaki (2016/17) and in Jackson-Arawhata (Haast; 2017) – see ZIP website for details of those trials.

We are not aware of any other feasible technique able to completely remove possums and ship rats that could be deployed at this site, with the same confidence we have in this 1080 to Zero methodology.

5. Further information

Details of contractor or principal

If the operation will be contracted to another company, or if this application is being made on behalf of a principle organisation please provide the following details:

Company/organisation:	<u>Principal:</u> Zero Invasive Predators Ltd <u>Contractor:</u> Tasman Pest Control Ltd
Contact person:	ZIP: § 9(2)(a) TPCL: § 9(2)(a)
Contact number:	PO Box 9267, Wellington 6141 Ph: § 9(2)(a) PO Box 17, Brightwater 7051 Ph: § 9(2)(a)

Further information

Refer: *DOC agreement to support the research and development programme Whataroa/Perth Valley (doccm 5387479)*

Appendix 1: DOC Performance Standards

Insert the appropriate sheet of Department of Conservation (DOC) Performance Standards for each pesticide use proposed for the operation. Complete all areas shaded grey on the sheet. This includes retaining the additional performance standards and information needs in the grey boxes that you propose for the operation.

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Pesticide Use #1	Sodium fluoroacetate 1.5g/kg Cereal pellet Aerial (0.15% 1080 Pellet)	Target Pests: Possums, Rats
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Location of operation
ZIP Perth Valley Aerial 2019



Caution Period
The estimated caution period for this operation is <i>[assessor to complete]</i> months after last date of bait application, and is subject to compulsory bait and carcass monitoring. This estimated caution period cannot be reduced to less than 4 months, and must be extended if the endpoints for monitoring have not been met at the end of the period.

Performance Standards

*Compulsory for **all** operations*

1. For operations targeting rats, prefeed with this pesticide use.
2. The DOC Code of practice for aerial 1080 in kea habitat [DOC 2612859](#) must be followed.
3. Flight paths to and from the bait loading zones by aircraft equipped with loaded or uncleaned bait sowing equipment must avoid: stocked paddocks, residential dwellings, and any other 'no fly zones' specified by consent providers.
4. An aircraft must not, when flying to or from the treatment area, fly over a public drinking water supply or waterway that is less than 100 metres upstream of a point of extraction from a water source for a drinking water supply (not being a water supply exclusively for stock).
5. For operations targeting possums, baits will have a mean size in excess of 6g and 95% of baits should weigh more than 4g.
6. The baits must be dyed green or blue.
7. The boundaries of the bait preparation and loading site are marked and loading site signs [docdm-181171](#) erected. At the end of every day of the operation (including the final day), the loading site and any storage area must be fenced so that people do not inadvertently enter the site and stock cannot gain access to the area. The fence and signs remain in place until you judge that there is no longer a risk to stock.
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.
9. The product must only be used as specified on the manufacturer's product label.

Compulsory for this operation (delete those that you won't be applying to your operation)

10. Bait sowing rate must be no greater than 5kg/ha for 6gm baits (or equivalent bait density per hectare for other bait sizes).
11. Designate a "Safety Officer" on loading site who audits and ensures adherence to safety standards.
12. Use bait sowing buckets with retractable legs.
13. *[Add further standards as required. These could include local performance standards as well as any recommendations from [Current Agreed Best Practice](#) that you want to apply to your operation. Attach conditions from other consents as separate pages.]*

Information Needs

*Compulsory for **all** operations*

Nil

Compulsory for this operation

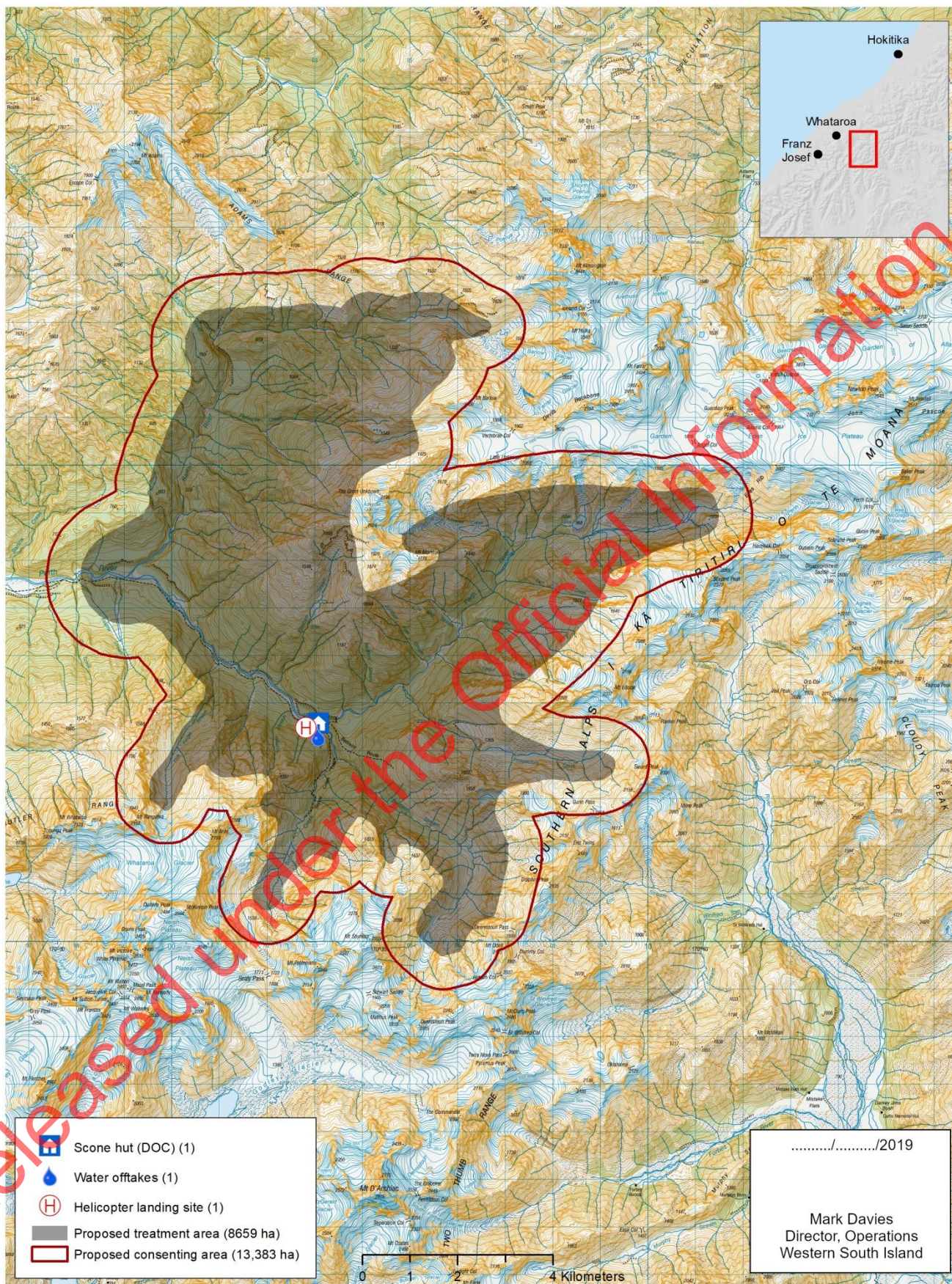
1. *[Add as required.]*

Appendix 2: Maps

Your map(s) must show the following as a minimum:

- NZTM Topo50 Map reference (e.g., BN34)
- The external boundary of the treatment area or those treatment blocks included in this operation
- Legal boundaries of land managed by DOC
- Name of treatment area
- Financial year of operation
- Land tenure and adjacent owners, including leased land
- Any areas excluded from the treatment area (such as around public water supplies, pā sites)
- Location of any warning signs and public information signs
- Location of normal points of entry where warning signs must be a minimum size of A3
- Any water catchments or bodies of water (include rivers, streams, lakes, reservoirs, wetlands, coastal marine areas)
- Recreational facilities (tracks, huts, road ends, roads, picnic sites)
- Date map prepared

NOTE: 1:50,000 is the preferred scale. Use more than one map if the amount of detail becomes to visually cluttered to be clearly understood.



...../...../2019

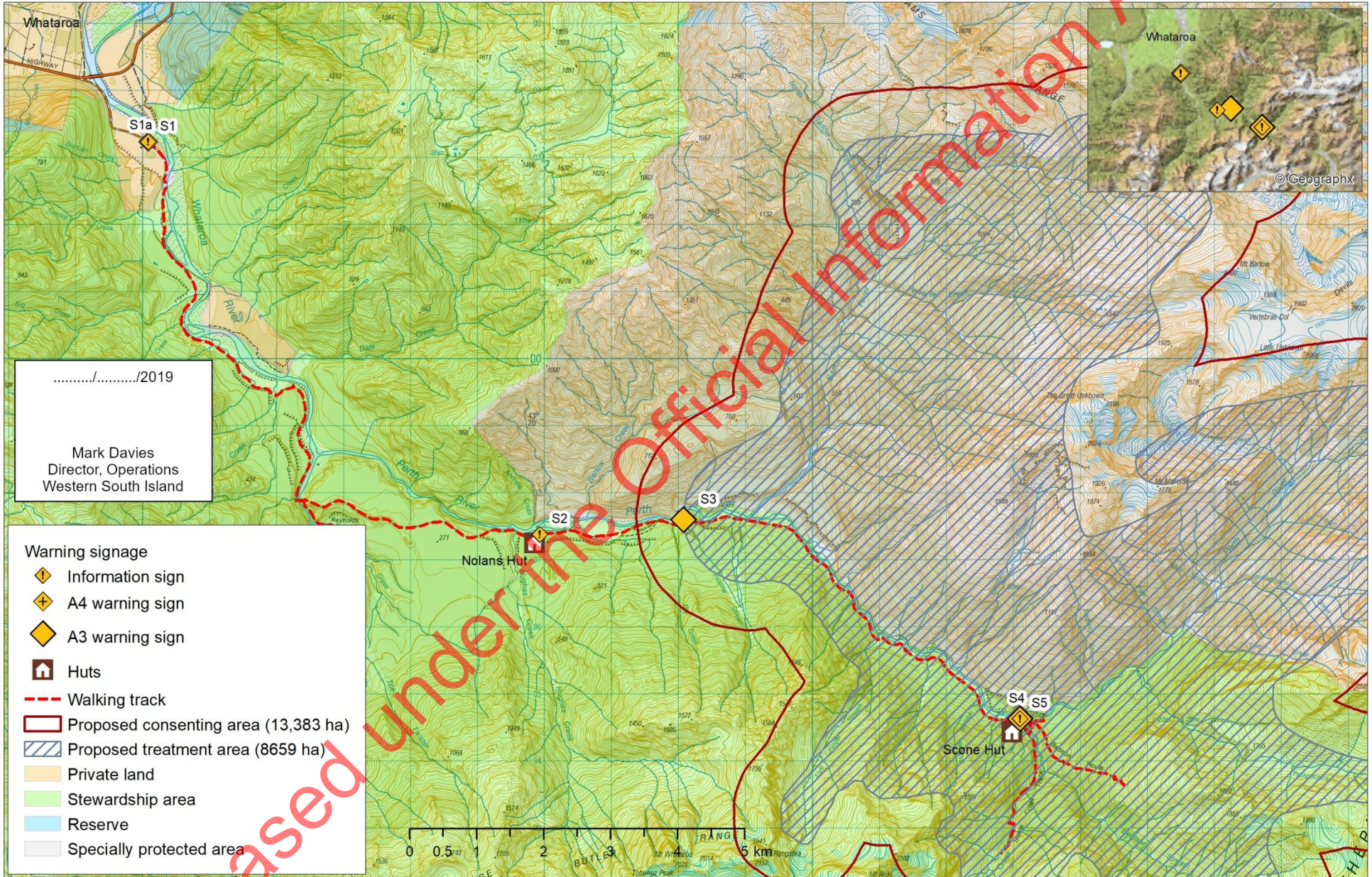
Mark Davies
 Director, Operations
 Western South Island

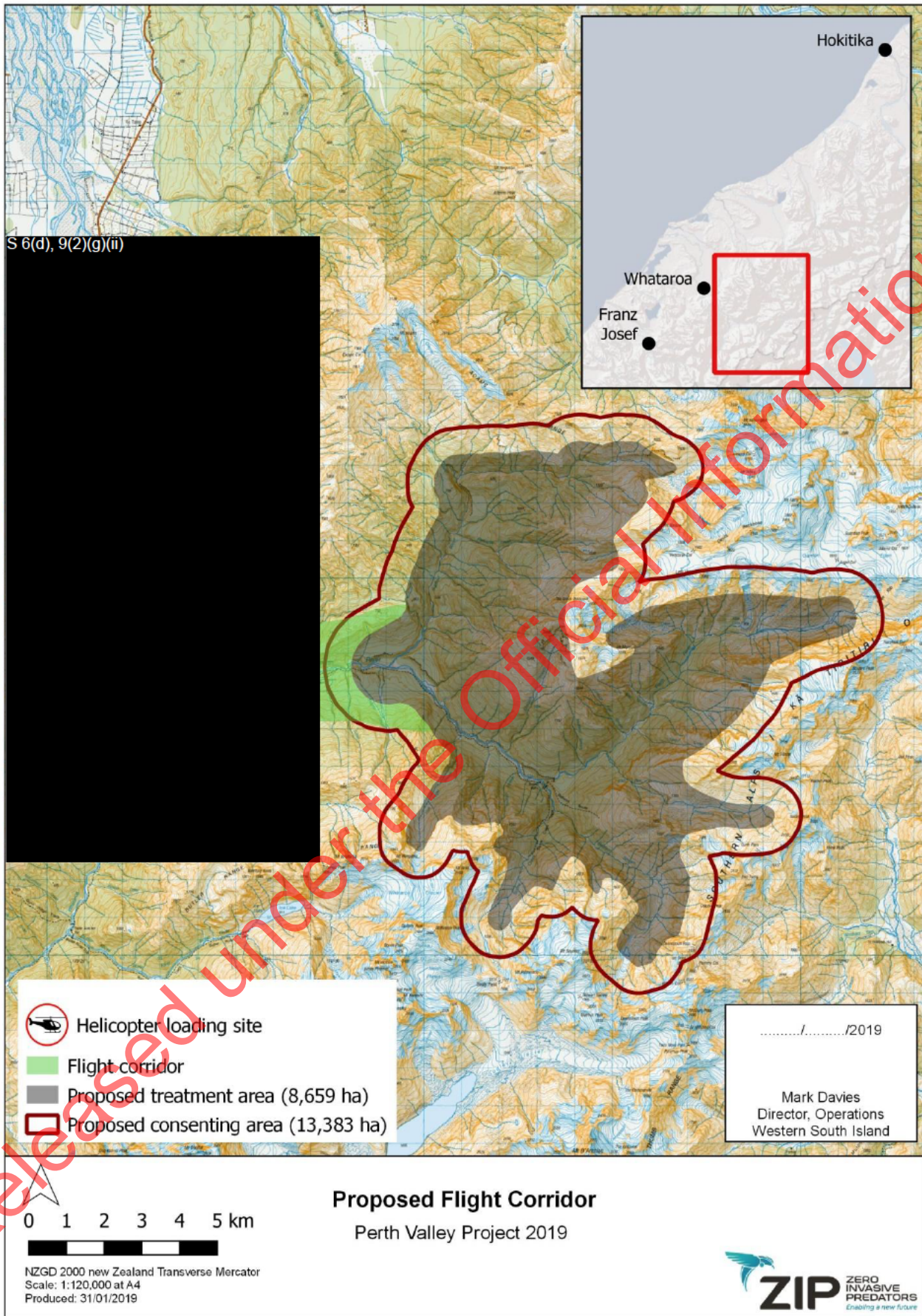
NZGD 2000 New Zealand Transverse Mercator
 Scale at A4 1:100,000
 Produced: 2019-01-16
 Background: LINZ Topo50 licensed under Creative Commons

Consenting and Treatment Areas
 Perth Valley Project 2019



DOC APPLICATION: ZIP Perth Valley possum control research trial, 2019.





Appendix 3: Communication Record

This records every individual or group who has been consulted about the proposed operation.

If using the DOC Communication Plan/Record template, insert the Communication Record you created. The required contents are the following pages:

- *Introduction*
- *Consultation on options (if applicable)*
- *Consultation on effects (if applicable)*
- *Toolbox*

If using another format, information must include:

- *The decision on consultation*
- *Who was consulted*
- *Actual dates when consultation was undertaken*
- *Outcomes of consultation, including any complaints and how they were addressed*
- *Any landowner/occupier consent conditions*
- *References to which resources were used for each target audience*

Refer ZIP Perth Project Communications Record.

Appendix 4: Consents

Insert copies of all consents you specified in Section 3.2.

Landowner/occupier consents are recorded in the Consultation record whether or not written consent is obtained.

Refer attached application to WCDHB HPO for VTA Permission.

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Appendix 5: Assessment of environmental effects

Complete this section if an Assessment of Environmental Effects (AEE) is required by the DOC manager approving the permission. An AEE that has been prepared on the DOC RMA AEE template (docdm-96227) for a resource consent application can be attached instead if it covers all the pesticides uses in this application.

Effects on non-target native species

Target benefit species

List of threatened native species that are known to be present in the project area:

COMMON NAME	SPECIES	THREAT RANK
Kea	<i>Nestor notabilis</i>	Nationally endangered
Rock wren	<i>Xenicus gilviventris</i>	Nationally endangered
Blue duck, whio	<i>Hymenolaimus malachorhynchos</i>	Nationally vulnerable
South Island kaka	<i>Nestor meridionalis meridionalis</i>	Nationally vulnerable
New Zealand falcon	<i>Falco novaeseelandiae</i>	Nationally vulnerable

Other common native bird species that may be present include:

COMMON NAME	SPECIES
Bellbird	<i>Anthornis melanura</i>
Brown creeper	<i>Finschia novaeseelandiae</i>
Fantail	<i>Rhipidura fuliginosa</i>
Morepork	<i>Ninox novaeseelandiae</i>
Silvereye	<i>Zosterops lateralis</i>
South Island tomtit	<i>Petroica macrocephala macrocephala</i>
South Island robin	<i>Petroica australis</i>
Tui	<i>Prothemadera novaeseelandiae</i>
Yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>

Research shows that native bird populations increase significantly when similar controls for possums and rats are undertaken.

Other native fauna recorded in the area that may benefit from the proposed operation include forest lizards, weta and other invertebrates.

Studies of the effects of 1080 baiting on weta populations, including one study within the West Coast, showed that weta and other insect numbers continued to increase in the months following 1080 application.

The cereal bait has been specifically developed to be attractive to possums and rats and to be unattractive to birds by the nature of the bait size, colour (green or blue) and lure (orange and cinnamon smell) which deters the majority of non-target animals. Some individual birds from various species have been known to die from 1080 poisoning (both reported and anecdotal), but overall the population benefits for those species is typically significant.

Bait quality control also reduces the risk to many birds by reducing the incidence of bait fragments being produced.

The main plant species expected to benefit include:

Southern rata	<u><i>Metrosideros umbellata</i></u>
Kamahi	<u><i>Weinmannia racemosa</i></u>
Fuchsia	<u><i>Fuchsia excorticata</i></u>
Wineberry	<u><i>Aristotelia serrata</i></u>
Mountain Five finger	<u><i>Pseudopanax colensoi</i></u> .
Hall's Totara	<u><i>Podocarpus hallii</i></u>
Mountain Cedar	<u><i>Libocedrus bidwillii</i></u>

Reduced browsing pressure and increased abundance of fruit and flowers will provide an increased food source for native fauna.

Non-target species

The following bird species are considered potentially at risk from 1080 poisoning:

<u>COMMON NAME</u>	<u>SPECIES</u>
Kea	<i>Nestor notabilis</i>
Rock wren	<i>Xenicus gilviventris</i>
Blue duck, whio	<i>Hymenolaimus malachorhynchos</i>
South Island kaka	<i>Nestor meridionalis meridionalis</i>
New Zealand falcon	<i>Falco novaeseelandiae</i>
Morepork	<i>Ninox novaeseelandiae</i>
South Island tomtit	<i>Petroica macrocephala macrocephala</i>
South Island robin	<i>Petroica australis</i>
Yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>

Effect of operation on native species

Kea, whio, and rock wren

A separate risk assessment and mitigation and monitoring plan has been drafted and should be read in conjunction with this application.

Other species

All of the below species assessments are sourced from the 1080 Pesticide Information Review, relating to aerial application of cereal bait.

• **Kaka**

A total of 60 radio tagged **Kaka** have been exposed to this method and bait type over 4 operations and none have died from poisoning (see table). Additionally, 38 radio tagged birds have been exposed to 0.08% carrot baits over 2 operations and none have died from poisoning.

OPERATION	No. OF BIRDS EXPOSED	No. KILLED BY POISON	SOWING RATE (kg ha ⁻¹)		REF.
			Prefeed	Toxic	
Windbag (1998)	15	0		5	1
Waipapa (2001)	20	0		5	1
Waipapa (2008)	10	0	1	1.5	2
Waitutu (2010)	15	0	1	2	3

Kaka monitored during aerial 1080 operations using 0.15% 1080 pellets.

• **Morepork/Ruru**

A total of 23 radio tagged morepork/ruru has been exposed to this method over 4 operations and none have died from poisoning (see table). Call count monitoring at Waipoua did not indicate significant 1080 related mortality.

Morepork/ruru monitored during aerial and handlaid 1080 operations using 0.15% or 0.08% 1080 pellets.

OPERATION	No. OF BIRDS EXPOSED	No. KILLED BY POISON	SOWING RATE (kg ha ⁻¹)		REF.
			Prefeed	Toxic	
1990 Waipoua	2	0		5 ^a	1
1994 Saxon River	6	0		5 ^b	2
1994 Tennyson Inlet ^c	1	0		5 ^b	2
1998 Pureora	3 ^d	0		5 ^a	3
2010 Waitutu	11	0	1	2 ^b	4

- **South Island Robin**

Twenty one colour banded and 5 unbanded SI robins monitored during 2 aerial 1080 pellet operations all survived.

- **South Island Tomtit**

In 2008, SI tomtits were monitored during an aerial operation using deer repellent coated pellets (2 kg ha⁻¹ prefeed followed by 2 kg ha⁻¹ 0.15% 1080 pellets) in the Waianakarua Scenic Reserve southwest of Oamaru and at a nearby non-treatment site when no possum control occurred. At both these sites tomtits increased by similar amounts (~13%) during the post control monitoring.

Transect counts of SI tomtits, grey warbler, SI robins and riflemen were conducted before and after the 2010 Waitutu aerial 1080 operation (1 kg ha⁻¹ prefeed followed by 2 kg ha⁻¹ 0.15% 1080 pellets). The transects were located at five sites, three within the operational area and two in a non-treatment area.

While the numbers of tomtits and grey warblers detected on the transects changed following the application of the 1080, the scale and direction of the changes (decreases for tomtits and increases for grey warbler) was similar at all five sites. The pre- and post-control counts of riflemen and SI robins were similar between the operational area and non-treatment sites.

The authors therefore concluded there was no evidence for population level impacts from 1080 on any of these species.

- **NZ Falcon**

NZ falcon have not been monitored individually when exposed to this method and bait type. However falcon territories have remained occupied, presumably by the resident birds, during four aerial 1080 operations using cereal pellets (Pureora 1984, Mapara 1990-92) and one using carrot bait (Waihaha 1994).

The total number of falcon involved in this monitoring is about 13, although the Mapara birds (3 pair) were exposed in three consecutive years. Seaton et al. (2009) collected productivity data from 87 falcon nests in Kaingaroa pine plantation during three breeding seasons, 2003 - 2006.

During this time 1080 pellets and carrots were ground laid or aerially applied in forest compartments where falcon bred. The numbers of chicks successfully fledged was not related to time since 1080 application (1 month to >3 years), application method or bait type.

During the study the breeding falcon population increased from 20 to 36 pairs, leading to the authors concluding that 1080 did not have a negative impact on falcon, and probably had a positive impact by reducing predation pressure on the falcon.

- **Kakariki**

Kakariki (parakeet) nests have been monitored during two aerial cereal 1080 operations. Fifteen nests were monitored during the October 2007 Hurunui Valley operation and a further seven nests were monitored during a 1080 operation in the Dart Valley.

Dead chicks in a failed nest in the Hurunui Valley operation contained 1080 residues and the female was not seen after the nest failed. All the monitored nests in the Dart Valley operation were successful, however two unmonitored Kakariki were found dead with 1080 residues in their tissues. The combined estimate of mortality of nesting parakeets from these operations was 2.27% (0.1-12 % 0.95 CI).

The authors concluded that while some Kakariki were killed during the 1080 operations, given the rate of nest predation observed in areas where no predator control was carried out, the net benefit from the 1080 operations was positive.

No detectable impact could be determined through five minute bird count monitoring before and after four aerial 1080 operations using carrot or cereal pellet baits (Spurr & Powlesland 1997).

Additionally following an intensively monitored aerial 1080 operation in Waihaha in 1994 using carrot bait, Greene (1998) observed "...kakariki remained common within the study area...".

Impact observed in previous 1080 to Zero trials

At Mt Taranaki, 1 blackbird and 1 chaffinch were found dead from within the treatment area. No toxin assay was conducted, but 1080 poisoning was the assumed cause of death.

At Jackson-Arawhata, the following species were found dead: 2 tomtits, 1 chaffinch, 1 song thrush, and 3 blackbirds. The field team recorded seeing or hearing kea on 31 occasions post-toxin.

The cameras, used as detection devices post-toxin, recorded live encounters with 6 kea, 1 SI robin, 1 tomtit, 1 kaka, 1 song thrush, and 8 blackbirds – they were deployed 20 days post-toxin for 40 nights.

General benefit of 1080

Native bird populations are expected to benefit from the operation following reduced predation as a result of the reduced populations of possums and rats. Although this operation may result in some non-target deaths of individual birds, research has shown that 1080 operations have a net positive effect where non-target deaths in the short-term are counter balanced by better survival of the population in the longer term (Powlesland *et al.* 1998).

Performance standards and information needs

The recommended mitigation measures or monitoring are included in the Taonga Species Risk Assessment and Action Plan.

No other performance measures are recommended.

As the Perth Valley Project is a research and development project that is utilising the 1080 to Zero methodology, it is not a standard operation and therefore needs specific assessment of the risks and benefits (as opposed to under the Aerial 1080 in Kea Habitat COP).

Effects on non-target domestic and feral animals

Non-target species

Himalayan Tahr - *Hemitragus jemlahicus*
Red Deer – *Cervus Elaphus*
Chamois – *Rupicapra rupicapra*

Effects of operation on domestic and feral animals

Feral deer population mortality from aerial poisoning operations targeting possums is highly variable and does not appear to be consistently influenced by toxic loading, sowing rate, pre-feeding or bait type. Most estimates of deer kill fall between 30 and 60%. Nugent et al. (2001 and 2011) quote productivity figures for red deer populations of around 30% so low to moderate by-kill of deer populations is probably negated within a couple of years. This was demonstrated at Hauhungaroa in 2012 where a comparative trial using aerial sown 1080 cereal baits, some coated with a deer repellent substance and some uncoated bait was used. Red deer mortality was measured at about 30% but post poisoning deer densities recovered to pre poisoning levels in about 18 months.

3 deer were found dead after the 1080 to Zero trial at Jackson-Arawhata. 6 deer were seen alive on cameras in the treatment area 20-60 days post-toxin.

The impact of aerial 1080 cereal baits on Tahr is unknown.

The Game Animal Council, with ZIP support, are leading a Tahr monitoring plan, whereby 21 Tahr in the area have been radio collared and will be followed (via Sky Ranger) through the full baiting operation to determine level of impact.

The proposed loading site has cattle and bee hives present on occasion. The land owner has agreed to exclude the cattle and remove the bee hives before toxic baiting, and not return them until the site is decontaminated (with at least 25mm of rain post-toxin application).

Performance standards and information needs

No other performance measures are recommended.
