

Application for DOC permission to use VTAs: assessment report

Applicant name:	s 9(2)(a) Zero Invasive Predators Ltd
Operation name:	Possum Control in the Perth Valley, South Westland
Approving manager:	Mark Davies
Assessor:	s 9(2)(a)
Date received:	1 February 2019
Overview:	<p>From the DOC application form:</p> <p>1.1 overview:</p> <p>ZIP is collaborating with DOC and Predator Free 2050 Ltd on a research and development programme over an approximately 12,000 hectare block within the Perth Valley.</p> <p><u>The purpose of this research 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.</u></p> <p><u>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.</u></p> <p>The approach being developed has three main parts:</p> <ul style="list-style-type: none"> - 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 application. - 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. <p>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.</p>

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	<p>As mentioned, the project proposes the aerial distribution of cereal pellet 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.</p> <p>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.</p> <p><u>The use of aerial 1080 is part of a research and development project, and therefore we consider the parameters of the <i>Aerial 1080 in Kea Habitat Code of Practice</i> 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.</u></p> <p>It is proposed that the following pesticide uses will be applied:</p> <ul style="list-style-type: none"> - 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 RS5 cereal pellets sown aerially, at rates of 2kg/ha (1kg/ha with 50% swath overlap). <p>Preferred timing of the operation is from 18th March (1st prefeed) ending 30 June, 2020. This timing has been chosen in an attempt to avoid big and constant snowfall events, such that caused the postponement of this operation last year.</p> <p>Permission is sought for an operation starting on 18 March 2019 and ending on or before 30th June 2020.</p> <p>1.2 Treatment area</p> <p>Part Waitangi Forest Conservation Area and part Adams Wilderness Area in the Whataroa/Perth catchment, South Westland.</p> <p>13,383 Hectares (PHU/DOC consent area)</p>
Applicant type:	Independent individual or organisation — National performance standards for pest operations docdm-1492976 will apply.

Step 1 Confirm application is complete <i>Are all documents (listed below) provided?</i>	
<p>DOC Application form complete: <i>Are all sections of the DOC Application Form completed to a standard that you can assess them? Where are the information gaps? Is the operational information for treatment blocks clearly separated in each section of the application form where differences exist between them? Does the proposed application meet the grouping standard (see <u>Applying for DOC permission for external agencies or Operational planning for animal pest operations SOP</u> ?</i></p>	<p>The application as provided has been completed to a standard that allows for assessment. All sections of the application form have been completed, including the AEE section.</p> <p>There is one treatment block, so the application meets the grouping standard.</p> <p>A separate document <i>Taonga species risk assessment and mitigation plan</i> forms part of the application to provide risk assessment, mitigation, and measurement proposed for the operation.</p> <p>Documents provided by the applicant and used for this assessment:</p> <p>Application form: <u>DOC Application form ZIP Perth 1080 operation 2019 DOC-5702819</u></p> <p>Public Health Application: <u>DOC-5702820</u></p> <p>Taonga species risk assessment and mitigation plan: <u>DOC-5702822</u></p> <p>Communication record 2019: <u>DOC-5702821</u></p> <p>Technical report on kea repellent for cereal bait: <u>DOC-5702826</u></p> <p>Technical report on tahr as a preferred kea food source: <u>DOC-5702827</u></p>
Are all the proposed pesticide use(s) accepted for use?	Yes. PU#1 is accepted for use on the DOC status list.
Performance standards sheets	A performance standards sheet for PU#1 is included in the application.
DOC permission map(s) (image file or files)	The maps provided meet the required standards in Appendix 2 of the DOC application form including showing the locations of warning signs and points of entry where warning signs must be A3.
DOC Pesticide Summary shapefiles (independent groups or individuals only)	Shapefiles received on 4/02/2019. The Treatment area shapefile ('consenting area') matched the map in the application form.
Consultation record including conditions of	The communication record provided notes that it builds of the consultation and communication from 2018 for the postponed winter

<p>landowner consents Was level of consultation adequate? All required owner/occupier consents obtained? Are conditions of consent evident in their application?</p>	<p>2018 operation. The 2019 consultation (updates for this operation) has included:</p> <ul style="list-style-type: none"> -Medical Officer of Health -Iwi (Makaawhio) -Federated Farmers <i>*Note this is a typo and should read Federated Mountain Clubs</i> -Game Animal Council -New Zealand Deerstalkers Association <p>Updated notification (indicating when the operation is now planned for 2019) has been given to DOC concession/permit holders; Fish and Game; Forest and Bird; Police; Recreation clubs; Medical Centres; Veterinary Clinics; Schools; TLAs. This has gone out in January 2019.</p> <p>There has been ongoing communication with the consenting landowner where the loading site will be based.</p>
<p>Public health permission/ proof of application</p>	<p>The Public Health Permission Application form has been provided.</p>
<p>Other (specify, e.g. RMA consent)</p>	<p>None</p>
<p>Your confirmation email and subsequent correspondence Include dates and nature of requests for further information.</p>	<p>I emailed s 9(2)(a) who submitted the application, on 2/2/2019:</p> <p>Hello s 9(2)(a)</p> <p>Thank you for the application and supporting documents. The information appears complete and comprehensive. Thank you for your effort with this.</p> <p>I will be in touch if I have any queries or further information requests as I work through and process it.</p> <p>Would you be able to provide shapefiles for the 2019 'consenting area' (13,383 ha), 'treatment area' (8,659 aerial application area) consistent with the maps you have provided? This will enable me to upload the operation so it is visible on the DOC pesticide summary as a 'Proposed' operation.</p> <p>s 9(2)(a) sent through the shapefiles on 4/02/2019.</p> <p>I emailed the following requests/questions to s 9(2)(a) on 9 February</p> <ol style="list-style-type: none"> 1. From the risk assessment and mitigation plan the measurement of potential impact on kea includes mark-recapture using cameras at tahr carcasses. Given the low precision of estimates from tx birds (assuming there are 15-18), the mark-recapture could be important/useful for improving the understanding of the impact (or lack of) for the operation. Are you able to provide more detail of the field implementation particularly #s of monitoring sites and timing of the sessions. At present all I can assume from the plan is that cameras will be out with (some?) of the tahr carcasses as per deployments in the mitigation sequence table. I assume there would need to be at least one 'capture' session at the conclusion of

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the 1080 operation (after bait hazard is no longer present). Can you describe the population and/or survival estimate analysis that will be applied to the data?

2. Assuming an earliest possible start date for prefeeding of 18 March, what would be the earliest possible date for toxic bait application? I have currently entered the proposed toxic bait application starting from 1 April, but can sharpen this up – critical that we enter the earliest possible toxic date.
3. Are you able to move the location of the A3 warning sign 'S3' from the boundary of the aerial application area, westward to the boundary of the consenting area. This is the area that needs to be notified, therefore signs at normal points of entry should be positioned where access routes enter this area.

s 9(2)
(a) replied on 11/02/2019

1. We have suggested using the mark:recapture technique as a further measurement tool of potential impact on kea, to supplement that data provided from the transmitted kea. To do it, we propose to replicate (as much as practical) the tahr deployment work undertaken last July-August, utilising the same tahr locations and camera set-ups as that 2018 winter work, so that our sampling method and data are comparable. Once we have completed sufficient deployments (likely 3 rounds of tahr (across 9-20 sites) over 5 camera service rounds) we will run the MARK programme to determine the population estimate of kea visiting the tahr - this estimate (and range) will then be compared with that from 2018. All of those tahr deployments and camera services will be post-1080 to Zero operation, in order for it to reflect the post-operational state of the kea population. This work is additional/seperate from the mitigation deployment of tahr, which will be pre-op and during the operation itself. ✓
2. Based on our timing, I think we are looking at a toxin start date from April 1. Right now, the sequence (if the weather plays ball) is prefeed #1 on March 18; prefeed #2 on March 25; and toxin #1 on April 5. However, I suggest we state April 1 on the approval so that we have flexibility in case the weather dictates going earlier (i.e. lots of rain in between prefeed applications etc). ✓
3. No problem moving the location of sign S3. I should have remembered that from last time! We are preparing a new map

	now - we will get it to you as soon as possible. Do you need it before approving/recommending approval for the application?
Step 2 Capture treatment blocks in the Pesticide Application	
Your publication of the proposed operation on the DOC Pesticide Summary	I uploaded the treatment area ('consenting area') to the DOC pesticides application on 6/2/2019 as 'Proposed Publish', so it was visible on the DOC Pesticide Summary from 7/02/2019.
Step 3 Evaluate control method <i>Is the proposed method suited to the pest problem, treatment area and consultation outcomes?</i>	
Your assessment of the control method <i>Include relevant points from the 'Choose your control method' part of Current Agreed Best Practice, where available.</i>	<p>The control method, aerial application of 1080 cereal pellet baits, is well used and the only practical method for controlling possums and rats over large tracts of difficult terrain in a short timeframe.</p> <p>The objective of this programme of work to completely remove possums and ship rats from the Perth Valley project area is to be attempted using a novel method of aerial 1080. The applicant proposes to use specifications termed '1080 to Zero' to minimise the chance that any possums (and ship rats) survive the operation. The operation will have 2 toxic bait application phases for the entire treatment area, with the contingency of a 3rd phase for spot treatment of areas (likely 100-500 hectares per loci) if surviving rats or possums are detected.</p> <p>The operational specs (phase 1 and 2) include the following points of difference from 'standard' aerial 1080 operations:</p> <ul style="list-style-type: none"> -2 prefeed applications prior to toxic bait application - higher than usual rates of bait application for phase 1 (prefeed at 2kg/ha, toxic at 4kg/ha both with 6g baits) -50% bait swath overlap to minimise potential for coverage gaps -avoiding the need for exclusion zones (in consultation with MOH and DOC consent providers) within the treatment block. - undertaking 2 toxic bait applications (each preceded by 2 prefeed applications). -both prefeed and toxic bait is to be green-dyed <p>The bait used for phase 1 is Wanganui # 7 with orange lure. For phase 2, planned for approximately 6 weeks later RS5 bait and cinnamon lure will be used.</p> <p>The '1080 to Zero' methodology (phase 1) achieved very high or complete kills of rats and possums in previous trials on Mt Taranaki (2016) and Jackson Arawhata (2017).</p>

	Because of the more intensive baiting, the proposed methodology has potential to heighten the risks to non-targets. The use of Wanganui #7 bait and orange lure may also heighten some native non-target risks compared to using RS5 bait and cinnamon lure.
Label directions	The methodology is consistent with the product label.
Summary of any technical advice received on the proposed control methods.	None sought
Summary of any Community relations and Pou Tairangahau advice received.	Not sought. ZIP has undertaken consultation with Te Runanga o Makaawhio.
Step 4 Identify and assess risks and adverse effects <i>Are you satisfied that all risks and adverse effects have been identified?</i>	
Are there any gaps in the applicant's assessment of these (where the AEE section was supplied)?	<p>None identified. The AEE section makes use of available information from the DOC 1080 pesticide information review and also includes non-targets found dead and observed alive after the 1080 to zero operations at the Mt Taranaki and Arawhata trial sites.</p> <p>Kea, whio, and rock wren are covered comprehensively in the <i>Taonga species risk assessment and mitigation plan</i></p>
Relevant points from the DOC Pesticide Information Reviews	<p><i>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. Additionally, 38 radio tagged birds have been exposed to 0.08% carrot baits over 2 operations and none have died from poisoning (Greene 1998; Powlesland et al. 2003). Based on a meta-analysis of the kaka monitored through the 5 pellet and carrot operations between 1994 and 2008, Veltman and Westbrooke (2011) calculated the upper bound of the 95% confidence interval for an estimate of zero mortality at 3.5%.</i></p> <p><i>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) (Spurr & Powlesland 1997). The total number of falcon involved in this monitoring is about 13, although the Mapara birds (3 pair) were exposed in three consecutive years (Calder & Deuss 1985; Bradfield 1993; Greene 1998).</i></p> <p><i>77 whio have been monitored through aerial 1080 pellet operations without any bird deaths. All 19 radio-tagged whio in Waihaha survived for at least four weeks following aerial application of carrot</i></p>

bait (0.08%) at 15 kg ha⁻¹ (Greene 1998). Based on the results of these operations and 0/19 who dying during a carrot operation in Waihaha in 1998, Veltman et al. (2014) calculated the upper bound of the 95% confidence interval for an estimate of zero mortality at 3.0%.

A total of 222 radio tagged **Kea** have been exposed to this method and bait type over 19 operations and 24 have died from poisoning (Error! Reference source not found.). Additionally, 2 radio tagged birds have been exposed to 0.08% carrot baits during 1 operation and none died from poisoning (Kemp & van Klink 2008).

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) (Rhodes et al. 2008). 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.

A total of 47 radio tagged **morepork/ruru** has been exposed to this method and bait type (aerial/handlaid application 1080 cereal pellet) over 6 operations and none have died from poisoning. Call count monitoring at Waipoua did not indicate significant 1080 related mortality (Pierce & Montgomery 1992).

A total of 6 **morepork/ruru** has been exposed to this method (aerial application 1080 carrot) and bait type over 1 operation and one has died from poisoning.

A total of 55 colour banded **NI robins** have been exposed to this method and bait type over 2 operations and 10 have disappeared after poisoning.

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

	<p>A total of 29 colour banded <i>NI tomtit</i> have been monitored during two non-prefed aerial 1080 cereal pellet operations, with 1 bird disappearing.</p> <p>In 2008, <i>SI tomtits</i> 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 (Oates 2008a).</p>
<p>Summary of any technical or community relations advice received</p>	<p>The memo <i>Summary of feedback of kea risk following assessment of biomarker bait interaction</i> from Amber Bill (Director, Biodiversity Threats Unit) to Mark Davies (Director, WSI) from 20 July 2018, outlines the (uncertain) level of risk to kea from the subsequently postponed 2018 ZIP Perth operation and the implications of this.</p> <p>Kea population modelling scenarios from s 9(2)(a) and s 9(2)(a) (from 19/7/2018) models the kea population over time with differing levels of by-kill and differing stoat control effort.</p> <p>Advice on risk to Rock Wren by s 9(2)(a) s 9(2)(a) 22 March 2018. DOC-5444949.</p> <p>Summarised key points:</p> <ul style="list-style-type: none"> • The sub species of Rock Wren at the proposed treatment area have a national threat classification of Nationally Critical. • Following an aerial 1080 operation in Kahurangi NP in 2014, 45% of rock wren disappeared from the study area. This may have been due to mortality caused by either 1080, 1080 and a heavy snowfall, or just the heavy (and unseasonable) snowfall. The rock wren population at the Kahurangi site have recovered from the 2014 reduction, but this has taken 3 years with stoats at very low densities because of subsequent 1080 operations. • There is a risk that rock wren mortality of greater than 45% will occur in the proposed Perth operation, given the sowing rate of 4 kg/ha. • The use of a 'fruit' (orange) lure in prefeed and toxic baits, rather than the more usual cinnamon lure, may also increase the risk. • It is likely that the Perth operation will provide adequate stoat control to ensure remaining birds breed successfully for one breeding season. <p>I spoke with s 9(2)(a) on 8/2/2019 and asked about the bait aversion and tahr carcass placement strategies</p> <ul style="list-style-type: none"> • The AQ bait work at Willowbank demonstrated that exposure to AQ bait did cause aversion to the bait type and that this

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was a finding that can have application for training wild kea to avoid baits.

- The tahr carcass work did show that they were an attractive food source and a high proportion of banded kea were confirmed to use them even when the carcass availability was less comprehensive than what is proposed for the 2019 operation mitigations.

s 9(2)(a) provided advice on the kea risk and mitigation as proposed in the Taonga Species risk assessment and mitigation plan. (provided 7 February 2019). DOC-5707693. Points include

- The availability of tahr carcasses may be drawing and supporting more kea in the area than would otherwise be present, which could result in higher exposure than would be expected normally.
- Proposed mitigation measures are worth pursuing and potentially game changing if successful. They deserve proper testing.
- The operation is different from other (standard) 1080 operations, so the level of risk to kea is more uncertain and requires a cautious approach and consideration
- The number of kea with transmitters, estimated 15-18, will not provide robust enough survival data in relation the operation.

s 9(2)(a) made the following comments about the whoio section of the Taonga Species risk assessment and mitigation plan (provided by s 9(2)(a) 11/02/2018):

Concerns

The proposed method for surveying whoio has produced variable results based on their application. This compromises the ability to understand whether the 1080 ZIP regime increases the likelihood of whoio ingesting the bait, and whether ingestion leads to death.

Critical issues

How to accurately measure the possible impact of the 1080 ZIP regime on whoio?

Background

The summary of events on Mt. Taranaki are accurate and balanced. I do not agree with their assessment that risk from the 1080 ZIP trial to whoio is low. Mt. Taranaki was the first incident where whoio were confirmed to ingest bait. How many birds died of a result of it is the big unknown. This doesn't mean the risk is low. We have yet to quantify it.

There were three possible contributing factors:

- 40% of the population are captive birds raised on cereal pellets.
- Birds appeared anecdotally in poorer condition following a high flood season which stripped the rivers of aquatic invertebrates, and they may have been more likely to forage on foreign items such as 1080
- The ZIP trial distributed a large amount of pre-feed (4 pre-feed runs rather than one or two), and a toxin drop of 4kg/ha (rather than the normal ~2kg/ha)

It is unclear which of the above factors (or combination of) was the key driver, but we do need to understand how this occurred. If it is the ZIP regime that increased the likelihood of who ingesting bait, we need to test this independently of the other variables. The South Island ZIP trial provides an opportunity to do so.

ZIP has offered to do fly-through surveys in a helicopter before and after the drops to assess whether there is any change in who numbers. From their application, they noted that the helicopter survey only found 6 of 11 confirmed who on the rivers, and their field team has only been able to confirm 1 who sighting since. This shows how variable the result from this type of survey would be, meaning that if fewer who are found subsequent to the drop, we would not know whether it's due to the 1080 or due to variability in monitoring. Our ability to know whether we've killed who through the 1080/ZIP regime would be low. The decision maker needs to consider the implications.

Undertaking a back-pack transmitter study coupled with surveys to look for green scat (indicating bait consumption) in known territories would provide more detailed information about ingestion and survival rate. As a concept this makes sense, but I cannot comment on the feasibility (practicality, resourcing required etc.) because I am not familiar with the terrain. The South Island can be immensely challenging. It sounded like a few of the who were around a hut, or potentially in more accessible locations. I would recommend exploring the feasibility of transmitters with local who practitioners more familiar with the area to ensure that we have thoroughly investigated this option, before agreeing to a monitoring method less likely to give a definitive result.

I hope the above is sufficient, but please let me know if there are any questions. Happy to talk it through.

I spoke with s 9(2)(a) on 18/2/2019 and discussed the feasibility of monitoring who given the river flows/gradients/and gorgy nature of who habitat and the low density of birds. It was acknowledged that catching and fitting birds with radio transmitters could not yield a useful sample size, if possible, at any sites on the rivers at all. There are similar issues with attempting extensive river surveys for who (e.g dog surveys and scat searches). The helicopter survey method proposed by ZIP was the only

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	<p>practical method and in combination with observations from field staff is the best that can be done. The information need around the consumption of cereal baits and poisoning risk to whio from the 1080 to zero method will remain and should be re assessed in any future operations.</p> <p>On 18/02/2019 s 9(2)(a) emailed Mark Davies the following advice:</p> <p><i>Regarding whio, our residual question (assuming you decide to go with what's proposed for whio monitoring) would be:</i></p> <ul style="list-style-type: none"> <i>How to ensure that no close-order monitoring at this ZIP project doesn't set a precedent for a lack of monitoring at the next operation and location where they overlap with whio. i.e. an acknowledgement that the lack of close-order monitoring in this instance was due to feasibility rather than it not being important to do. At the next operation the discussion regarding monitoring needs to be revisited</i> <p>s 9(2)(a) provided comment about the rock wren section of the Taonga Species risk assessment and mitigation plan Provided by s 9(2)(a) s 9(2)(a) 1/02/2019:</p> <p><i>See my couple of comments on the document attached. The only critical one really is around the timing of the pre and post-operative monitoring for rock wren; this needs to be clarified, i.e. the pre- operation monitoring should happen in early march, and then the post-operation monitoring needs to start c. 3 weeks after each of the two toxin operations.</i></p>
Other resources consulted (specify)	
Your assessment of technical risks and adverse effects (e.g. the pesticide use, use pattern, site factors)	<p><u>Kea</u></p> <p><u>The risk mitigation measures to accompany the 2019 operation have changed significantly as a result of trials undertaken by ZIP in 2018.</u> The risk mitigation is assessed below under step 5. The following considers the risk to kea from the proposed 1080 to zero operation at the site in the absence of the mitigation measures proposed.</p> <p>The operational specifications appear mostly unchanged from the planned 2018 application. In 2018 ZIP trials during the prefeed stages of the planned operation, with non-toxic biomarker bait, indicated that 2 of 11 kea had consumed cereal pellet bait and 8 of the 11 had at least interacted with the bait.</p> <p>Bait and tahr carcass trials undertaken at the site suggest that kea interest in non-toxic cereal baits declined with a successive exposure</p>

suggesting that multiple (rather than single) prefeed applications may not increase the risk of them consuming toxic bait.

From the 2018 application assessment:

Site factors and potential kea susceptibility mean that there is a significant risk of high observed kea mortality with a 1080 operation at this site

- The kea population at the site is significant, 51 birds have been caught during the radio transmitter fitting work [4 more subsequently added]. This is higher than initially expected and so therefore is the number of birds that will be exposed to the treatment.
- All 28 Kea blood sampled by ZIP recorded the presence of lead, with 11 of these with dangerously high levels. Elevated lead levels in kea have been correlated with a depression of natural caution. This could increase the likelihood of kea consuming novel food such as 1080 baits.

The proposed operational specifications are likely to increase the risk to kea compared to standard operations and the Kea and 1080 COP:

- The 'phase 1' application will use Wanganui # 7 bait with orange lure. Trials with captive kea showed a preference for Wanganui # 7 bait over RS5. All operations where kea survival has been monitored have been with cinnamon (not orange as proposed here) lured bait, and we don't know if orange lure changes the attractiveness of bait for birds.
- High bait application rates. 4kg (6g bait)/ha for the toxic bait application is twice the maximum density in the Kea and 1080 COP. This may present kea with more bait investigation opportunities.
- Two prefeed applications preceding each of the toxic bait applications – more opportunity for kea to habituate or overcome caution to bait.

The risks to kea from the aerial 1080 operation at the site are assumed to be elevated by the 1080 to zero methodology at the Perth Valley site. The pyranine marker trial results confirm there was the *potential* for significant mortality, but the actual risk level cannot be reliably quantified. The acceptance of levels of kea mortality from a pest control operation may be weighed up against the levels of benefit that arise from predator control from both the immediate and subsequent stoat control.

	<p><u>Whio</u></p> <p>The mortality estimates for whio monitored through from previous operations suggests the risk of poisoning from 1080 operations is low (DOC 1080 information review, copied above).</p> <p><i>2016 1080 to zero trial and whio on Mt Taranaki</i> Following toxic bait application in the 2016 '1080 to Zero' trial on Mt Taranaki whio scats were found that contained green dye and 3 scats tested positive for 1080 residue. It is not clear if there was any 1080 related mortality, but a decline in pair numbers 32 pairs in 2015/16 to 28 pairs in 2017/18 across rivers inside and outside the 1080 to zero block (those outside were treated with a standard 1080 operation) could be explained by natural factors (weather events and flood impacted-food depleted rivers) or the 1080 to zero operation and/or the surrounding standard 1080 operation. In the 2017/18 season (post 1080) there was a record number of ducklings and fedglings counted.</p> <p>A subsequent application with green dyed non-toxic pellets in preparation for a planned 2nd phase poison application resulted in green whio scats being found in most known whio territories within the treatment area. The risk of poisoning whio was judged to be unacceptably high and the 2nd aerial toxic bait application did not proceed.</p> <p>Factors such as low natural food availability in the waterways and a proportion of captive reared birds (previously fed on pellets) were suggested as potential contributing factors to the bait consumption. It is a possibility that the '1080 to zero' specifications with higher than usual bait density and multiple bait applications increased the likelihood of whio consuming baits. Whio consumption of 1080 baits (or prefeed) had not been observed previously.</p> <p><i>Risk to whio in Perth Valley 1080 to zero operation</i> There was understood to be a stable but low-density population in the Perth Valley. ZIP undertook a survey in June 2018 and six whio were seen. Since then the ZIP team have recorded an assumed additional 5 birds.</p> <p>The risk to the whio in the Perth cannot be assessed as low with the same level of confidence as with standard spec 1080 operations. It should be noted that the lack of a large observed population level effect in the 2016 Taranaki 1080 to zero trial operation was without a phase 2 toxic bait application (as is proposed in this application) Taking a precautionary approach, the high level of prefeed bait</p>
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consumption was considered to indicate a risk of high mortality if the 2nd toxic bait application had occurred.

Rock wren

There is concern of potential risk of poisoning rock wren based on the disappearance of 45% (22 out of 49) monitored rock wren at a 1080 treatment site in Kahurangi National Park in 2014. Poisoning was not confirmed (birds not radio transmitted or recovered) and the 1080 bait application was also followed by a heavy snowfall which remained for 2 weeks. It was considered likely that at least some of the missing birds were killed by 1080. The snowfall may have increased the exposure risk of rock wren as baits remained toxic for a longer than usual period and the birds may have been more compelled to consume baits and/or poisoned invertebrates. The Kahurangi population has been monitored after the 2014 operation and it has taken 3 years in the presence of stoat control to return to previous levels.

The proposed ZIP operation requires that all target predators (possums, rats) are exposed to bait so the bait must be applied up to the altitudinal limit of vegetation in the alpine zone. This means that rock wren habitat cannot be avoided without compromising the pest control objective.

The timing of the 2019 operation from March to June is more likely to avoid heavy snow cover than the planned 2018 operation was, but this is not assured and it possible that baits in the alpine zone could retain toxicity well onto winter. Compared to standard operational specifications, the 1080 to zero method with high bait application rates (4kg/ha for phase 1) and double applications give more bait encounter opportunity to rock wren and to invertebrates as potential poison vectors. The use of orange lure in phase 1 may change (potentially increase) the likelihood of rock wren eating bait.

The rock wren risk assessment notes that the rock wren distribution extends far beyond the Perth Valley (1080 to zero treatment area) so only a part of the rock wren population in the area is being exposed. This suggests that even if the operation was to reduce the population, immigration would contribute to recovery.

Risks to other native species

Noted

	<p>Of the listed bird species with lower threat rankings, there has been recorded/estimated mortality through 1080 cereal pellet operations for tomtit, robin, and yellow-crowned kakariki. The level of mortality seen in standard operations has generally been low relative to species productivity. Mortality rates were not considered a threat to the viability of the studied populations and it was considered that losses were more than offset by improved survival expected from effective predator control.</p> <p>The specs for this operation including higher bait application rates (phase 1), 2 prefeed applications per phase, 2 toxic operations, and the use of orange lured bait all add uncertainty to risk evaluations. The 1080 to zero methodology outwardly would appear to increase risk to these bird species that have displayed some susceptibility to poisoning in aerial 1080 operations. The proposed operation may lead to higher levels of mortality of these species than experienced in standard operations.</p> <p>The risk to kaka is low based on none of 98 monitored birds poisoned and an upper bound 95% CI for mortality of 3.5% from 4 pellet and 2 carrot operations. Some of these operations were not prefeed, and sowing rates were as high as 15kg/ha. It seems improbable that the 1080 to zero specs could elevate this low risk to a concerning level.</p> <p>There is enough evidence from the studies noted in the 1080 Pesticide Information Review to indicate that NZ Falcon are at low risk. As falcon could only realistically be exposed by secondary poisoning the proposed operation should not present a higher risk. Similarly, morepork are also at low risk based on survival monitoring noted from the pesticide information review. Secondary (including via inverts) rather than primary exposure routes are the only likely means of exposure.</p> <p><u>Feral animals: Thar, red deer, chamois</u></p> <p>There will be some by-kill of red deer, but the level cannot be predicted. As noted in the AEE most recorded deer by-kill estimates fall between 30 and 60%.</p> <p>The impact of aerial 1080 operations on thar, and chamois populations has not been evaluated.</p>
<p>Your assessment of non-technical risks (e.g. high public use, consultation outcomes)</p>	<p>The public perception risk associated with this operational component of the R&D programme is significant. A by-kill of kea has potential to strengthen opposition around the use of aerial 1080 in kea habitat.</p>

	<p>Key stakeholder relationship risks for the operation appear low based on the outcomes of consultation. Iwi, Te Runanga o Makaawhio, have indicated support for the Perth Valley project.</p> <p>Recreational use of the area is low and it is mostly used by hunters and trampers. It takes 1 day to walk into the site. There is one public hut, Scone Hut, immediately adjacent to the treatment area. The hut has a roof water supply. There is approximately 8 km of tramping track and 2 km of tramping route (in the DOC AMIS system) that are within or immediately adjacent to the treatment area. It is noted in the application for public health permission that the area may also be used for rafting and canoeing (helicopter in, float out) on Scone Creek or the Perth River.</p> <p>The proposed timing of the operation, from 18 March means bait (initially prefeed) application will occur over the April roar period. I assume that the Approving manager and operational manager are aware of and accept this impact.</p> <p>Access via the landing sites for the balloted Thar hunting blocks is managed by DOC.</p>
<p>Step 5 Calculate estimated caution period and evaluate if risks and adverse effects are at an acceptable level <i>Will risks be managed adequately with the performance standards proposed for this operation? Include dates and outcomes of any discussion with the applicant.</i></p>	
<p>Estimated caution period for all the pesticide use(s)</p>	<p>The estimated caution period (using >600mm of rainfall PA and average temp in 6 months following the operation <10 degrees) is 9 months after the last date of bait application.</p>
<p>How well does the proposed operation manage potential risks to native fauna? <i>(i.e. as proposed in the Application form or performance standards)</i></p>	<p><u>Kea</u></p> <p><u>Mitigations to reduce the risk of poisoning kea</u></p> <p>The trial work with 11 captive kea showed that repeated exposures to cereal baits laced with 2.7 % anthraquinone generated an aversion to the bait type. Bait consumption was greatly reduced after the kea had been allowed to feed on the AQ bait. The consumption of non-repellent bait that did occur post AQ bait exposure was very low. Only 1 of 11 birds consumed any W#7 bait, and this was 0.25 of a bait which is below the LD50 estimated range of 0.35-0.9 (The LD 50 estimate is from data from another parrot species). In the final bait presentation of the sequence one bird of 11 consumed an amount of RS5 (0.5 bait) that was within the estimated LD50 range.</p> <p>The study with tahr carcasses showed that they are a favoured food source, are effective at attracting kea to a site (31 of 55 banded birds seen at deployed carcasses), and are preferred as food over cereal pellet baits.</p> <p>The specific risk mitigation measures proposed by ZIP for this operation are:</p>

- providing tahr carcasses as a preferred food source and micro site attractant
- cereal bait aversion training using the secondary repellent anthraquinone (AQ).

The mitigation is proposed to start in late February with 20-25 tahr carcasses being placed just beyond the alpine boundary of the aerial bait application area of the operation. Following the initial tahr deployment, further tahr carcasses will be placed at these sites to maintain the food source and micro site attractant. From the second tahr carcass deployment each site will have 1-1.25kg of hand-laid AQ non-toxic, green dyed bait (W#7, then RS5 to match the bait type to operational phase) applied so as to expose kea to the bait aversion training. Further AQ non-toxic bait exposure opportunity will also be achieved by aerially sowing the bait at 1-2kg/ha along a single bait swath applied along the alpine boundary. The proposed sequence of these mitigation measures is shown in the table in the *Taonga Species Risk Assessment and Mitigation Plan*. Carcass + repellent bait deployments and aerial repellent bait applications are to occur immediately before and during the phase 1 and 2 prefeed and toxic bait application stages.

Based on the information from work completed by ZIP in 2018, as summarised in pages 6-7 of the *Taonga Species Risk Assessment and Mitigation plan*, these risk mitigation measures appear likely to significantly reduce the risk that kea will consume and die from the toxic bait.

Wrotech

Measuring the impact of the 1080 to zero operation and mitigation plan on the kea population

It is proposed the impact of the operation on the kea population can be evaluated by determining the survival of the radio transmitter fitted kea through the operation (including immediately after each of the toxic #1 and #2 bait applications) and by mark-recapture population estimates from trail cameras at tahr carcasses. It is estimated that 15-18 of the transmitter fitted kea will be in the area in late February. This sample size won't give a precise population survival estimate. If all of a sample of 15 birds survived then the mortality estimate would be 0-22% (95% confidence), if 3 birds died then the estimate is 4-48%.

ZIP propose to also use mark recapture methodology to estimate the kea population that visit tahr carcass sites post operation (after the phase 2 toxic bait application). This 2019 post-1080 operation estimate can be compared with the winter 2018 estimate. While we won't be able to prove the mark recapture estimates and population change (or lack of) from carcass sites is representative of the kea

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population or behaviour at the site generally, ZIP work indicates that a significant proportion of kea visit these sites.

Effect on the kea population

The Perth 1080 to zero operation is designed to target all individual possums and ship rats and the secondary poisoning of stoats will at least greatly reduce the population. The post-operation kea breeding season will likely experience a higher (70%) level of nesting success relative to non-stoat irruption seasons without predator control where success has been around 40%.

Modelling of differing levels of kea by-kill and regimes of stoat control (see DOC-5534389), suggest that if there is no further stoat trapping (or other effective stoat suppression/exclusion) after 3 years there will be little benefit to kea even at low levels of kea by-kill. The kea population did not recover if there were high levels of by-kill. Therefore, any benefits of the 1080 operation were lost if stoat control was discontinued.

Whio

The benefit of stoat control from the 1080 to zero and the trapping should reduce predation pressure during the following breeding season.

It would be beneficial if the operation could be used to improve our confidence about the risk level to whio from the 1080 to zero baiting methodology. ZIP propose to undertake pre and post operation helicopter surveys to count whio. Based on the counts made to date it appears the results from these surveys can be variable and we won't be confident if differences between pre and post op surveys really reflect a change in the number of whio or the effect of the operation. It is suggested that a back-pack transmitter study and surveys to for green-scat (indicating bait consumption) would provide more detailed information about bait consumption and survival rate. The practicality and cost of this at the site could be prohibitive.

Rock wren

Stoat control from secondary poisoning is likely to lead to reduced predation pressure and rock wren survival in the subsequent nesting season. Similar considerations may apply as with kea, that ongoing commitment to predator control may be required to be confident that population losses from a high level of by-kill would be recovered.

Surveys for rock wren were carried out at the site in 2018 to enable for pre and post operational assessment of the planned 2018 operation. Four survey sites have been selected, 2 in the 1080

	<p>treatment area and 2 non-treatment sites. The locations of rock wren were mapped, a total of 112 birds were found across the 4 sites.</p> <p>ZIP propose that in 2019 the territory mapping surveys in treatment and non-treatment locations, are undertaken pre and post the operation using the same locations and methods as in 2018. In addition to the information of pre-post 1080 operation and overwintering impact, the 2019 pre-operational survey could be compared with the 2018 survey results.</p> <p>There would be considerable value if the rock wren surveys could be completed pre-treatment (in March), 3 weeks post toxic phase 1, and post toxic phase 2 (timing probably determined by seasonal conditions – spring summer). This is partially because the post toxic phase 2 survey probably wont be completed until after winter.</p>
<p>How well are other potential risks managed? <i>(i.e. as proposed in the Application form or performance standards)</i></p>	<p>Public perception risks will be proactively managed by the approving manager with staff from the Media and Communications team.</p> <p>ZIP is supporting the Game Animal Council to lead a monitoring plan to determine the impact of the 1080 operation on tahr. At present 21 tahr are fitted with radio transmitters so their survival through the 1080 operations can be determined. It will be the first study to do this.</p> <p>The 4 tahr ballot landing/camping sites have been removed from this year's tahr ballot.</p> <p>In the application for public health permission it is proposed that the Scone roof water supply pipe will be disconnected during the toxic bait application. This supply will be reconnected after the roof has been checked for and cleared of bait.</p> <p>The proposal is to apply bait over tracks and exclude any members of the public from the treatment area during bait application. Track, and hut surround clearances will be undertaken. The final details of these will be prescribed by the conditions of the Public Health Permission.</p>
<p>Are you satisfied with the proposed warning sign locations and normal points of entry?</p>	<p>The proposed warning sign locations cover the normal points of entry to the treatment area (where signs must be at least A3). s 9(2)(a) submitted a revised map indicating that the A3 warning sign on the Perth river track will be placed to coincide with the 'consent' treatment boundary rather the aerial application boundary as was indicated on the original map.</p>
<p>Summary of any technical or community relations advice received</p>	<p>Advice received is in step 4.</p>

<p>Public health permission, including application form sighted (if not provided at time of application) <i>Consider if public health permission has any impact on DOC permission conditions.</i></p>	
<p>Other resources consulted (<i>specify</i>)</p>	
<p>Which additional performance standards should be applied and why? <i>Consider impacts of conditions from other consents. Consider if the additional performance standards specific and auditable, and can be justified.</i></p>	<p>I recommend that the permission letter states that the following risk mitigation, monitoring and reporting as conditions of the approval:</p> <ol style="list-style-type: none"> 1. Kea risk mitigation measures are to be implemented as described in the <i>Perth Valley Project: Taonga Species Risk Assessment and Mitigation Plan</i>, submitted 1 February 2019. This condition also acts as my approval and provision of DOC support in implementing the tahr carcass components. 2. The level and rate of tahr carcass consumption by kea will be recorded at each placement (subsequent to placement 1) and reported to me as soon as practical. 3. Kea fitted with radio transmitters are monitored to determine their survival during and after the operation. The sample size present in the area must be reported to me prior to prefeed 1. Mortality information must be sought after both the phase 1 toxic bait application and after the phase 2 toxic bait application and these results are to be reported to me once they are available. 4. The kea population will be estimated using mark-recapture methodology with trail cameras at tahr carcass sites. This will be undertaken after the phase 2 toxic bait application to reflect the post operational kea population. The 2019 post 1080 population estimates will be compared with the population estimates from the winter 2018 data at the same tahr carcass sites. 5. Pre and post operational surveys of whio are undertaken as described in the <i>Perth Valley Project: Taonga Species Risk Assessment and Mitigation Plan</i>, submitted 1 February 2019. 6. Monitoring of rock wren is carried out in 2019 pre and post the operation, using the same methods and sites as in the 2018 survey. There will be a minimum of 2 surveys, but ideally 3 if weather allows: pre-operational (March 2019- compulsory survey); post Phase 1 (3 weeks after the phase 1 toxic application) and/or post Phase 2 (after phase 2 as snow conditions allow). As a minimum, the post-Phase 2 survey

	<p>must be completed; with weather conditions and staff health and safety considerations to dictate the feasibility of the post-Phase 1 survey.</p>
<p>Step 6 Make a recommendation <i>Should the application be approved or declined?</i></p>	
<p>What key points should the approving manager have drawn to their attention?</p>	<ul style="list-style-type: none"> • This operation is a critical component of a project which aims of completely remove and prevent reestablishment of possums from a 12, 000 ha site in the Perth Valley in South Westland. The project also aims to develop the ability to achieve the same large-scale removal and defence for ship rats and stoats. This is R&D is intended to be part of the progression towards the PF2050 goal. • The aerial 1080 operation specifications (bait, lure, sowing rates, number of prefeed and toxic bait applications, sowing strategy) are intended to prevent any possums or ship rats surviving. These specifications may heighten the poisoning risk to native non-target species. • Mortality levels of native birds could be higher than with standard operations. The level of risk can't be quantified so there is no assurance that potential losses can be recovered within the timeframe of this project. • ZIP have proposed a kea risk mitigation plan that applies novel methods they have developed. The plan entails providing tahr carcasses as a preferred food source (relative to cereal pellets) and micro site attractant and coupling this with cereal bait aversion training using the secondary repellent anthraquinone (AQ) to dissuade kea from eating cereal baits. The potential effectiveness of the kea risk mitigation plan is supported by the results of ZIPs trial work. • The risk level to kea is likely reduced with the mitigation plan, but as neither the initial or remaining the level of risk can be quantified, there remains some chance of high kea mortality. Stoat control from the operation and subsequent proposed work will likely improve the breeding success of kea. To offset a high kea by-kill (e.g. 37.5% of kea) would require a long-term commitment to ongoing effective stoat control at the site. • ZIP propose to measure the potential impact of the operation on kea by determining the survival of estimated 15-18 kea with radio transmitters and by mark-recapture methodology using cameras to at tahr carcass sites. • For who the risk is outwardly considered low as no 1080 mortality has been recorded and high survival has been recorded through past standard 1080 operations. But uncertainty has arisen from a 2016 1080 to zero ZIP trial operation on Mt Taranaki where it was confirmed that who consumed baits. For this operation it is proposed to monitor who by making make counts of birds pre and post the

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operation. The monitoring will provide only coarse information. Monitoring of radio transmitter fitted whio and checking for bait consumption by searching for green dye in scat would provide a more useful evaluation of potential impact of the 1080 to zero methodology. However, this site has challenging river habitat and a low density whio population meaning the information need cannot be addressed in this operation.

- The risk to rock wren is known from only one previously monitored operation in Kahurangi where 45% of birds disappeared but the cause may have been very heavy snowfall, 1080 poisoning, or a combination of the two. There is concern that the proposed operation could cause high mortality. The treatment area is a relatively small part of a large area of alpine habitat occupied by rock wren. It is proposed to repeat monitoring of rock wren using the same methods and treatment and non-treatment sites used in 2018. The surveys will be done pre and post (ideally each phase of) the 2019 operation. This is a valuable opportunity to learn more about the risk/benefit of treating rock wren habitat with aerially applied 1080 bait.
- There are perception and reputational risks associated with instances of native non-target poisoning. This is a significant risk for the proposed project that has implications for wider pest management.
- The direct risks and impacts to public users of the site are limited and manageable, but the operational timing does overlap with the roan hunting period. This is a change from the 2018 operation proposal.
- There is engagement and support from Iwi, recreational user interest groups, and conservation interest groups.
- Public Health Permission has not yet been forwarded to the assessor. A requirement that public health permission is obtained and forwarded to the approving manager prior to toxic bait application is included in the drafted permission letter.

Is approval or decline recommended?
 If declined, summarise reasons.
 If approved, is a readiness check recommended (DOC operations only – see Pre-Operational Step 7 of the)?

approved
 s 9(2)(a)
 18/2/19
 Director / O Perceval
 Western South Island

Step 7 Prepare documents and advise manager

<p>For recommended approval: Attached correct draft letter of permission, DOC Performance Standards sheet(s) and map(s) of operational boundaries.</p>	<p>Draft permission letter: <u>DOC-5709603</u></p>
<p>For recommended decline: Attach draft letter of decline including a summary of reasons.</p>	

Record of permission decisions that differ from the assessor recommendation	
<p>Record of permission decision Only complete this section where the manager has made a decision that differs from the assessor's recommendation. For example, where the manager decides on different operational timing or warning sign locations or rejects a recommendation to approve or decline the application. Where required, complete this in Section 7 (Approving or declining DOC permissions), Step 2. Record the difference between the decision and recommendation and summarise the reason(s) for the decision.</p>	