From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: RE: 1080 in the Greater Putaruru Area
Date: Monday, 8 January 2018 1:12:00 pm

Hi 9(2)(g)(ii)
I got this message from 9(2)(g)(ii) re any 1080 ops since July around Putaruru. The only location where DOC (Rotorua/Tauranga) carries out pest control near Putaruru is at Mokaihaha. No 1080 used there this year. We are planning for an aerial 1080 operation there this coming spring. I presume you have contacted Waikato DOC colleagues as Putaruru is close to our regional and District DOC boundaries and I have no knowledge of their pest ops.
Give me a call if I can help further
Regards
9(2)(g)(ii)

9(2)(g)(ii) | Senior Ranger, Community | Kaitiaki Matua, Āo Hāpori
Department of Conservation -*Te Papa Atawhai*
99 Sala St | P O Box 1146 Rotorua 3040
DDI: 9(2)(a) | M: 9(2)(a) | VPN 9(2)(a)

From: 9(2)(g)(ii)
Sent: Friday, 5 January 2018 1:58 p.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: 1080 in the Greater Putaruru Area

Hi 9(2)(g)(ii)

As discussed this afternoon, I have had a telephone call from 9(2)(g)(ii) the Medical Officer of Health for Waikato DHB requesting information on 1080 disbursement in the greater Putaruru area. Could you please contact 9(2)(g)(ii) with any information you have. 9(2)(g)(ii) telephone number if you which to discuss the information he requires is 9(2)(a)

Regards

9(2)(g)(ii)
Administration Officer - *Āpiha Whakataka*
Department of Conservation - *Te Papa Atawhai*
DDI 9(2)(a) | VPN: 9(2)(a)
9(2)(g)(ii)

9(2)(g)(ii)
Administration Officer - *Āpiha Whakataka*
Department of Conservation - *Te Papa Atawhai*
DDI 9(2)(a) | VPN: 9(2)(a)
9(2)(g)(ii)

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: RE: Curry in a hurry
Date: Wednesday, 31 January 2018 4:05:17 pm
Attachments: image001.png

Kia ora 9(2)(g)(ii)

Thanks for this. 9(2)(g)(i) [redacted]

My responsibility is to public health. Not to the unfortunate family involved (whom incidentally I believe it is to the work of the clinical teams that they are still alive). While it is clear a neurotoxin has been consumed by the family, it has not been possible to identify what it was.
1080 was never on the cards due mainly to worse correlation with symptoms than others (e.g. botulism), as well as the lack of biological plausibility. I asked for tests late on (on the curry) as I hoped it would put it to bed. They have come back negative for 1080 FYI. I doubt that is the end of it tho.
As you are aware there have been no 1080 drops (on DOC land) in the area for a long time.

So, I have never uncovered any public health risk. I have not identified that the pork had anything to do with it.

I have also faced an inconsistent and changing story throughout, so even if I thought there was a public health risk I would have really struggled to investigate appropriately as the information I got was unreliable.

9(2)(g)(i) [redacted]

Hope this helps a little?
Happy to talk further – perhaps while getting a rocket…

Cheers

From: 9(2)(g)(ii) [redacted]@doc.govt.nz]
Sent: Wednesday, 31 January 2018 11:24
To: 9(2)(g)(ii)
Subject: FW: Curry in a hurry

Hi 9(2)(g)(ii),

Would you be able to help DOC develop a statement? Not sure what we can say in relation to

this.

If you know who the hunter was and they traded/sold the pork to the family, have the NZ Food Safety Authority become involved? It appears the hunter would have been selling the pork illegally, so could be prosecuted.

I realise it is highly likely to have been an 'unidentified' neurotoxin, but we need to stress that DOC and other users of 1080 have SOPs in place to notify the public of where 1080 is being used. We also need to point out that it is illegal to sell meat from wild animals unless the hunter is certified and selling it to a certified processor.

Regards,

9(2)(g)(ii)

9(2)(g)(ii) | Technical Advisor Threats (Hamilton) | Biodiversity Group | Department of Conservation
Postal Address: Private Bag 3072 | Hamilton 3240
Physical Address: 73 Rostrevor Street | Hamilton 3204
DDI: 9(2)(a) | VPN: 9(2)(g)(ii) | Mob: 9(2)(a) | Email: 9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Wednesday, 31 January 2018 9:47 a.m.
To: 9(2)(g)(ii) @doc.govt.nz>; 9(2)(g)(ii) @doc.govt.nz>
Cc: 9(2)(g)(ii) @doc.govt.nz>; Harry Maher <hmaher@doc.govt.nz>; Amber Bill <abill@doc.govt.nz>
Subject: FW: Curry in a hurry

We may need reactive messages for a flurry of activity that may occur.
I understand you have information from the health authorities about the poisoning of the family in Tokoroa.
According to my assessment of the release below, compiled misinformation apparently makes a PhD…. Piled higher and Deeper.

http://www.scoop.co.nz/stories/AK1801/S00585/acc-approved-for-the-not-botulism-kochumman-family.htm

Do you know…

- Where when and how was the pig taken? (Caught? Stuck? Shot?)
- Who was the hunter?
- How was the pig cooked?
- Does 1080 denatures on cooking?
- Was the offal part of the meal?

As I said below – It does not make sense.
If the people reacted in this manner to supposed 1080, the pig must have eaten a huge pile of bait (Where? When?), assimilated the bait without being affected, just in time to be shot/stuck when the toxicity miraculously peaked to be able to impart the observed symptoms to the

people without killing the highly susceptible dogs on the way???.

If the people reacted is this manner to supposed 1080 then the dogs would have been long dead from their interaction if they were involved in killing the animal.(implied in release)
If the people reacted in this manner to supposed 1080, the pig would have been dead when taken.(toxicity required would be massive to affect people in that manner)

9(2)(g)(ii)
Senior Communications Advisor:
Customer Engagement Unit
Department of Conservation | **Te Papa Atawhai**
DDI: 9(2)(a)

ww100.govt.nz

From: Harry Maher
Sent: Tuesday, 30 January 2018 4:22 p.m.
To: 9(2)(g)(ii) @doc.govt.nz>
Cc: 9(2)(g)(ii) @doc.govt.nz>; 9(2)(g)(ii) @doc.govt.nz>
Subject: RE: Curry in a hurry

This will be the primary angle from now on is my view. i.e. trying to link 1080 to illness/death in humans. No traction in other angles so going down this one hard.

Harry Maher
Director, Safety
Department of Conservation

9(2)(a)

From: 9(2)(g)(ii)
Sent: Tuesday, 30 January 2018 4:03 p.m.
To: Harry Maher <hmaher@doc.govt.nz>
Cc: 9(2)(g)(ii)
Subject: Curry in a hurry

Bear in mind that this is not 'out there' but just a speculative media release I the hope it gets picked up.

It is full of speculation and extrapolation from reality.
If it was 1080 and the people were showing symptoms, the pig would have been dead before it was caught and the dogs would be long dead.

http://www.scoop.co.nz/stories/AK1801/S00585/acc-approved-for-the-not-botulism-kochumman-family.htm

Apparently someone knows who the hunter is and is not saying

Cheers

9(2)(g)(ii) [redacted]
Senior Communications Advisor:
Customer Engagement Unit
Department of Conservation **| Te Papa Atawhai**
DDI: 9(2)(a) [redacted]

ww100.govt.nz

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: FW: Ferret predation - Rangitane
Date: Monday, 14 March 2016 11:17:57 am
Attachments: image001.png

From 9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Monday, 14 March 2016 7:53 a.m.
To: 9(2)(g)(ii)
Subject: RE: Ferret predation - Rangitane

Hi 9(2)(g)(ii)
I take it from this that we have had another killing spree in the Kiwi at Pukaha.

Anything we can do to help just give us a shout.

Cheers
9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Wednesday, 9 March 2016 12:00 p.m.
To: 9(2)(g)(ii)
Subject: FW: Ferret predation - Rangitane

Hi Bio planner's.
Please see email below in regards to the action we are taking around a recently notified kiwi death.
We may be asking for some feedback / meetings at some stage depending on how the next 2 weeks pan out.

Current CIMS

Thanks
9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Tuesday, 8 March 2016 6:05 p.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: RE: Ferret predation - Rangitane

Hi 9(2)(g)(ii)

I've just finished a meeting with the team where we've discussed the critical issues and planned our response to prevent any further kiwi deaths.

The critical issues we've discussed include:

- How to ensure our response is as efficient/effective as possible
- How to ensure the kiwi status is current
- How to ensure the DOC, Regional Councils and Pukaha volunteer response is coordinated
- How to eliminate the threat

Our planned response is as follows:

- We noticed last week during our audit of volunteer lines that some trap mechanisms were not activating within the accepted tolerances. **Commencing tomorrow** we will perform a full audit of the volunteer lines and ensure the trap mechanisms working optimally. Please be assured that this is not a reflection on the volunteers. We think they're doing a great job.
- We are also considering the placement of additional 250's on the front face – we will look at that when we audit and tidy up mechanisms.
- As you know, we have been baiting with fresh rabbit since January on a monthly cycle. **Commencing tomorrow** we will start replacing rabbit with fresher meat and **by this Friday**, every trap in the reserve will have been baited with fresh rabbit. Thanks for doing the same on the volunteer lines.
- We will complete a full rotation of fresh rabbit across the reserve again **by the end of next week**.
- We are mapping all of the data and will share that with you **by the end of tomorrow**. This will include ferret kill sites, the kiwi kill site and the location of monitored kiwi.
- We have a plan to record the whereabouts of every monitored kiwi **tomorrow, Thursday and Friday this week**. We will re-look at the monitoring plan at the end of the week. We'd appreciate the help of volunteers to track kiwi daily. We'd need to do that in a coordinated way so we're making the best use of our resources. Todd, if you do have volunteers available, could you please liaise with 9(2)(g)(ii) who is leading the telemetry work.

- We checked our bait and carcass monitor today and we're confident that we will be able to bring the 1080 operation to a close by 11 March. This requires probably the equivalent of a full day and the work is planned for **the end of this week**.
- We're talking to mustelid dog handlers and kiwi dog handlers with a view to bringing them in **next week if we can**. We will keep you posted on our progress with them.
- We're considering other ways to lure the mustelid (probably ferret). Could you please ask volunteers to keep any ferrets or stoats caught – we may use them for lure and we would like to examine their gut.

I appreciate your desire to have a swift response. I think it's equally as important to ensure our response is well coordinated, is making the best use of resources and that we are clear about who is making decisions.

We're looking to reconvene on Friday to plan our attack for next week so it would be great if Todd attended. We haven't scheduled a time for that yet because we need to work around the activity, but will keep you posted.

Nga mihi
9(2)(g)(

9(2)(g)(ii)
Operations Manager *Kahui Matarautaki*
Department of Conservation - *Te Papa Atawhai*
Wairarapa District - South Road Masterton
9(2)(g)(ii) | 9(2)(g)(ii) | VPN 8542

Conservation leadership for our nature *Tākina te hī, Tiakina, te hā o te Āo Tūroa*
www.doc.govt.nz

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha
Date: Wednesday, 9 April 2008 1:13:27 pm

FYI

From: 9(2)(g)(ii)
Sent: Wednesday, 9 April 2008 9:16 a.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha

Another one for you

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 4:43 p.m.
To: 9(2)(g)(ii)
Subject: RE: Kiwi death Pukaha

Howdy,

Thanks for the e mail. A question for you first. Is it high numbers of all species of mustelid, or is it ferret numbers that are high.

I have been going up to Boundary Stream every few years ever since it was established as a Mainland Island. At the moment it is absolutely crawling with rabbits. I suspect due mainly to the years of predator control. So it might be worth your while talking to them (9(2)(g)(ii)), plus 9(2)(g)(ii) who has also been providing advice to the managers of that project. As far as I know at Boundary Stream they have not done anything about rabbit numbers.

Regarding what might happen if the rabbit population is hit hard by whatever control method is decided upon, it might simply mean the ferrets will be suckers to trap. Bear in mind that ferrets are also known scavengers so there could be a bit of a lag between actually killing rabbits and the ferrets being short of food. Particularly if the rabbit control was carried out over the winter months. A dead rabbit mid winter might be quite palatable to a ferret for a few weeks if in a burrow. Be bit like rabbits in a cool store.....just a thought.

Can you keep me in the loop. Cheers, 9(2)(g)(i).

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 4:12 p.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha

9(2)(g)(ii) and 9(2)(g)

Just a brief heads up on predation death at Pukaha Mount Bruce. Plse see below. I would welcome any advice you might have. Undoubtedly this could be a one off incident but I have asked Staff at Pukaha to increase kiwi monitoring intensity in order to gain an early insight to any further attacks. Rabbit control by fumigation is a definite possibility but it is difficult to know whether much would be gained. Eketahuna residents recently organised a "great Bunny Hunt" which has created gun and light shy rabbits so I think fumigation probably would offer the best option.

Anyway, as I have said advice and suggestions welcome.

Regards

9(2)(g)(ii)
Wairarapa Area manager

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 8:15 a.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: Kiwi death Pukaha

9(2)(g)(ii)

We have had the death of a kiwi (mustelid predation probably ferret) in the Pukaha Forest confirmed. There is a view that the mustelid population is high because of the high rabbit numbers in the area and that the elevated rabbit numbers are in part due to the predator control. This is probably at least partially correct as the high level of predator control in and around the forest undoubtedly reduces the natural predation of rabbits. Trapping of mustelids is continuing but catches have been similar to seasonal averages. Kiwi monitoring will be continued and I will ask 9(2)(g)(ii) to consider intensifying monitoring for the next two to three weeks.
.

I have spoken to GWRC who have taken blood samples from rabbits at Pukaha to sample the RCD antibody level. If this happened to be low enough they will consider a re release of RCD. Otherwise we will be hopeful they will employ other methods to reduce the rabbit numbers. It is a delicate balance however as probably reducing the rabbit numbers in the presence of a relatively high mustelid population (assuming this is the case) will expose kiwi to an even greater risk of becoming the target species for the ferrets.

[redacted]

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha
Date: Wednesday, 9 April 2008 1:13:01 pm

FYI

From: 9(2)(g)(ii)
Sent: Wednesday, 9 April 2008 9:16 a.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha

FYI

From: 9(2)(g)(ii) RO
Sent: Tuesday, 8 April 2008 5:00 p.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: RE: Kiwi death Pukaha

Hi 9(2)(g)(ii) Not sure if this was an adult kiwi or juv but it's not uncommon to lose kiwi to predators despite doing our best with predator control. Your situation with the rabbits appears similar to Trounsen Kauri Park and Boundary Stream mainland islands so I suggest you have a chat with 9(2)(g)(ii) and 9(2)(g)(ii)) . The influence of (perhaps) higher than normal rabbit population on mustelid threat to kiwi is a vexed question - perhaps they help by keeping the predators fat and happy? - perhaps they draw in more?- perhaps controlling them leads to prey switching?. These are all valid biological concepts but I doubt that the scale you're talking about in & around Pukaha is going to be meaningful for the mustelids ie a 1km buffer around the forest would take a stoat about 2 minutes to cross so he probably wouldn't notice higher or lower rabbit numbers along the way. Bottom line is what can you do about kiwi predation and I think the answer is keep doing the best you can with your predator control and measure the outcomes on the kiwi population trends.

I've copied this to 9(2)(g)(ii) and 9(2)(g)(ii) in cae they have more to add.- Regards 9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 4:12 p.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha

9(2)(g)(ii) and 9(2)(g)(ii)

Just a brief heads up on predation death at Pukaha Mount Bruce. Plse see below. I would welcome any advice you might have. Undoubtedly this could be a one off incident but I have asked Staff at Pukaha to increase kiwi monitoring intensity in order to gain an early insight to any further attacks. Rabbit control by fumigation is a definite possibility but it is difficult to know whether much would be gained. Eketahuna residents recently organised a "great Bunny Hunt" which has created gun and light shy rabbits so I think fumigation probably would offer the best option.

Anyway, as I have said advice and suggestions welcome.

Regards

9(2)(g)(ii)
Wairarapa Area manager

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 8:15 a.m.
To: 9(2)(g)(ii) CO
Cc: 9(2)(g)(ii) CO
Subject: Kiwi death Pukaha

9(2)(g)(ii)

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I have spoken to GWRC who have taken blood samples from rabbits at Pukaha to sample the RCD antibody level. If this happened to be low enough they will consider a re release of RCD. Otherwise we will be hopeful they will employ other methods to reduce the rabbit numbers. It is a delicate balance however as probably reducing the rabbit numbers in the presence of a relatively high mustelid population (assuming this is the case) will expose kiwi to an even greater risk of becoming the target species for the ferrets.

9(2)(g)(ii)

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha
Date: Wednesday, 23 April 2008 1:06:05 pm

9(2)(g)(ii)
National Wildlife Centre Pukaha Mount Bruce

Please consider the environment before printing this e-mail

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 8:16 a.m.
To: 9(2)(g)(ii)
Subject: FW: Kiwi death Pukaha

9(2)(g)(ii)

Please not suggestion in first para. for your consideration.

9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 8:15 a.m.
To: 9(2)(g)(ii) CO
Cc: 9(2)(g)(ii) CO
Subject: Kiwi death Pukaha

9(2)(g)(ii)

We have had the death of a kiwi (mustelid predation probably ferret) in the Pukaha Forest confirmed. There is a view that the mustelid population is high because of the high rabbit numbers in the area and that the elevated rabbit numbers are in part due to the predator control. This is probably at least partially correct as the high level of predator control in and around the forest undoubtedly reduces the natural predation of rabbits. Trapping of mustelids is continuing but catches have been similar to seasonal averages. Kiwi monitoring will be continued and I will ask 9(2)(g)(ii) to consider intensifying monitoring for the next two to three weeks.

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9(2)(g)(ii)

From: 9(2)(g)(ii)
To: 9(2)(g)(ii) 9(2)(g)(ii)
Subject: FYI - Kiwi death articles
Date: Thursday, 29 July 2010 9:33:28 am

Four kiwi found dead at Mount Bruce - Dominion Post - 29th Jul 2010

Four kiwi have been found dead in the Pukaha Mount Bruce wildlife reserve, with a ferret the suspected culprit.

Four kiwi birds killed by ferret in Wairarapa

Efforts to establish a colony of kiwi in northern Wairarapa have suffered a setback, with four birds falling victim to a ferret attack. (duration: 2'07")
Download: Ogg Vorbis MP3

Ferret kills four Mt Bruce kiwi - Wairarapa News - 28 July 2010

Work towards establishing a self-sustaining population of kiwi at Pukaha Mount Bruce has suffered a setback, with four of the forest's birds falling victim to a ferret attack.

9(2)(g)(ii)
Conservation Support Officer/ Public Awareness
Wellington Hawke's Bay Conservancy
Department of Conservation | Te Papa Atawhai

9(2)(g)(ii) | New Zealand
DDI: 9(2)(g)(ii)
9(2)(g)(ii) | www.doc.govt.nz

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: Kiwi death comms plan
Date: Tuesday, 17 August 2010 2:33:56 pm
Attachments: DOCDM-614260 Communication issues plan - Pukaha Kiwi Deaths July 2010.dml

---

Hi 9(2)(g)(ii)

Can you plse arrange for this plan to be updated ASAP. I'm happy to help. you may need to ask 9(2)(g)(ii) to give you read/write access.

Cheers, 9(2)(g)(ii)

9(2)(g)(ii)
Conservation Support Officer/ Public Awareness
Wellington Hawke's Bay Conservancy
Department of Conservation | Te Papa Atawhai

9(2)(g)(ii) New Zealand
9(2)(g)(ii)
9(2)(g)(ii) www.doc.govt.nz

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: Kiwi debrief
Date: Friday, 23 May 2008 10:24:48 am
Attachments: Kiwi Debrief Pukaha Mount Bruce.doc

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adfasfd

Kiwi Debrief Meeting Minutes

Thursday, May 15, 2008
Venue: Pukaha Mount Bruce
Scribe: 9(2)(g)(ii) Start time: 10:15

Attendees

9(2)(g)(ii)	DoC Area Manager, Wairarapa
9(2)(g)(ii)	DoC Pukaha Mount Bruce
9(2)(g)(ii)	DoC Pukaha Mount Bruce
9(2)(g)(ii)	DoC Pukaha Mount Bruce
9(2)(g)(ii)	DoC Field Centre Supervisor, Pukaha Mount Bruce
9(2)(g)(ii)	DoC Wairarapa Area Office
9(2)(g)(ii)	DoC Wairarapa Area Office
9(2)(g)(ii)	National Predator Officer, RD&I
9(2)(g)(ii)	Programme Manager (Biodiversity Assets) Hawke's Bay
9(2)(g)(ii)	Boundary Stream Maungaharuru
9(2)(g)(ii)	Greater Wellington Regional Council
9(2)(g)(ii)	Greater Wellington Regional Council
9(2)(g)(ii)	Greater Wellington Regional Council
9(2)(g)(ii)	Horizons Regional Council

Goals: (9(2)(g)(ii))
If we can leave with widely accepted view of how we can do what we have been doing better.

If we can do anything to make the kiwi pop more sustainable.

Do we need to facilitate any thing extra predator control for other species.

We set out to prove that we could have a kiwi pop without a predator proof fence.

Summaries

Mount Bruce 9(2)(g)(ii)
Reserve wide Pukaha has 530 trap sets, fenn and DoC 200s
1000 operational trap sets.
We use eggs as bait. Just started to use dehydrate rabbit. We employ a pest contractor over summer season, to clear and monitor trap lines. We are doing weekly trap checks in kiwi protection zone. (Kiwi protection zone 75-100 ha on the front face, behind the Visitor Centre).
Trap catches this year from Aug 07-Apr 08 were 35 stoats 17 ferrets and lots of rats. A large % are trapped in kiwi zone (~50%) particularly ferrets.
Clarification: The Total reserve is 948 ha. "kiwi zone" is 75-100ha.
Kokako hold territories in the kiwi zone.
We have been using racumin for rat control for the past 3 years. We are looking to make a change for next year.

Greater Wellington 9(2)(g)(ii)

Out of scope

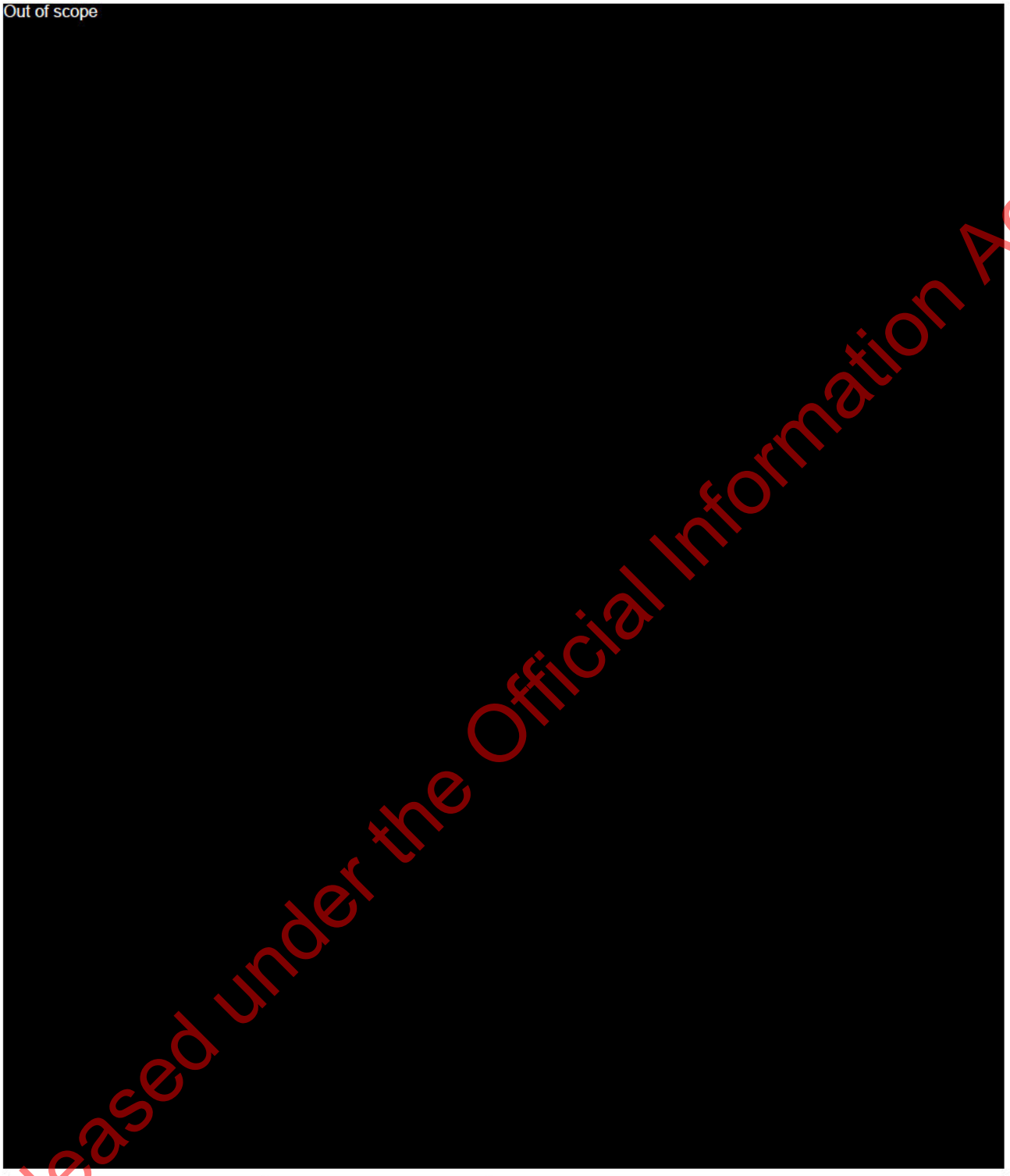
[redacted]

Horizons 9(2)(g)(ii)

Out of scope

[redacted]

Out of scope



Kiwi predation events (9(2)(g)(ii))
(refer to predator incident timeline.)

Background

On Friday, 28 March, the restoration team found an adult female kiwi predated on the front face of the Pukaha Reserve. This was the first kiwi predation event that we know of (marked bird). The carcass was delivered to Massey (29 March) and the necropsy indicated a mustelid was responsible for the kill. The kiwi was also in poor body condition, so there was some speculation that she was more vulnerable due to her condition.

The kiwi, named Rangi was released on 9 October 2006 and had been adopted by Greytown Kindergarten.

The Area Manager sought advice from RD & I Senior TSO's 9(2)(g)(ii) and 9(2)(g)(ii) and GWRC. Their advice was to continue with existing controls.

On Monday 21 April, a further two predated kiwi were found. One adult female and one sub-adult female both recently released into the reserve. The two birds were found 30 m apart. Necropsy results from Massey confirmed that both birds were killed by mustelids.

Kopakopa, the adult female was first released in 2004 but had been returned to captivity when she suffered an injury to her bill. She was released again on 19 February 2008. She had been adopted by Pahiatua School.

W6, the sub-adult female and wild Pukaha bird was released on 11 April and had been adopted by Cloverlea School.

ACTIONS TAKEN
Monday evening:
*Approximately 12 traps (Fenns, Tims, and Doc 200s) were placed around the kill zone, baited with kiwi feathers, feacals and chicken eggs.
*9(2)(g)(ii) asked the volunteer monitoring kiwi via telemetry if there were other kiwi in the area and she said there were none.

On Tuesday 22 April, 8 am Meeting **held**: 9(2)(g)(ii) .
We outlined our options which included the following:

- More traps[1]
- More frequent checks of traps[2]
- Different bait[3]
- Target trap sets in kill area[4]
- Dogs (predator and/or kiwi)[5]
- Catch up kiwi on reserve and put in enclosures[6]
- Do nothing.[7]

We had already placed additional traps (target traps) at the kill site.[4] Standard best practice for stoat control is 1 trap/3 ha. Pukaha has 1 trap/1 ha over the entire block.[1]

We had a volunteer checking trap lines on the front face. She was picking up two rats/week and reporting the baits were in good condition. We decided to keep up the same frequency of trap monitoring on the front face[2]. Our traps are baited with chicken eggs, and we discussed using fish oil or rabbit, or day old chickens. We then discussed whether we should change to different bait on just the target traps or everywhere in the reserve. We agreed that we should use kiwi scent at the new target traps at the kill site, and switch to 1 day old chicken carcasses on the rest of the front face.[3]

We then discussed what kiwi might be considered at risk. There were 2 breeding pairs on the front face and a 15 year old single male that had been released on April 10th. Given that the old male was from a nocturnal house and probably rather naïve we decided it was imperative to

bring him until the rogue predator was caught. 9(2)(g)(ii) would arrange for "Tahi" to be brought in immediately. [6] 9(2)(g)(ii) would also monitor the breeding pairs (further up the hill) and bring them in IF both the male and female were found at the same time. We did not want to bring in one member of the pair to hold in NPF enclosure. The enclosure was in close proximity to the kill site and we felt that if one member of the pair was calling out to the other that might result in that
The discussion then moved to "Are we targeting the right predator?" Necropsy from the first kill (28 March) indicated a mustelid kill with teeth marks found on the head and neck. Evidence from the scene of the 2 kills (21 April) was also classic mustelid sign. We discussed setting out cat traps, the possibility of a dog in the reserve (a recent sighting), also whether we should do night shooting. All the advice we had been given suggested we were targeting the correct species and taking the correct measures.

Further actions from the meeting:
9(2)(g)(ii) would contact 9(2)(g)(ii) and 9(2)(g)(ii) regarding predator and kiwi dogs. 9(2)(g)(ii) would also contact the Regional councils (Greater Wellington, Horizons) to see what kills they were getting in the buffer zones.
Meeting adjourned 10 am.

Noon, Tuesday 22 April a fourth kiwi was found.

Tahi was the 15 year old male that had recently transferred from the Queenstown Kiwi Birdlife Park. He was released on 10 April and had been adopted by Dannevirke South School. He was killed overnight, he's transmitter had not yet kicked over to mortality mode.

Actions taken:
*9(2)(g)(ii) uses feathers and blood from Tahi's carcass and fresh chicken meat to bait additional traps at the kill site.
*Two live kiwi arrive from Willowbank at 4pm. These two females are placed in the bush aviary (~ 100 meters from where Tahi was killed) to keep the scent of kiwi in the area.
* Staff and volunteers also went up the hill to catch the 2 breeding pairs to bring into captivity. The males were already out of the burrows at sunset, so none were captured Tuesday evening.

Results
23 April- Ferret fur found in Doc 200 trap, trap set off, and wire mesh bent. Predator escaped.

24 April- male ferret caught (1.5 kg male) in Timms trap
26 April- Female ferret caught (800 grams), immature, similar markings to the male. Believed the two ferrets were siblings.

29 April- 9(2)(g)(ii) and his predator dog "Tiki" spend a day looking for fresh 'mustelid' sign. The dog only reacted in areas where the kiwis had been killed. No major reactions.

13 May- Badly decomposed kiwi found (C4) . This kiwi was mostly killed at the same time as others (~ 20 April. Faulty equipment resulted in carcass not being discovered right away).

Three ferrets later caught but further away. Male ferret 1.4 kg

Pukaha currently has 6 birds untransmitted, 4 adult kiwi living in the kiwi zone.
This predator event: 1 kiwi killed in burrow, 1 buried under sticks, two others found out the in open.
9(2)(g)(ii) *suggests* 9(2)(g)(ii) *protocols for assessing kill site will be useful for staff and volunteers.*
It is thought ferrets caught could be siblings dispersing from natal territory.
9(2)(g)(ii) *suggested DNA testing the fur from the ferret caught and the fur from the trap where predator escaped to see if it was the same animal.*

What can be done better??
9(2)(g)(ii)
Everyone needs to keep in mind that 90% of kiwi populations have no protection. Predation happens every night; put the event in context nationally.
Kiwi best practice: 1 trap every 5-7 hectares this project has 1/hectare. This is better than most kiwi zones.

Pukaha not using Doc 250s currently, Trapping could be excluding large ferrets.
One suggestion would be to alternate Doc 200 and Doc 250s around perimeter.
9(2)(g)(ii) mentioned that Pukaha has been criticized for trap maintenance and trap types.
9(2)(g)(ii) DOC 250 only effective ferret kill trap. Trap maintenance is important and there are SOPs out there.

Move towards ideas
9(2)(g)(ii) gave national perspective: 90% of kiwi populations have no predator control, so what we are doing here at Pukaha is a good thing. These events happen and we have to keep our chins up and move forward. It is hard with public history, and the fact staff know birds, but know we are making a hell of a difference when compared to other areas.

Surprising that mustelids can still get through- Several participants gave examples of stoat getting through intense trapping zones. Stoat home range is 100 ha.

Look to alternating bait, seasonally.
Suggestion to the Regional Councils' Buffer zone- put more effort into a line rather than spreading out the zone. It's working at Boundary Stream.
Horizons - it takes 2 guys one day covers whole zone. Perhaps stream lining to a line would mean one guy could do it in a day, and it could be checked more often (?).
These events are catalyst for change, to see where we can improve.
Peaks of predators known. Change baits during the peaks. Fresh bait is best. Any bait is good.

Council could provide labour to help DoC operations. Just give then a call.
In the field maintenance is needed .Horizon's Regional Council could help with supply of traps to help out with getting maintenance underway.
Now that 9(2)(g)(ii) has returned to the Area Office, 9(2)(g)(ii) now doing 2 jobs. Focus needs to be on hiring staff to do trapping, kiwi monitoring. Next years work plan will empathize the need for more labour.

Currently Pukaha is doing releases near perimeter for school groups.

Discussion followed regarding the best place to release kiwi:
9(2)(g)(ii) showed a map of their predator kills and they were all around the fringes. Should we release Kiwi into middle of reserve?
Young kiwi disperse into middle. Adults hanging out around perimeter. Releasing birds into middle would reduce ferret risk. 9(2)(g)(ii) was concerned we would have to extend the "kiwi zone"and intensive monitoring. 9(2)(g)(ii) felt that it would not be necessary. He suggested we determine a target number of birds for release on the front face and release rest into the middle. It doesn't make any difference to advocacy whether released onto front face or middle. You need a 30% survival rate of chicks and populations increase.

Kiwi deaths and the media.
9(2)(g)(ii) asked how Boundary Stream handle the media when these events take place. BS do press releases- explain what we talked about today. Important to do media release but we need it to be positive stance. We need to do story. Many at the meeting felt it was an excellent idea to tell story of what we have done to address the issue (Highlight the debrief meeting). Mention regional council involvement in project and show them press release before release. Look at death in positive light, one step forward two backwards.

Should we continue to release birds?
9(2)(g)(ii) - Go for it! Move forward, Pukaha has robust trapping regime and continue with heads held high.

9(2)(g)(ii) and 9(2)(g)(ii) thanked everyone for attending, and invited them to walk around the reserve with Tom or Tony after lunch.
Meeting adjourned at 12:40

Recommendations from 9(2)(g)(ii) :
DOC Reserve"

- As fenn tunnels and fenn reach end of their lives, replace with Doc 200s
- On forest margin replace with Doc 250s (or alternate 200 and 250s)
- Bait- alternate meats of the "high pressure" time (and in winter in case anything was missed by egg)

Buffer zone

- Doc can provide labour if trap checking falls behind
- Horizons can provide labour and gear for "these predator events"
- Regional council could also increase number of 250s
- Have 1 km buffer strip ideal. Decrease dispersal rates into reserve

Response

- All actions undertaken for this event can be used as a draft template for response in the future
- First you must decide if you will respond – or will you just keep truckin on when these events happen.

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: RE: Four kiwis predated
Date: Wednesday, 23 April 2008 11:02:00 am

Hi There,
Sorry for the delay in responding. We are really feeling like we are in crisis mode at the moment. Having said that, we are working through the issue logically and with as much advice and support as we can get from the TSOs and others.

The situation:

5th of April, the resoration team found an adult female kiwi predated on the front face of the Pukaha Reserve. This was the first kiwi predation event that we know of (marked bird). The carcuss was delivered to Massey and the necropsy indicated a mustelid was responsible for the kill. The kiwi was also in poor body condition, so there was some speculation that she was more vulnerable due to her condition.
Advice at that time was to keep doing what we have been doing.

21st of April, TWO kiwis are found predated. One adult female, and one subadult both recently released into the reserve. The two birds were found 30 m apart. Very obvious signs of mustelid predation with these carcasses, and both were sent to Massey.

Yesterday, (22 April) 9(2)(g)(ii) and I sat down for a planning meeting.
We worked thru our options : Increasing Traps, changing baits, target trapping and increased kiwi monitoring.
We also discussed the possibility of bringing in dogs, and bringing in our adult kiwis that are on the front face. We have aviary space to hold them while we continue to try and catch the 'mustelid".

During our meeting we discussed that there was another kiwi in the same area as the recent kills that was at risk. (A recently released 15 year male). We made the decision to catch him immediately and hold him in the bush aviary close to the kill zone. We felt the scent of kiwi in the area would keep this rouge mustelid hanging around and we could focus our target trapping efforts more effectively. Unfortunately, we found this male predated at 2pm Tuesday.

All further kiwi released have been put on hold. (we have 3 birds due to be released in the next month). We have located all the transmittered males on the front face, and plan to catch them today. We hope that the untransmitted females will be with them so we can bring them in as well. If they are not, there is not much we can do. We have made calls to find out about getting a kiwi dog and a predator dog. Hoping to hear from someone today.

Media release will be written and distributed today. 9(2)(g)(ii) has been out sick, so it's going to fall to me. 9(2)(g)(ii) I will also be calling Queenstown Wildlife Bird Park, to inform them that the 15 year old Male that they raised from a chick and sent us 4 weeks ago, to live out his days in the wild, is now dead (ouch!). All of the dead kiwis were adopted by school groups and most schools are on school holidays, so unfortunately some students will hear about their kiwis via the media. 9(2)(g)(ii) will inform the teachers when they return to work.

I will also we speaking to 9(2)(g)(ii) from Rangitane, and make a call to GWRC and Horizon's.

NOTE: 9(2)(g)(ii) was at the car park area south of the redwoods this morning and saw a fox terrier leaving the Pukaha Reserve via the bridge!
We are still confident that the kills are mustelid, but we will be dealing with the dog situation IMMEDIATELY this morning. I'm on my way out the door to speak to the neighbors.

Let me know if you need any further information

9(2)(g)(ii)
National Wildlife Centre Pukaha Mount Bruce

Please consider the environment before printing this e-mail

From: 9(2)(g)(ii)
Sent: Wednesday, 23 April 2008 7:50 a.m.
To: 9(2)(g)(ii)
Subject: FW: Two kiwis predated

9(2)(g)(ii)

If you havnt already would you action this?/

9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Tuesday, 22 April 2008 8:54 a.m.
To: 9(2)(g)(ii)
Subject: RE: Two kiwis predated

May I suggest Rangitane are kept in the loop as well please?

9(2)(g)(ii)

From: 9(2)(g)(ii) CO
Sent: Tuesday, 22 April 2008 7:45 a.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: RE: Two kiwis predated
Importance: High

9(2)(g)(ii)

Plse take a series of actions as a very high priority 1 today, 2 + 3 today/tomorrow, 4 Thursday:

1 Please promptly debrief the incident, and seek input from predator experts, with a view to determining what stepped-up mustelid control is prudent, and/or retrieval of kiwi. Welfare/survival of the birds should be priority.

Determining whether the same predator as the previous death is involved is important - will help decide whether other bird species are vulnerable.

You could seek assistance from DOC RD&I pest control experts (9(2)(g)(ii) et al), and from regional council - at your discretion - we want the best advice as to how to protect the remaining kiwi and other threatened birds.

Plse keep me informed later today (Tues 22nd April) by e-mailing me what has been decided to protect the birds.

2 Plse have ready the comment and key messages that will be provided to the media - you can decide when to release the information about predation and the management response being taken. Do not sit on it. Plse involve 9(2)(g)(ii) in the decisions.

3At your discretion, plse also advise associates involved in the restoration - including neighbours/regional councils/sponsors. Plse also advise the PMB Chair. Discuss with 9(2)(g)(ii) (9(2)(g)(ii) if 9(2)(g)(ii) still away) who should advise DB and any other major sponsors of the restoration (they are the Board's associates too).

4 Plse put a MTMANS item for my consideration by mid-morning Thursday this week.

Thx 9(2)(g)(ii)

9(2)(g)(ii) | Acting Conservator | Wellington Conservancy | Department of Conservation
9(2)(g)(ii) New Zealand |
9(2)(g)(ii) | www.doc.govt.nz

From: 9(2)(g)(ii)
Sent: Monday, 21 April 2008 3:25 p.m.
To: 9(2)(g)(ii)
Subject: FW: Two kiwis predated

Not good news. I have asked the team to get together urgently to devise the best strategy. Imminent releases have been cancelled.

9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Monday, 21 April 2008 3:20 p.m.
To: 9(2)(g)(ii)
Subject: Two kiwis predated

I've just been informed that 2 kiwis (both female) Kopakopa and W6 were found predated in the reserve today. That is 3 predator deaths this month (all female kiwis).

As a result all further kiwi releases are to be postponed until further notice.
9(2)(g)(ii) please inform the school group that adopted W7.

I'm meeting with 9(2)(g)(ii) at 8 am tomorrow morning to formulate a plan of attack.

9(2)(g)(ii)

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 11:58 a.m.
To: 9(2)(g)(ii)
Subject: RE: Kiwi death Pukaha
Importance: High

9(2)(g)(ii)
Thank you for advising me.

Please promptly debrief the incident with input from predator experts, with a view to determining whether any control of rabbits and/or stepped-up mustelid control is prudent, and/or retrieval of kiwi.

I anticipate that you could seek assistance from DOC RD&I pest control experts 9(2)(g)(ii) 9(2)(g)

9(2)(g)(ii) et al), and from regional council - at your discretion.

Plse keep me informed.

9(2)(g)(ii) | Acting Conservator | Wellington Conservancy | Department of Conservation
9(2)(g)(ii) |
9(2)(g)(ii) | www.doc.govt.nz

From: 9(2)(g)(ii)
Sent: Tuesday, 8 April 2008 8:15 a.m.
To: 9(2)(g)(ii)
Cc: 9(2)(g)(ii)
Subject: Kiwi death Pukaha

9(2)(g)(ii)

We have had the death of a kiwi (mustelid predation probably ferret) in the Pukaha Forest confirmed. There is a view that the mustelid population is high because of the high rabbit numbers in the area and that the elevated rabbit numbers are in part due to the predator control. This is probably at least partially correct as the high level of predator control in and around the forest undoubtedly reduces the natural predation of rabbits. Trapping of mustelids is continuing but catches have been similar to seasonal averages. Kiwi monitoring will be continued and I will ask 9(2)(g)(ii) to consider intensifying monitoring for the next two to three weeks.

.

I have spoken to GWRC who have taken blood samples from rabbits at Pukaha to sample the RCD antibody level. If this happened to be low enough they will consider a re release of RCD. Otherwise we will be hopeful they will employ other methods to reduce the rabbit numbers. It is a delicate balance however as probably reducing the rabbit numbers in the presence of a relatively high mustelid population (assuming this is the case) will expose kiwi to an even greater risk of becoming the target species for the ferrets.

9(2)(g)(ii)

From: 9(2)(g)(ii)
To: 9(2)(g)(ii)
Subject: RE: kiwi death meeting
Date: Monday, 19 May 2008 9:14:13 am

9(2)(g)(ii)
Thank you for the supportive message.
I am going to put together "kits" for the restoration team to carry in the their packs, in case they find something.
I will also talk to 9(2)(g)(ii) again and see if we can have him come by to 'train" staff.

I'm glad you also got something out of the meeting. Again, Thanks for coming.

9(2)(g)(ii)
National Wildlife Centre Pukaha Mount Bruce
P Please consider the environment before printing this e-mail

-----Original Message-----
From: 9(2)(g)(ii)
Sent: Friday, 16 May 2008 10:54 a.m.
To: 9(2)(g)(ii)
Subject: kiwi death meeting

Hi 9(2)(g)(ii)

Thank you very much for inviting me to the meeting yesterday. It was very well structured and it made me think a few things about our management, too.

Anyway, I thought I should e-mail you some of my thoughts on the subject.

As other people mentioned, you need to accept a few kiwi kills/year as part of establishing kiwi population in the area like Mt Bruce or Boundary Stream. We could do some things to attempt reducing the risk of kiwi kill by releasing new birds in the middle of the reserve instead of behind visitor centre etc. You could also set up some DoC 250 traps near road or farm edge if you have enough money. Also, it is really important that your staff and volunteers are trained to examine 'crime scene' and perform necropsy on dead kiwi. 9(2)(g)(ii) is probably the best person to contact for this.

Here are the protocol that I use when we find a dead bird.

1. Do not touch the bird. Draw the picture of how the body is placed. Note any information (ie. the location, general vegetation, whether or not the bird is hidden in a burrow, under fern or in an open area). Treat the site as if it is a murder scene. Do through search of the area (approx 30mins). Take any evidence back for later examination. Take picture with a camera if available.

2. When you complete your search, gently place the body into a plastic bag. Put all the evidence in the separate bags (ie. Faeces, kiwi feathers etc)

- If the bird appears to be killed by a predator (ie. Bite marks on the neck or body), write down the name of the bird and date on the plastic bag, and put it in the freezer at workshop.
- If there is no sign of predation, fill the submission form (\\Docf731\data731\Boundary Stream\DOC\KIWI\Boundary Stream Kiwi\Deceased kiwi\huia%20submission%20form.pdf) and send it to:

Attention 9(2)(g)(ii) Room 8.28 Vet Tower IVABS Massey University Fitzherbert Road Palmerston North

Make sure to put the dead kiwi in a polyethylene box with some frozen drink bottles to keep the body cool. Write Urgent, Perishable or Keep Cool, Do Not Freeze on the box. Ring 9(2)(g)(ii) to make sure that they know the box is coming

The Condor 104:899–902

NEST MONITORING AND PREDATOR VISITATION AT NESTS OF BANDED DOTTERELS

RACHEL J. KEEDWELL[1,3] AND MARK D. SANDERS[2]
[1]*Ecology Group, Institute of Natural Resources, Massey University, Private Bag 11-222, Palmerston North, New Zealand*
[2]*Department of Conservation, Private Bag, Twizel, New Zealand*

Abstract. We used videocameras to monitor 39 nests of the Banded Dotterel (*Charadrius bicinctus*), a ground-nesting plover endemic to New Zealand that suffers from predation by introduced mammals. To test whether monitoring nests increased the chances of nests being visited by predators, 22 of the video-monitored nests were approached on foot daily to simulate conventional monitoring and 17 unapproached nests were monitored using videocameras only. The proportions of approached nests (46%) and unapproached nests (41%) that were visited by predators did not differ significantly, nor was there any evidence that predators used human scent trails to locate nests. This study provides some evidence that monitoring Banded Dotterel nests by regularly checking them does not influence their risk of predation.

Manuscript received 24 July 2001; accepted 24 June 2002.

[3] E-mail: rachel.keedwell@xtra.co.nz

Key words: *Banded Dotterel,* Charadrius bicinctus, *investigator disturbance, nest monitoring, predation, videocameras.*

Control de Nidos y Visita de Depredadores a Nidos de *Charadrius bicinctus*

Resumen. Usamos cámaras de video para controlar 39 nidos de *Charadrius bicinctus*, un ave endémica de Nueva Zelandia que anida en el suelo y es depredada por mamíferos introducidos. Diariamente nos acercamos a pie a 22 de los nidos controlados con cámaras para simular el modo convencional de seguimiento, y controlamos 17 nidos usando sólo las cámaras y sin acercarnos a ellos con el fin de examinar si el control convencional de nidos incrementa la probabilidad de visita de depredadores. La proporción de nidos personalmente examinados (46%) y no examinados en persona (41%) que fueron visitados por depredadores no difirió significativamente, y no hubo evidencia que los depredadores usan rastros de olores humanos para localizar los nidos. Este estudio sugiere que controlar

regularmente los nidos de *Charadrius bicinctus* no influencia su riesgo de depredación.

Monitoring nesting success of birds involves a degree of disturbance by the researcher, and this may influence nest survival (reviewed in Götmark 1992). One effect of disturbance may be to alter predation rates, and it is widely believed that mammalian predators in particular pose a threat to nests visited by researchers (Bart 1977, Lenington 1979, Lloyd et al. 2000). However, research to date has provided contradictory results, with some studies concluding that researchers increased predation rates (Götmark et al. 1990, Esler and Grand 1993, Sandvik and Barret 2001) and others indicating that researchers either had no effect or reduced predation rates (O'Grady et al. 1996, Skagen et al. 1999, Lloyd et al. 2000). These results suggest that interactions between habitat, predator species, and prey species influence the effect of researchers on nest survival. Relatively few studies have examined this effect outside North America and Europe (Götmark 1992) and it is important to assess the effect of researchers in all nest success studies.

In the large, braided riverbed systems of the Mackenzie Basin, South Island, New Zealand, many researchers have monitored breeding success of both common and endangered ground-nesting bird species, many of which rely entirely on braided riverbeds for breeding (Maloney 1999), yet none have formally measured researcher impact on nest outcome. The main cause of nest failure in this environment is predation by introduced mammals such as feral cats (*Felis catus*), ferrets (*Mustela furo*), stoats (*M. erminea*) and hedgehogs (*Erinaceus europaeus*; Pierce 1996, Sanders and Maloney 2002).

Traditionally, assessing nest survival rates has involved regular visits to active nests. Now, remotely operated video systems are widely available and can be used to monitor nests with minimal disturbance (Innes et al. 1994, Pietz and Granfors 1996, Brown et al. 1998). We used videocameras at nests to (1) test whether regularly approaching nests resulted in increased visitation rates by predators; and (2) assess whether mammalian predators used human scent trails to locate nests. We also compared predation rates at video-monitored nests and nests that were inspected regularly but not video-monitored, to test whether the videocameras affected nest survival.

METHODS

We placed videocameras at nests of a small, common plover, the Banded Dotterel (*Charadrius bicinctus*) in the Ohau River, South Island, New Zealand (44°20′S, 170°11′E) from mid-September to the end of December, 1998 to 2000. We found nests by following breeding adults to their nests. Banded Dotterels usually lay three eggs in a shallow hollow in the gravel. Both parents share the incubation of the eggs (usually 28 days), average hatching success is 56% (Rebergen et al. 1998), and 83% of chicks leave the nest within two days of the last chick hatching (Sanders and Maloney 2002).

Cameras and infrared lights were placed 1–2 m from nests and connected to a video recorder and 12-V battery that were hidden 30–60 m away. Nests were filmed continuously until hatching or failing, and tapes and batteries were changed daily. Full details of the camera configuration are available in Sanders and Maloney (2002).

Nests monitored with cameras were alternately assigned one of two treatments: ''approached,'' where nests were approached on foot daily from the same direction each time (simulating traditional nest monitoring); and ''unapproached,'' where nests were not approached between initial camera set-up and the end of incubation. Approached and unapproached nests were distributed evenly over the length of the river (10 km) in each year. For approached nests, we used the same direction of approach as we had when the nest was first located.

Videotapes were watched daily and nests were categorized as visited or not visited by predators. The proportions of approached and unapproached nests that were visited were compared using contingency table analyses. Data from all three years were pooled because sample sizes were too small to test for differences among years. Ten nests that hatched or failed within three days of the camera set-up were excluded from the data set to rule out any potential effects of the initial camera set-up, and because we considered that human scent trails would still be fresh at unapproached nests for at least this length of time.

To assess whether predators followed human scent trails to the nest, the direction of predator and human approaches to the same nest were compared using the Rayleigh test for circular uniformity (Zar 1999). The direction of human approach was set at 0° and each predator visit was categorized into one of twelve 30° segments relative to the human approach path (0°, 30°, 60°, etc., up to 360°).

To assess whether the videocameras affected predation rates, we used contingency table analysis to compare predation rates at the 39 videotaped nests with those at 227 Banded Dotterel nests that were monitored by field observers in a concurrent study on the Ohau River (RJK, unpubl. data). Nests were classified as preyed upon if one or more eggs were lost to predators. Human-monitored nests were visited every 2–4 days until the nesting attempt ended. As with the video-monitored nests, nests that hatched or failed within three days of discovery were excluded from analysis. There were no significant differences in predation rates at video-monitored and human-monitored nests among years; thus data from all three years were pooled. Percentages are reported with 95% binomial confidence intervals.

RESULTS

We videotaped outcomes for 22 approached nests and 17 unapproached nests over the three years. Filming effort (mean days filming per nest ± SE) was similar at approached (15.3 ± 1.3 days) and unapproached (13.8 ± 1.8 days) nests.

We recorded predator visits to 10 approached nests and seven unapproached nests. Two visits resulted in the predation of newly hatched chicks and at one of those nests an adult was also taken. Seven visits were nonlethal and during the remaining visits one or more

TABLE 1. Details of predator visits to video-monitored Banded Dotterel nests that were either approached daily (approached nests) or not approached after the initial camera set-up (unapproached nests). Unless otherwise stated, each item represents a single nest. Numbers in parentheses indicate the difference in degrees between the approach paths of human observers and predators. No angle is given for the magpie visit because it approached from above.

	Predator visits to nests	
Year	Approached nests (n = 22)	Unapproached nests (n = 17)
1998	Cat ate 1 of 2 eggs (30°) Mouse visited nest (300°)	Mouse visited nest, 5 days later cat ate 1 of 3 eggs Australian Magpie ate 3 chicks Cat visited same nest on 3 nights
1999	Cat ate eggs at 3 nests (30°, 180°, 180°) Cat ate 3 chicks and 1 adult (120°) Hedgehog ate 3 eggs (210°) Cat visited nest (120°)	Cat ate 3 eggs Hedgehog visisted nest
2000	Hedgehog ate 3 eggs (210°) Australian Magpie visited nest	Hedgehog ate 3 eggs Australasian Harrier ate 3 eggs
Total nests visited	10	7

of the eggs were preyed upon (Table 1). The same species of predators were recorded at both approached and unapproached nests. Listed in decreasing order of visits, they included feral cats, hedgehogs, mice (*Mus musculus*), Australian Magpie (*Gymnorhina tibicen*) and Australasian Harrier (*Circus approximans*).

The proportion of approached (46%, 24–68% CI) and unapproached (41%, 18–67% CI) nests visited by predators did not differ significantly ($\chi^2_1 = 0.1$, $P > 0.7$). There was no evidence to suggest that the directions of approach by visiting predators and by humans were correlated ($n = 9$; $z = 0.8$, $P > 0.20$; magpie visit excluded). The proportions of video-monitored (31%, 17–48% CI) and human-monitored (24%, 18–30% CI) nests that were depredated did not differ significantly ($\chi^2_1 = 0.5$, $P = 0.46$).

DISCUSSION

In this study, sample sizes in each year were small, a direct limitation of the number of cameras available. Although the proportions of approached and unapproached nests visited by predators were similar, a power analysis of the data indicated that with the given sample size, 0.44 was the minimum difference between the two proportions that could have been detected (with $\alpha = 0.1$, $\beta = 0.9$). Therefore, there may have been a difference in visitation rates between the two treatments that we could not detect. However, we approached nests daily, which is more frequent than usual for nest monitoring, and the lack of a strong effect of frequent monitoring on predator visitation rates suggests that traditional nest monitoring every 2–4 days is even less likely to influence nest survival.

Our results also suggest that approaching nests had little influence on how predators located nests. Again, sample sizes were small, but predators approached nests from seemingly random directions that did not correlate with human scent trails to nests. Observations of predator behavior have shown that cats tend to use visual cues to locate nests (Fitzgerald 1990, Sanders and Maloney 2002), whereas ferrets and hedgehogs use olfactory cues (Lavers and Clapperton 1990, Sanders and Maloney 2002). No ferret depredations were recorded in this study, but ferrets were responsible for 21% of 69 videotaped predations at braided-river bird nests (Sanders and Maloney 2002). If ferrets do hunt by smell, there is a possibility that monitoring nests may increase ferret predation rates. However, given that cats and hedgehogs together account for over two-thirds of depredations at nests (Sanders and Maloney 2002), and that there was no evidence that either of these species used human scent trails to locate nests (this study); it is unlikely that nest monitoring has any appreciable effect on nest survival in this braided-river environment.

Our comparison of predator visits to nests assumes that videos yield an unbiased picture of what happens at nests. This is difficult to test because any method of observation potentially has an effect. Conspicuous nest markers, such as videocameras, may increase nest predation rates (Götmark 1992). The videocameras used in our study were up to 40 cm high, and some of the infrared lights emitted small amounts of visible light at night; thus the cameras or lights may have provided visual cues to attract either mammals or birds to the nests. However, our comparison showing no difference in predation rates at video-monitored and human-monitored Banded Dotterel nests suggests this is not the case. Also, behavioral observations have shown that mammalian predators approached the nests and not the camera (Sanders and Maloney 2002); and although avian predators such as Australasian Harriers and Australian Magpies are abundant in the braided-river environment (Keedwell and Brown 2001) they were responsible for fewer than 3% of 69 videotaped predations (Sanders and Maloney 2002) and are therefore unlikely to be using videocameras to locate nests. Video-monitored and human-monitored nests of the Black-fronted Tern (*Sterna albostriata*), a species that shares the habitat of the Banded Dotterel, also showed no significant difference in survival between the two treatments (Sanders and Maloney 2002, RJK, unpubl.

data), which further suggests that videocameras do not have a detrimental effect on nest survival.

The use of videocameras helped us investigate the effects of nest monitoring because the cameras recorded nest fates without physical nest checks. Without cameras, the only other method for testing researcher effect is to alter the frequency of monitoring, because nests must be approached at some stage to determine outcome (e.g., Nichols et al. 1984, Major 1990, Sandvik and Barret 2001). Videocameras also increase the amount of information available by providing data on whether predators use human scent trails to locate nests and whether nest monitoring attracts different species of predators.

Video-monitoring provides valuable opportunities to compare different methods of nest monitoring on other species. Although the financial costs associated with running videocameras may be high, we believe video monitoring provides a comprehensive method for investigating the relationships among nest survival, nest monitoring, and the effects of predators.

We thank Rory McGirr, Nikki Wells, Jo Tilson, Lana Hastie, Anita Spencer, and Gavin Udy for operating the videocameras. Duncan Hedderley provided statistical advice, and Murray Potter, John Innes, Ed Minot, Hanno Sandvik, and one anonymous reviewer provided helpful comments on earlier drafts. This work was funded by Project River Recovery (Department of Conservation), Massey University, Miss E. L. Hellaby Indigenous Grasslands Research Trust, and the J. S. Watson Conservation Trust (Royal Forest and Bird Protection Society).

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