



PARKER CONSERVATION

Kārearea / New Zealand falcon *Falco novaeseelandiae* surveys before and after aerial application of 1080 (sodium fluoroacetate) in the Mt Allan conifer plantation area

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Abstract

Regular control of possum populations is conducted by TB Free New Zealand with the long-term goal to eradicate bovine tuberculosis in New Zealand. A leading concern of individuals and groups opposed to the use of 1080 is primary or secondary poisoning of non-target species leading to the mortality of native birds. Due to concerns regarding non-target mortality of Kārearea / New Zealand falcons *Falco novaeseelandiae*, Wenita Forest Products requested that Parker Conservation investigate the survival of Kārearea during a 1080 possum control operation at Mount Allan in the 2016 winter. Four days of surveys were conducted 57 to 60 days prior to the aerial application of 1080 and six observations of eight Kārearea were made. The second surveys were conducted 16 to 17 days after the 1080 application and seven Kārearea were detected, all single adult birds. One further day of survey 43 days after the 1080 was applied recorded six separate observations of adult Kārearea. The surveys reported here did not detect clear and obvious non-target mortality of Kārearea / NZ falcons in the Mount Allan aerial 1080 operation conducted in winter 2016. It cannot be said with certainty that there was no mortality as a result of the 1080 poisoning since survival of individuals was not monitored. Adult Kārearea were detected in the same general locations before and after the 1080 operation. If there had been a significant amount of non-target mortality, these territories would have had to be filled by other adult Kārearea in a very short amount of time. This is considered unlikely since adult Kārearea are territorial year-round. Further studies of individually marked Kārearea fitted with tracking devices should be a priority in future studies of the effect of 1080 on Kārearea.

Introduction

Australian brushtail possums *Trichosurus vulpecula* are a vector of bovine tuberculosis *Mycobacterium bovis* in New Zealand (Ryan et al. 2006). For this reason OSPRI New Zealand conduct regular control of possum populations through their wholly owned subsidiary TB Free New Zealand with the long-term goal to eradicate bovine tuberculosis in New Zealand (TB Free 2016). The most common large scale possum control technique employed by TB Free NZ is aerial application of cereal pellets laced with the toxin sodium fluoroacetate, commonly known as 1080. Aerial application of 1080 is an effective method for controlling possums, and has secondary benefits for the

conservation of biodiversity by also killing ship rats *Rattus rattus* (Gillies and Pierce 1999) and, via secondary poisoning, stoats *Mustela erminea* (Murphy et al. 1999).

Although 1080 is clearly proven to control possum numbers (PCE 2011), the application of 1080 to large areas of native and conifer plantation forests is opposed by many New Zealanders (Hansford 2009; Green and Rohan 2012). A leading concern of individuals and groups opposed to the use of 1080 is primary or secondary poisoning of non-target species leading to the mortality of native birds (Green and Rohan 2012). Non-target mortality from 1080 operations has been reported in 19 native bird species since the toxin was first used in New Zealand in 1956 (summarised in Veltman and Westbrooke 2010).

Earlier aerial 1080 operations using unscreened, undyed carrot baits with a berry lure reported high non-target mortality of native birds (Spurr and Powlesland 1997; Powlesland et al. 1999). Contemporary TB Free 1080 operations have been refined and now use cereal pellets, thinner sowing rates (Veltman and Pinder 2001) and green dyes and masking agents to deter birds from consuming bait (Powlesland et al. 2000). These refinements have contributed to lower non-target mortality in those bird species reported in earlier studies (Powlesland and Westbrooke 2005).

The fate of some native bird species during 1080 operations remain unstudied however. Kārearea / New Zealand falcons *Falco novaeseeladiae* are a species for which there are very few well designed, controlled studies investigating the effect of 1080 on survival of juvenile and adult birds (Veltman et al. 2014). Kārearea have large territories (9 km² in North Island pine forest, 15 km² in open country of the eastern South Island)(Heather and Robertson 2015) so it is expensive and difficult to achieve robust sample sizes for statistical analyses during most 1080 operations. As a result until recently there were no studies researching individual Kārearea survival or mortality (Veltman et al. 2014) during a 1080 operation. A PhD student, Chifuyu Horikoshi, is currently completing a thesis at Massey University examining Kārearea ecology, including survival during aerial 1080 operations.

Due to concerns regarding non-target mortality of Kārearea, Wenita Forest Products (WFP) requested that Parker Conservation investigate the survival of Kārearea during a 1080 possum control operation at Mount Allan in the 2016 winter. Previous avian surveys by Parker (2015) and Lawrence (2010 – 2014) have recorded Kārearea in the WFP area of Mt Allan. Lawrence found four nests in the area between 2010 – 2014; since two nests were found in a short amount of time in one of those years, at least two Kārearea territories existed in the area previously.

The specific aim of this work was to identify the presence of Kārearea before and after the aerial application of 1080 to the Wenita Forest Products area of Mount Allan.

Method

Kārearea are a medium sized endemic raptor with three distinct forms recognised since the late 1970s (Fox 1977). The three historically recognised regional forms are 'bush' in North Island and northwest South Island forests, 'eastern' in the open country of the eastern South Island, and 'southern' of Fiordland and the Auckland Islands (Heather and Robertson 2015). Recent research showed there is no genetic distinction between Kārearea throughout New Zealand, and that rather than three morphs, there are just two; the North and the South Island (Olley 2014). Kārearea are rare on Stewart Island and north of the northern Waikato (Seaton and Hyde 2013). Falcons are classed as *Threatened; Nationally Vulnerable (B: Moderate, stable population (unnatural))*, (*Data Poor, Stable*) by the New Zealand Department of Conservation (DOC) Threat Classification System (Robertson et al. 2012). This DOC threat classification includes Kārearea in the Rare, Threatened and

Endangered Species category of the Forest Stewardship Council (FSC), of which Wenita Forest Products are a member.

To locate Kārearea, comprehensive surveys of the Mt Allan area were conducted over four days prior to the aerial application of 1080. Kārearea readily respond to playback of pre-recorded calls or call-playback (Holland et al. (2014). Therefore, to systematically survey for Kārearea territories call-playbacks were broadcast via a loud speaker throughout as much of the Mount Allan WFP estate as could be surveyed in four days. The local topography was used to maximise the broadcast coverage of an area; for example, broadcasting playbacks from ridges and spurs rather than in valley bottoms. Broadcasting was stopped as soon as a Kārearea was sighted, or after 60 seconds of play, then observations were conducted for five minutes to detect Kārearea. A hand-held GPS unit (Garmin Map 62csx) with topographical mapping software was used to record all survey points and the locations of all Kārearea detected. The number, age and whether or not the birds appeared to be a pair was recorded for all Kārearea sightings.

As a result of a high volume of truck traffic from harvesting operations the survey did not include the southeastern area of WFP Mt Allan forest.

The date for the 1080 operation was not fixed, so to ensure pre-1080 surveys were completed prior to baiting commencing, initial surveys took place at the end of April and beginning of May.

Results

Four days of surveys were conducted April 28 and May 1-3 2016, 57 to 60 days prior to the aerial application of 1080. Kārearea calls were broadcast from 113 locations over the four day period. Six observations of eight Kārearea were made: two observations were of pairs of birds responding together, two were of single adults and the remaining two were separate observations of juvenile birds (Table 1; Figure 1).

On June 15 TB Free NZ applied pre-feed of 6 g RS5 cereal pellets at 1 kg per hectare. Two weeks later, on June 29, poison laced of 12 g RS5 cereal pellets with 0.5% sodium fluoroacetate were applied to the Mount Allan WFP estate.

The second and third surveys focused on revisiting areas where Kārearea were detected in the first survey. The second surveys for Kārearea were conducted July 15–16, 16 to 17 days after the 1080 application. Seven Kārearea were detected during the second survey, all observations being of single adult birds. We conducted one further day of survey August 11 2016, 43 days after the 1080 was applied to Mt Allan. Six separate observations of Kārearea were made in the single day of survey, all of adult birds.

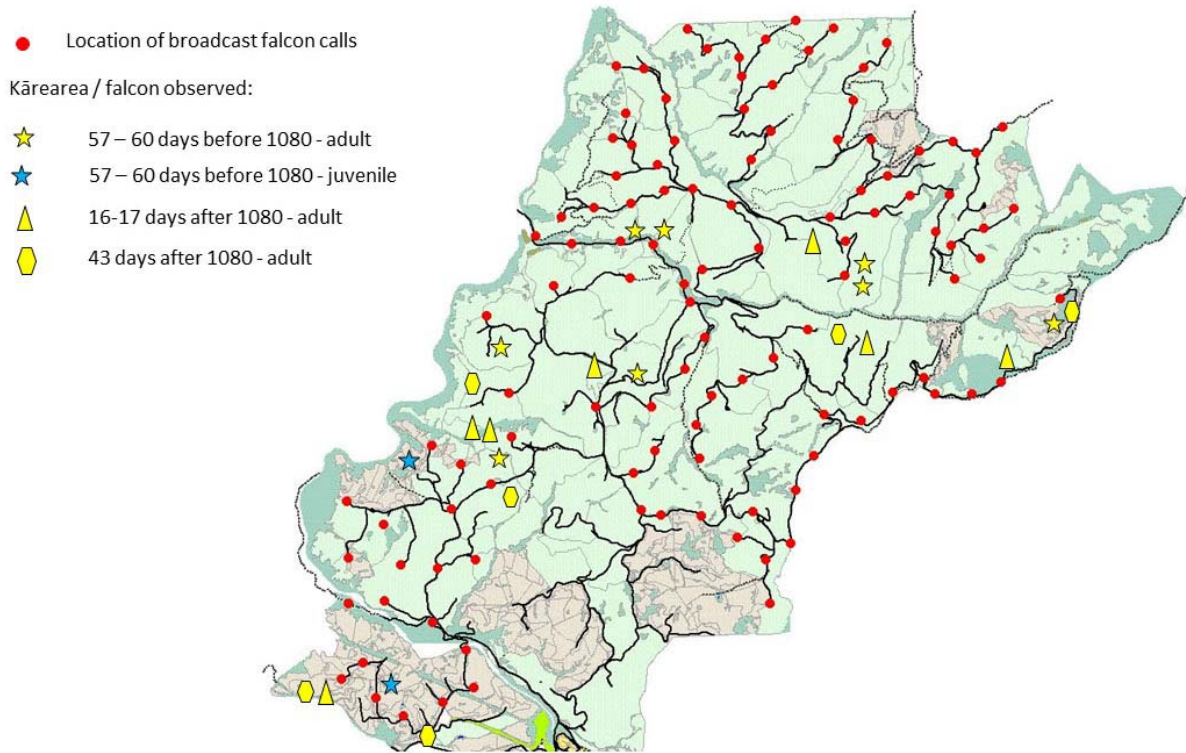


Figure 1. The Mt Allan area of Wenita Forestry Products estate surveyed for Kārearea / NZ falcons before and after the aerial application of sodium fluoroacetate / 1080

Table one. The number and age class of Kārearea recorded in surveys relative to the aerial application of 1080 to the Mt Allan area of Wenita Forestry Products estate in winter 2016

| Date | Survey relative to 1080 application | adult Kārearea | juvenile Kārearea |
|------------------------|-------------------------------------|----------------|-------------------|
| April 28 and May 1 – 3 | 57 – 60 days before | 8 | 2 |
| June 29 2016 | 1080 applied | - | - |
| July 15 – 16 | 16 – 17 days after | 7 | 0 |
| August 11 | 43 days after | 6 | 0 |

Discussion

The surveys reported here did not detect clear and obvious non-target mortality of Kārearea / NZ falcons in the Mount Allan aerial 1080 operation conducted in winter 2016.

It cannot be said with certainty that there was no mortality as a result of the 1080 poisoning since survival of individuals was not monitored. Establishing and monitoring a marked population of, and tracking individuals using vhf radio transmitters so that corpses can be retrieved and necropsied, are methods for monitoring individual survival used for many other native bird species during 1080 operations (Veltman et al. 2014). Another way to increase certainty would be to establish a control population to monitor concurrent with Kārearea monitored during a 1080 operation. Marked (leg banded) individuals, the use of vhf transmitters, monitoring of a control population, and a larger sample size would create a much clearer insight into the effect of 1080 on Kārearea. Studies

including these methods require considerable lead in time and funding because falcons can only be captured during the breeding season.

As Kārearea were not marked in this study, it is unclear how many individual birds we observed in surveys. But adult Kārearea were detected in the same general locations as before the 1080 was applied, 16 to 17 days after the 1080 operation. If there had been a significant amount of non-target mortality, these territories would have had to be filled by other adult Kārearea in a very short amount of time. This is considered not very likely since adult Kārearea are territorial year-round (Heather and Robertson 2015). Thus it would be surprising if there were multiple adult birds moving about widely and able to readily to fill territories that had become vacant due to 1080 associated mortality.

There is a lack of studies of Kārearea survival throughout 1080 operations. The first large scale study was conducted recently by Horikoshi et al. (2016) and has not yet been reported fully. A recent conference abstract however states that they radio-tracked 37 adult Kārearea during three winters (2012–2014) in Kaiangaroa conifer plantation in the central North Island. Kārearea survival was studied during 1080 operations and all birds survived (Horikoshi et al. 2016). Earlier work in the same forests by Seaton et al. (2009) studied falcons over a three year period throughout which 1080 was applied to the area. The breeding falcon population increased from 20 to 36 pairs during the study, and whilst the authors state that the increase may not be related to the use of 1080, they did not find any clear negative impact to Kārearea as a result of the application of 1080 (Seaton et al. 2009). Monitoring of territory occupancy by unmarked Kārearea did not find evidence of mortality during 1080 operations at Pureora Forest Park (Spurr & Powlesland 1997). However Veltman et al. (2014) cite a record from 2007 by J. Campbell (pers. comm.) of three falcons regularly observed before a 1080 operation as being absent after.

Unlike Australasian harrier hawks *Circus approximans*, Kārearea rarely feed on carrion (Fox 1977), and as a predator the primary prey of Kārearea is small birds (Seaton et al. 2008). Lawrence (2012) examined prey remains from falcon nests in conifer plantations in the coastal Otago area (Akatore, Mt Allan and Toko Mouth). The prey species, identified by Noel Hyde of Wingspan Birds of Prey Trust, showed that blackbirds were the main prey followed by thrushes and chaffinches (Lawrence 2012). Blackbirds and chaffinches, commonly found dead after 1080 operations, are not often tested for evidence of 1080 poisoning (Fairweather et al. 2013). While small birds can consume 1080 bait, and potentially provide a source of secondary poisoning, this is considered only a problem when bait is not sieved properly before application (Powlesland et al. 1999). Sieving is a standard procedure in contemporary 1080 operations (Veltman and Westbrooke 2011) so this route of secondary poisoning should not occur.

A three year study investigating the density of breeding pairs, nest survival, adult and juvenile survival and conservation threats is beginning in October 2016. The study will include the Mount Allan area, so further surveys will be conducted there and it will be interesting if adult birds are in the same general areas as was found in all three surveys conducted in this study. Adult and juveniles will be banded in the study starting this year (pending IWI and DOC permission), so that will give some retrospective insight into if adult Kārearea remain on their territories year around in the Mt Allan area, as the species is reported to do elsewhere. The upcoming study plans to use nest cameras on falcon nests also and it is possible mammalian predators will become more abundant over the course of the three year study, as the time from the 1080 operation increases.

In conclusion, no clear evidence that Kārearea mortality occurred during a 1080 operation in the Mt Allan area of the Wenita Forest Products estate was found. However, it cannot be said with certainty

that there was no mortality as a result of the 1080 poisoning since survival of individuals was not monitored. The age, location and number of Kārearea recorded in post-1080 surveys, in combination with results from other studies investigating survival during 1080 operations, provides a substantial amount of evidence that mortality was either very low, or non-existent. Further studies of individually marked Kārearea, fitted with tracking devices so that corpses can be retrieved and necropsied if mortality occurs, should be a priority in future studies of the effect of 1080 on Kārearea.

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