PARKER CONSERVATION

Research to inform the management of Kārearea / NZ falcon in Eastern Otago

Project Report (maps removed)

Field season one, summer 2016 /2017

Photo: Chifuyu Hawkesby

Graham Parker

August 15, 2017

Note: the version of this report made publicly available does not contain maps showing the location of breeding adult kārearea / NZ falcons. The species is still recorded as persecuted (shot) in New Zealand. Without knowing if persecution occurs in the area of this study we therefore consider it wise to not provide maps.

This report has been provided to:

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Executive Summary

The objective of this study is to better inform management of Kārearea / NZ falcon *Falco novaeseeladiae* in conifer plantations and adjacent conservation land in the greater South Island, and specifically in the coastal Otago area. The first field season of this project collected valuable information to better inform the conservation management of Kārearea in conifer plantations and surrounding conservation land in the greater Dunedin area.

This is the most comprehensive study to date researching Kārearea in plantation forests in the South Island and has already been successful in collecting data for six key objectives. A minimum sixteen pairs of breeding Kārearea were identified in conifer plantation and native forests surrounding a centre of farmland (the Taieri Plain) in an approximately 150,000 h area from the northwest to south of Dunedin. These records provide a baseline estimate of the breeding population to compare future population estimates to. Thirty Kārearea were captured and banded with metal and plastic leg bands. Twelve were breeding adults and the remaining 18 were juvenile birds. These banded individuals will enable survival rates to be estimated. Thirteen nests were located from 13 pairs and 24 chicks were produced. This data will be used in conjunction with data from field seasons two and three to estimate nest survival rates.

We will be working with forestry companies over the next two years to better understand the outcome of any conflict between breeding Kārearea and forestry operations, and if necessary, collaborate with all involved parties to develop practical methods to mitigate the impact of forestry operations on breeding Kārearea.

Introduction

Kārearea / the New Zealand falcon *Falco novaeseeladiae* has recently been re-classified by the New Zealand Department of Conservation (DOC) Threat Classification System (Robertson et al. 2017) as Recovering (A: 1000–5000 mature individuals or total area of occupancy ≤100 ha (1 km^2), and predicted increase >10%, Data Poor). Prior to this year, Kārearea were classed as Threatened; Nationally Vulnerable (B: Moderate, stable population (unnatural)), (Data Poor, Stable). Eastern Kārearea are a poorly studie taxa, therefore the basis for the change in threat classification is based on increased geographical distribution only.

In greater Dunedin Kārearea are known to occur in conifer plantations (e.g. those of Wenita Forestry Products and City Forests in coastal Otago) and also in the surrounding conservation estate. However, very little is known about Kārearea in the South Island generally, particularly in conifer plantation forests: no detailed research to inform management has been conducted in conifer plantation forests in the South Island.

Currently the guidelines for managing Kārearea in conifer plantations are based entirely on Central North Island conifer plantation forestry, where the habitat is distinct to that in the eastern South Island, and anecdotal evidence suggests Kārearea ecology and behaviours may also differ.

Importantly, the following information for conservation management of Kārearea in the greater Coastal Otago region, and South Island generally, is unknown:

1. **Population size and density**
2. **Population trends (conservation)**
3. **Breeding success / nest survival**
4. **Survival rates of adults and juveniles**
5. **Mitigation options based on site-specific information**

Due to the high threat classification status of the Kārearea, in 2016 Parker Conservation proposed to conduct a three year research project to establish important baseline information to address the five knowledge gaps listed above.

The objective of the study is to better inform management of Kārearea in conifer plantations and adjacent conservation land in the greater South Island, and specifically in the coastal Otago area. A specific objective of this research is to extend the depth of knowledge of managing Kārearea in conifer plantation forests beyond that currently used by DOC or the Forest Stewardship Council (FSC). The results of this work will also aid management of Kārearea generally, outside conifer plantation forests.

It is important to recognise the role of conifer plantation forestry as forest habitat in the greater Dunedin area. As is clear on the GIS map showing ground habitat categories (Fig.1), a significant portion of forested land area is plantation, far more than the conservation estate. In addition to providing habitat, plantation forests provide forest-bird dispersal corridors linking between forested native remnants that could otherwise be farmland.

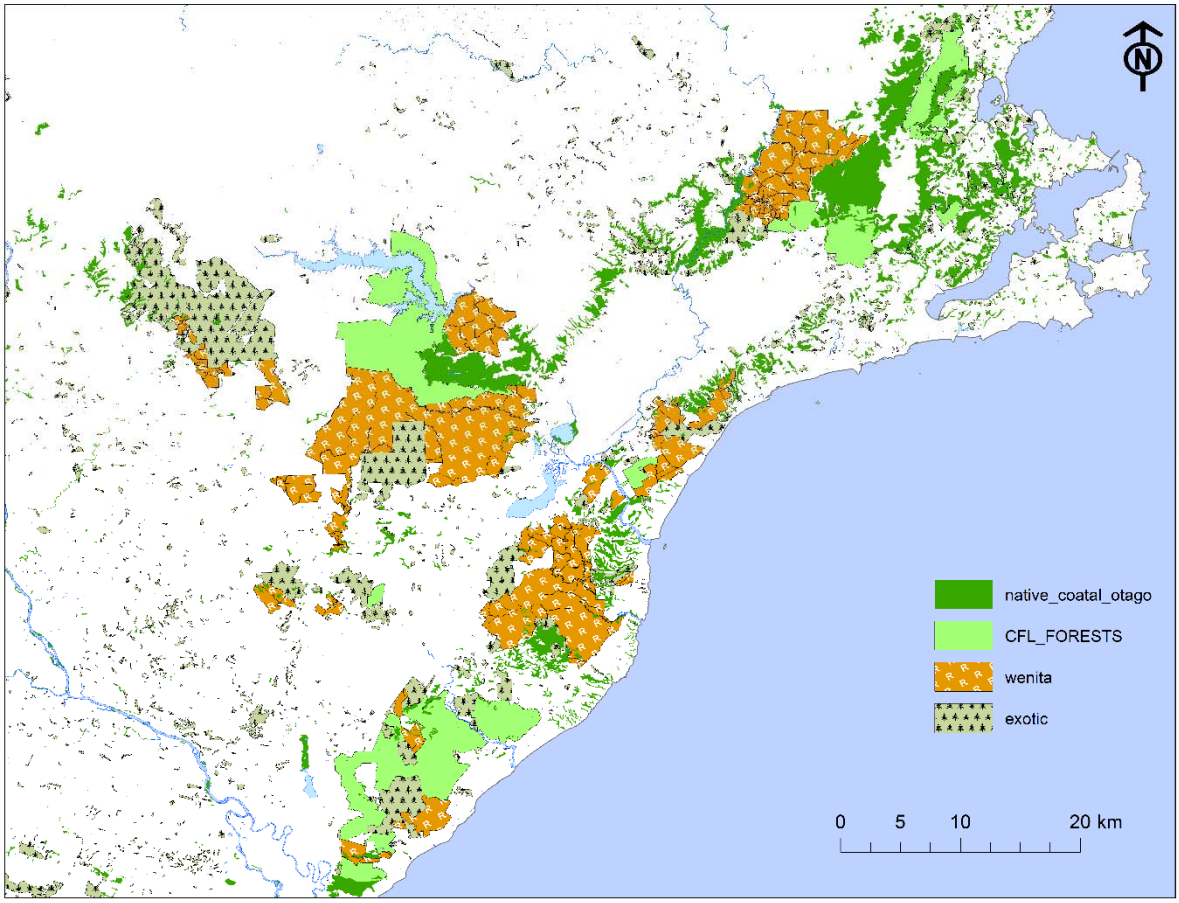

Figure one. Map showing conifer plantation land-cover (CFL, Wenita and exotic) in the greater Dunedin area compared to native vegetation.

Season one summary

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This short report summarises the results from the first breeding season.

Chifuyu Hawkesby was contracted to conduct the majority of the fieldwork in the first season. Chifuyu last year successfully completed a PhD at Massey University researching Kārearea in central North Island plantation forests, over five field seasons. The location of Chifuyu's PhD study was in the area where the current Kārearea management guidelines used by Forest Stewardship Council (FSC) are derived from, Kaiangaroa (Seaton 2007). Because the habitat, forest management, and possibly Kārearea behaviours are different in the South Island, it was of great value to have Chifuyu contribute to the first year of this project to identify any important differences.

The first field season of this project collected valuable information to better inform the conservation management of Kārearea in conifer plantations and surrounding conservation land in the greater Dunedin area. This is the first detailed study to research Kārearea in plantation forests in the South Island and was successful in collecting data for all six key objectives, discussed below.

1. Population size and density (in the greater Dunedin area)

Sixteen pairs of breeding Kārearea were identified in conifer plantation surrounding a centre of farmland (the Taieri Plain) and reserve land in native vegetation in an approximately 150,000 h area from the northwest to south of Dunedin (Fig. 1). A proportion of these breeding Kārearea were leg banded to allow individuals to be identified. A further four possible Kārearea territories were identified but breeding was not confirmed for birds occupying those areas in year one. Multiple pairs were nesting in more or less contiguous conifer plantation areas that form part of a landscape mosaic with areas of native forest and tussock vegetation, wetland, working farms and peri-urban lifestyle blocks on the far outskirts of Dunedin City. Kārearea have not previously been recorded using many of these areas. Areas of native vegetation were not surveyed thoroughly in year one but it is assumed that breeding Kārearea are holding territories in at least some of those areas and some of these areas will be surveyed next season.

An adult female Kārearea leg-banded whilst nesting at Hope Hill in January 2017 has been seen regularly in a recently clear-cut area adjacent to a lifestyle block in Abbottsford, approximately nine kilometres away from its' nesting site. The observers of the bird think it has been frequenting the area for the past one and a half years. Now that it is leg banded we can determine if the same bird does indeed keep visiting the same area.

2. Population trends

Surveys conducted in the past field season revealed a minimum of 16 breeding pairs within the boundaries of the study, with up to six pairs in one discrete plantation forestry area. A further six single adult falcons (four males and two females) were located and had territorries also but no mates were confirmed. These records provide a baseline estimate of the breeding population to compare future population estimates to. In the short term (from one year to the next) these observations allow insight into how static in a specific area territorial pairs are over the three breeding seasons of this study. The 2016/2017 breeding population estimate will be built upon in the 2017/ 2018 and 2018 /2019 breeding seasons, and likely reveal a larger breeding population than is currently mapped. This is because with some pairs already located greater effort can be put into surveying areas not yet thoroughly surveyed.

3. Breeding success / nest survival

Thirteen nests were located from 13 pairs and all were followed to determine the nest fate. Three further apparent nesting attempts were investigated, but no nests were found (see Objective 5). Mitigation options based on site specific information). Twenty four chicks were produced from the thirteen nests found. This data will be used in conjunction with data from field seasons two and three to estimate nest survival rates that account for the positive bias associated with 'apparent' nest survival (nests that fledge chicks are active for longer than nests that fail, so have a higher probability of being found by a researcher).

4. Survival rates of adults and juveniles

Thirty Kārearea were captured and banded with metal and plastic leg bands (Fig. 2). Twelve were breeding adults and the remaining 18 were juvenile birds. These banded individuals will enable

survival rates to be estimated for the adults, eventually. If sufficient repeated sightings of the juvenile birds are obtained this may potentially allow some insight into juvenile survival and dispersal from their natal territories. However due to emigration and likely a naturally high juvenile mortality rate, juvenile survival is much more difficult to estimate.

Figure two. An example of a leg-banded adult falcon at Berwick. In this example this male bird can be identified as left leg metal and right leg red, red (bands are read as the birds left leg first to the right leg second, and top band first then bottom band, M-RR).

5. Mitigation options based on site-specific information

Kārearea select recently clear-cut conifer plantation areas for nesting (Fig. 3). Because nests can be established before tree harvesting is completed in a given area, conflict between breeding Kārearea and forestry operations can occur. In the first year of this study, we received three reports of Kārearea from forestry harvesting companies (via the forestry company), describing behaviours conducive with Kārearea pairs defending nests. We investigated these three events as promptly as possible, but in the three occasions where this occurred it appeared that the continued timber harvesting activity disturbed the nesting birds sufficiently that the breeding attempt was abandoned. One of these pairs re-nested and abandoned a second nest whilst forestry operations occurred in close proximity. It is not yet clear if it is unusual to have three apparent nest failure events in a single season or if the rate is normal.

The Forest Steward Ship Council, of which both City Forests and Wenita are members, requires that forestry companies have management plans for 'rare, threatened and endangered (RTE)' species. The DOC Threat Classification (Robertson et al. 2013) until this year included Kārearea as an RTE species. The standard FSC management guidelines for Kārearea are that harvesting operations operate with a 200 m radius buffer centred on the nest.

A meeting with both forestry companies will be held after this report has been circulated. The purpose in part to discuss mitigation options and how to evaluate any developed in years two and three of the study.

Figure three. Example of conflict between forestry operations and Kārearea nesting attempt. The black arrow points to an excavator which is parked 15 m from a newly establish Kārearea nest that is located on the ground.

Engagement by others

Eighteen people volunteered their time towards this project during the first field season (Fig. 4). Almost all the volunteers helped with capturing Kārearea and observed leg banding and taking measurements from the birds. Importantly, nine volunteers were directly from the plantation forestry industry, including senior managers, field staff and individuals from companies that are contracted for forestry harvesting, some bringing young family members with them. Other volunteers included four University of Otago students and five members of the Dunedin Branch of Birds NZ. This level of community engagement is an important part of this project.

Figure four. Some of the volunteers who contributed their time to assisting with Kārearea capture and leg-banding in the 2016 / 2017 summer.

Looking ahead to field seasons two and three

1080

In the immediate future it is important to note that Ospri / TB Free NZ will be conducting a 1080 operation in the Silverstream area. It was communicated to Ospri in 2016 that this study would likely have leg-banded adult and juvenile Kārearea in the adjacent catchment to the area 1080 will be applied in 2017. Some of these banded Kārearea would undoubtedly also be hunting in the adjacent native forest, so are potentially good candidates for further investigating the potential occurrence or not of non-target mortality of Kārearea in 1080 operations. There are five banded adult Kārearea that nested close to the proposed baited area and would be expected to over-winter on those territories (Fig. 5). In addition eight Kārearea chicks were banded in the area last summer and some of those will likely stay in the area through the early winter (the baiting period). Last winter 1080 was applied to the Mt Allan conifer plantation area and Wenita Forestry Products funded pre- and post- 1080 surveys of non-leg-banded Kāreraea at Mt Allan. The surveys found no clear evidence of non-target mortality of the species (Parker 2016). But as the birds were not individually marked (banded) the scientific inference is weak. Ospri have stated they would not contribute any funding to support pre- and post- 1080 surveys of leg-banded Kārearea in the 2017 1080 operation.

Electrocution

Electrocution is a significant issue for Kārearea, with many records of it occurring (Gray et al. 2017). Delta, the company that manages the electricity network in the area of this study, have formed a partnership with DOC to better understand, and mitigate, the threat of electrocution to Kārearea. On the advice of Bruce McKinlay (DOC) the author has contacted DOC (Chris Hankin) multiple times

seeking further information and offering this project as an opportunity to address management questions and to date has had no response. Further efforts will be made to contact DOC as this study provides an excellent opportunity to gain insight into the occurrence of electrocution in Kārearea.

Funding

Funding for each of the next two field seasons is currently at $20,000. This consists of the base funding committed by City Forests Ltd, Wenita Forest Products and the Otago Regional Council. Encouragingly it is clear that more can be done with less next season now that baseline information is established, gear specific to the project has been purchased and we know roughly what to expect for fuel costs. But at least for some of the field season it would be ideal to raise further funding to enable a slightly longer field season, remuneration for planning and reporting work and to hire a field assistant to work with the main field biologist for at least a proportion of the field season. Funding applications are currently being completed and we welcome any suggestions for possible contributions.

The majority of funds in the first season was used to contract Chifuyu Hawkesby to conduct fieldwork. Remaining funds were used to purchase fuel, equipment and pay Graham for a proportion of his time contributed to the project.

Aims for the 2017-18 and 2018-19 field season

Five objectives:

1. **Population size and density**

All pairs located in 2016-17 will be surveyed for and if found followed through a second breeding season. In addition it is planned to both expand the area surveyed in the plantation area and include native habitat (tussock and forests). Results from surveys will allow a second season estimate of the size of the breeding population throughout the City Forests and Wenita estate, which builds on the work from the first year.

2. **Population trends**

Surveys of breeding pairs identified in 2016-17, and all banded individuals, will be conducted. Territorial adults are assumed to remain on breeding territories. Juveniles are assumed to suffer high levels of mortality during the winter. The dispersal behaviours of juveniles away from the natal territory is not known but we hope to encounter at least some of the 18 leg-banded juveniles.

3. **Breeding success / nest survival**

As many nests as possible will be located and followed through to completion (either chicks fledging or failure) to estimate nest survival rates. Cameras will be used on active nests to identify the occurrence of mammalian predators at nests. For nests that fledge chicks successfully the chicks will be monitored after fledging until it is clear they are likely to survive and become independent.

Emphasis will be placed on attending reports of Kārearea conflict with harvesting crews as soon as possible after activity is noted.

4. **Survival rates of adults and juveniles**

Banded adults and juveniles will be surveyed for. As many new adults and chicks will be captured and banded to increase the size of the banded population.

5. **Mitigation options based on site-specific information**

Cameras will be used to determine the level of impact introduced mammalian predators may have on nesting success. Forestry harvesting contractors will be urged to contact the respective forest company as soon as possible after Kārearea are observed displaying behaviours indicative of nesting.

Acknowledgements

Ross Chambers, Peter Oliver (City Forest) and James McEwan (Wenita) supported the concept of this project and coordinated various aspects throughout the planning and implementation. Birds NZ, City Forests Ltd, Dunedin City Council, Otago Regional Council and Wenita Forest Products funded this work. The detailed observations and records made by Ross Chambers of City Forests over many years provided information that simply is not available anywhere else and provided a sound basis with which to propose and implement a study like this one. The work reported here could not have been achieved without the huge efforts of numerous volunteers who freely gave their time. I am extremely grateful to the following people for their valuable contribution to fieldwork over the past season; Bryony Alden, Fran Cunninghame, Marcia Dale , Rowena East, Brendan Flack, Georgia-Rae Flack, Serra Kilduff, Bruce McDowell, Claudia Mischler, Mike Mullan, James McEwan, Peter Oliver, Sam Thomas, Abbi Virens and Ken, Katy, Paula, Craig and Billy. GIS information of the forest areas were kindly provided by Ian Young (Wenita) and John McMecking (City Forests).

References

Parker G.C. 2016. Kārearea / New Zealand falcon *Falco novaeseelandiae* surveys before and after aerial application of 1080 (sodium fluoroacetate) in the Mt Allan conifer plantation area. Report to Wenita Forestry Products. Parker Conservation, Dunedin.

Robertson, H.A; Baird, K.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; McArthur, N.; O'Donnell, C.F.J.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2017**.** Conservation status of New Zealand birds, 2016**.** *New Zealand Threat Classification Series 19. Wellington, Department of Conservation. 27*p.

Seaton, R. 2007. The ecological requirements of the New Zealand falcon (*Falco novaeseelandiae*) in plantation forestry. Unpublished PhD thesis, Massey University, Palmerston North.

Waite, E. 2017. Causes of mortality for kārearea / New Zealand falcon (*Falco novaeseelandiae*) in the Whakaitipu District. Notornis 64: 21 - 24