

Tawaki / Fiordland Crested Penguin Conservation Management;
Predator control - Stage one.

Report on year 1 progress.

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Introduction

The Fiordland crested penguin, (tawaki, *Eudyptes pachyrhynchus*) is an endemic species that breeds from Bruce Bay south, through much of Fiordland and around parts of Stewart Island (Mattern 2013). It is one of the least known and one of the rarest of all the penguin species. In the New Zealand Threat Classification System Tawaki are classified as nationally endangered (<http://www.doc.govt.nz/nature/valuing-nature/threatened-species-categories/threatened-birds/>) due to an apparent annual population decline between 2.7 and 7% (DOC 2012). The 2012 IUCN red list classifies the species as vulnerable.

It has been assumed that introduced predators pose a significant threat to the penguins and a priority action of both the past and present DOC recovery strategies was, and remains, to determine the effects of predators on their breeding success (DOC 2012). However, the remote and challenging terrain in which they breed and their perceived nervous disposition have hampered efforts to determine which, if any predators impact on tawaki. Without this knowledge predator control may prove to be unnecessary, directed at the wrong predators or at an ineffective level of predator control.

Effective control of land-based threats to Fiordland crested penguins requires knowledge of which predators, or nest disturbers, cause breeding failure and/or mortality of the penguins. Motion activated cameras offer a cost effective method to obtain such information that minimises disturbance to the birds. The cameras can be focused on nests and require researchers to only visit the nest sites at 7-10 day intervals to change the batteries and memory cards. The cameras record activities 24 hours a day, and some modern cameras use a black flash so neither penguins nor predators are aware of them.

Fiordland crested penguins are winter breeders. At Jackson Head near the northern breeding range of the species, eggs are laid late July to mid-August, chicks hatch in September and fledge mid to late November (Warham 1974, Mattern 2013). Those breeding further south lay up to a month earlier (McLean 2000). As with other penguins in the genus *Eudyptes* two eggs are laid but only one chick is normally reared (Warham 1974, McLean 2000).

In this project we will use motion activated cameras to determine which species visit Fiordland crested penguin nests, the response of the penguins to nest visitors and any impact nest visitors have on penguin breeding success or mortality. The information obtained will allow us to recommend research required to quantify predator impact and/or advise on or implement predator management.



Their nesting habitat makes research on Fiordland crested penguins somewhat challenging.

Project outcomes and objectives

This project uses photo/video monitoring to determine what if anything should be done to manage predators around Fiordland crested penguin colonies.

If predators are found to be an issue then the West Coast Penguin Trust (WCPT) can swing into action and implement appropriate predator control, aimed at the correct species and develop predator control strategies.

If predators are found to not be an issue then resources that could otherwise have been wasted on predator control for tawaki can be used effectively elsewhere.

In the past predator control for tawaki and other species has often been unnecessarily expensive and aimed at the wrong species. This work will ensure the appropriate species is targeted thus saving money in the longer term

Methods

We deployed 10 Little Acorn Trail Cameras at the Jackson Head West Fiordland crested penguin colony and eight of these cameras in the Gorge River penguin colony. The Jackson Head cameras were set up by Reuben Lane, Paul Elwell-Sutton and Kerry-Jayne Wilson of the WCPT and most battery and card changes made by Thomas Mattern and Popi Garcia-Borboroglu who were undertaking a related study at the same site (Mattern and Ellenberg 2015). The Gorge River cameras were set up and managed by Robin Long and Catherine Stewart who are residents at Gorge River. These cameras were spread along a 1km section of the tawaki colony which starts about 300m south of Gorge River and extends for several kilometres to Longridge Point.

The Little Acorn Trail Cameras can be set to take stills and/or videos and set to record for all of or just part of the day. These cameras employ a black light flash which causes minimal if any disturbance to nesting birds or visiting mammals.

As with any field study using technology with a little studied species in difficult terrain, teething problems were inevitable. Fiordland crested penguins breed in winter, the major funding for this project was announced in July, then with the inevitable delay in obtaining the money and ordering equipment we were unable to begin fieldwork until 25 August, by which time eggs had already been laid (Warham 1974). Thus the 2014 breeding season was to some extent a pilot season to perfect techniques and identify logistical and equipment issues. At Gorge River two cameras were first deployed on 14 August 2014 and the remaining six on 17 September 2014.

At Jackson Head cameras were deployed in a variety of habitats from dense kiekie tangles to relatively open habitats, and a varying distance from the focus nest. Where possible nests in caves, under overhangs or beneath tree roots were chosen and the cameras were focused on the approach paths to the nests. Cameras so positioned were not triggered every time a nesting penguin moved, thus prolonging battery and memory card life and resulting in fewer images to analyse.

These cameras can be set to take between one and three still photos, or up to five minutes of video, with choice of lag intervals between trigger times, sensitivity and other parameters.

At Jackson Head cameras were programmed to take one still followed by 30 seconds of video. Some cameras were initially set for 60 seconds of video but this was too demanding on battery life and

card memory. At Gorge River cameras initially recorded 30 seconds of video but were later changed to record 60 seconds videos, all with no still images



Thomas Mattern changing the batteries and memory card in one of the motion activated cameras.
Jackson Head, September 2014.

At most nests the 16GB memory cards used still had memory available when changed after seven days. However, at Jackson Head, memory cards in one camera that was trained on the approach path to two adjacent nests, where the penguins habitually preened and displayed in front of the camera, filled up in less than a week. At another nest, the memory card filled up in less than a week due to windblown vegetation repeatedly triggering the camera. At Gorge River it was impossible to train the cameras on approach paths as predators could approach from all directions. Gorge River memory cards filled up in less than a week on a few occasions as they were constantly triggered by penguin movement on the nest.

Results

At the time of writing not all images have been analysed, thus these results are preliminary. Table 1 shows the results from the cameras at Jackson Head West for those images viewed up 29 April 2015. Analysis of the remaining images continues. Brushtailed possums (*Trichosurus vulpecula*) were the introduced mammal that most often visited Fiordland penguin nests, with a total of 81 nest visits recorded so far (Table 1). At two nests, only a single possum visit has been recorded whereas at nest 5, 19 possum incidents have been recorded from the 283 images viewed so far (2439 images from this nest remain to be analysed). At nest 6 possums were recorded on 32 occasions. First impressions suggest that the frequency of possum incidents correlate with habitat type and an analysis of this will be undertaken once all images have been viewed.

At Jackson Head West rats (*Rattus* sp) and stoats (*Mustela erminea*) were recorded on only three and one occasion respectively. The camera firmware has been designed so that there is a delay of 3-5 seconds between taking the still and the following video, and the placement of some cameras at least 5m from nests may have resulted in under reporting of the frequency in which small mammals are present. These issues will be addressed in the 2015 season.

During most of these mammal visits the animal involved merely passed by the penguin nest, in only a few incidents did the mammal actually enter the nest site. A more detailed analysis of the behaviour of the visiting mammal will be made once analysis of the 2014 data is complete.

Of the four Gorge River cameras where image analysis is complete, possums visited three and stoats two of the focus nests. One of these nests (GR17) was visited by a possum on 16 occasions; the others had only two possum visits. The possums did not appear interested in the nest and during only one of these incidents did the penguins appear concerned by the proximity of the possum. Nest GR17 was visited by a stoat on 10 occasions and nest GR13 once. One or both adult penguins were present during most stoat visits but they paid little attention to the stoat even though it came within a few centimetres of the nest. If another penguin walked this close to the nest it would be chased away but stoats did not appear to be perceived as threats. At Jackson Head no penguin appeared concerned by the proximity of possums, rats or stoats. No mammal incident recorded so far resulted in predation of a penguin chick, egg or adult.



Fiordland crested penguins appear unconcerned by a possum close to their nest which is in the crevice behind and to the left of the penguins.

Camera	Date range	No images	Visits by possums*	Visits by stoats	Visits by rats
1	25 Aug – 28 Oct 2014	Total 4087 Viewed 4087	5	0	0
2	25 Aug – 2 Nov 2014	Total 1490 Viewed 348	9	0	3
3	25 Aug – 5 Nov 2014	Total 3589 Viewed 662	1	0	0
4	25 Aug – 24 Oct 2014	Total 4178 Viewed 244	4	0	0
5	25 Aug – ?? Nov 2014	Total 2722 Viewed 283	19	0	0
6	14 Sept - 16 Nov 2014	Total 2553 Viewed 2553	32	0	0
7	16 Sept – 3 Nov 2014	Total 2886 Viewed 2886	1	0	0
8	16 Sept – 27 Oct 2014	Total 1708 Viewed 1708	8	0	0
9	17 Sept – 28 Oct 2014	Total 3889 Viewed nil	-	-	-
10	17 Sept – 14 Nov 2014	Total 2570 Viewed 2570	4	1	0

Table 1. Preliminary results from the 10 cameras installed at the Jackson Head West, Fiordland crested penguin colony. Column 3 lists the total number of images taken by each camera, half are stills and half video, and the number viewed as at 29 April 2015.

*An animal which appears on a still image as well as the video that immediately follows counts, as a single visit.

The date function failed during the last deployment for Camera 5.



Discussion

The true conservation status of the Fiordland crested penguin, let alone the threats it faces remain uncertain. There has never been a comprehensive survey of their abundance with most information coming from a series of surveys overseen by Ian McLean in the 1990's (McLean and Russ 1991, McLean et al 1993, 1997, Russ et al 1993, Studholme et al 1994). These surveys were severely limited by the time available, and where and for how long it was possible to get observers ashore. Mattern (2013) suggested that the 2,500-3,000 pairs estimated based on the McLean surveys is an under estimate of the real population. Anecdotal evidence suggests those South Westland colonies close to settlements and those frequently visited by tourists, have declined in numbers. However, a recent survey of the coast between Cascade River and Martins Bay found a minimum of 870 breeding pairs and it was estimated that there could be up to 1000 pairs along this coast (Long 2014), many more than that estimated by McLean et al (1997) and about a third of the previously total estimated population in just a small fraction of their range (DOC 2012, Mattern 2013). Whether this unexpectedly high count is a result of more intensive surveying, an increase in penguin populations locally, or due to a redistribution as penguins abandon colonies more accessible to people and relocate to this remote area is unknown.

Although we recorded numerous nest site visits by possums, plus a few by stoats and rats we found no evidence that any of these introduced mammals preyed on penguins, their eggs or their chicks. All but one of the nests monitored appeared to successfully fledge chicks and there was no evidence to suggest that the chick death, recorded at one of the Gorge River nests, was caused by an introduced mammal. As the Fiordland crested penguin chicks are mobile once the guard stage is over and come and go from their nest, we cannot be certain that no chick mortality occurred, or had any deaths occurred if they were a result of predation. Red deer (*Cervus elaphus*) are also present in the study sites, but none were recorded at penguin nests.



The penguins remain unconcerned even when a possum enters the nest site.

As most of the money for this study was not approved until after breeding season began monitoring could not begin until mid-way through incubation. Thus had any early predation events occurred they would not have been recorded. Penguins are also vulnerable during the moult which happens between December and February (Mattern 2013). No moulting birds were monitored at Jackson Head but cameras were trained on moulting penguins at Gorge River. The Gorge River moult period videos have not as yet been analysed.

In 2015 we plan to install the cameras at the start of egg-laying and continue until chicks fledge or until chicks leave their nest to form crèches. Where possible crèches will be monitored although this was not feasible in 2014 as crèching chicks would seldom remain in the camera's field of view. We intend to monitor adults during their post-breeding moult; although in 2015 it appears that almost no Fiordland crested penguins moulted at Jackson Head, whereas many birds did return to the Gorge River colony to moult.

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